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3 **The 2019 Methane Budget And Uncertainties At 1 Degree Resolution And Each Country**  
4 **Through Bayesian Integration Of GOSAT Total Column Methane Data And A Priori**  
5 **Inventory Estimates**  
6

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19

20 **Abstract:** We use Optimal Estimation (OE) to quantify methane fluxes based on total column  
21 CH<sub>4</sub> data from the Greenhouse Gases Observing Satellite (GOSAT) and the GEOS-Chem global  
22 chemistry transport model. We then project these fluxes to emissions by sector at 1 degree  
23 resolution and then to each country using a new Bayesian algorithm that accounts for prior and  
24 posterior uncertainties in the methane emissions. These estimates are intended as a pilot dataset  
25 for the Global Stock Take in support of the Paris Agreement. However, differences between the  
26 emissions reported here and widely-used bottom-up inventories should be used as a starting point  
27 for further research because of potential systematic errors of these satellite based emissions  
28 estimates. We find that agricultural and waste emissions are ~263 +/- 24 Tg CH<sub>4</sub>/yr,  
29 anthropogenic fossil emissions are 82 +/- 12 Tg CH<sub>4</sub>/yr, and natural wetland/aquatic emissions  
30 are 180 +/- 10 Tg CH<sub>4</sub>/yr. These estimates are consistent with previous inversions based on  
31 GOSAT data and the GEOS-Chem model. In addition, anthropogenic fossil estimates are

32 consistent with those reported to the United Nations Framework Convention on Climate Change  
33 [80.4 Tg CH<sub>4</sub>/yr for 2019]. Alternative priors can be easily tested with our new Bayesian  
34 approach (also known as prior swapping) to determine their impact on posterior emissions  
35 estimates. We use this approach by swapping to priors that include much larger aquatic emissions  
36 and fossil emissions (based on isotopic evidence) and find little impact on our posterior fluxes.  
37 This indicates that these alternative inventories are inconsistent with our remote-sensing  
38 estimates and also that the posteriors reported here are due to the observing and flux inversion  
39 system and not uncertainties in the prior inventories. We find that total emissions for  
40 approximately 57 countries can be resolved with this observing system based on the degrees-of-  
41 freedom for signal metric (DOFS > 1.0) that can be calculated with our Bayesian flux estimation  
42 approach. Below DOFS of 0.5, estimates for a countries total emissions are more weighted to our  
43 choice of prior inventories. The top five emitting countries (Brazil, China, India, Russia, USA)  
44 emit about half of the global anthropogenic budget, similar to our choice of prior emissions but  
45 with the posterior emissions shifted towards the agricultural sector and less towards fossil  
46 emissions, consistent with our global posterior results. Our results suggest remote sensing based  
47 estimates of methane emissions can be substantially different (although within uncertainty) than  
48 bottom-up inventories, isotopic evidence, or estimates based on sparse in situ data, indicating a  
49 need for further studies reconciling these different approaches for quantifying the methane  
50 budget. Higher resolution fluxes calculated from upcoming satellite or aircraft data such as the  
51 Tropospheric Monitoring Instrument (TROPOMI) and those in formulation such as the  
52 Copernicus CO<sub>2</sub>M, MethaneSat, or Carbon Mapper can be incorporated in our Bayesian  
53 estimation framework for the purpose of reducing uncertainty and improving the spatial  
54 resolution and sectoral attribution of subsequent methane emissions estimates.  
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## 1.0 Introduction

### 1.1 Atmospheric Methane Background

Atmospheric methane (CH<sub>4</sub>) is the second most important anthropogenic greenhouse gas behind carbon dioxide (CO<sub>2</sub>) and a contributor to poor surface air quality as it is an ozone precursor. Atmospheric methane has increased by nearly a factor 3 over its pre-industrial values largely due to anthropogenic emissions (e.g. Dlugokencky *et al.* 2011; Ciais *et al.* 2013, and refs therein). Over the last two decades, methane has been increasing but for reasons that are still being assessed, although recent studies provide evidence that it is due to a combination of fossil and agricultural emissions with some role due to variations in the atmospheric sink of methane (e.g. Schaefer *et al.* 2016; Worden *et al.* 2017; Turner *et al.* 2019; Zhang *et al.* 2021). However, it is unclear which regions and which sectors are the cause of changes in atmospheric methane over the last twenty years because of substantial uncertainties in all components of the methane budget (Kirchke *et al.* 2013, Janssens *et al.* 2019; Sanuois *et al.* 2020) from the global (Table 1) to local scale (Section 2). Methane has a relatively short lifetime of approximately 9 years making it an attractive target for emissions reduction as a decline in emissions will have a rapid impact on net radiative forcing and corresponding atmospheric heating (e.g. Shindell *et al.* 2009;

Sector	Prior (Tg CH <sub>4</sub> /yr)	Posterior (Tg CH <sub>4</sub> /yr)
Wetlands / Aquatic	199.8+/-52.8	179.8+/-10.0
Seeps	32.0+/-6.2	22.5+/-3.8
Livestock	87.6+/-17.2	146.1 +/-10.3
Rice	36.9+/-12.9	67.6 +/-6.8
Fires	15.1+/-2.5	13.3+/-2.2
Waste	57.7+/-11.9	49.6+/-7.1
Oil	41.6+/-9.7	28.8 +/-4.7
Gas	24.5+/-4.7	28.0 +/-3.6
Coal	31.4+/-9.8	25.3 +/-3.9
Total	526+/-128	561 +/-52

Table 1: Prior emissions and uncertainties are generated from various inventories or models (Section 2.3). Posterior emissions represent projection of satellite based fluxes back to emissions while accounting for the prior emissions distribution and covariances (Section 2.2). We conservatively assume uncertainties are 100% correlated so that the total reported prior and posterior uncertainties are the sum of the individual uncertainties.

100 Ganeson *et al.* 2019; Turner *et al.* 2019). Hence there is significant interest in accurately  
101 quantifying methane emissions for identifying those emissions that can be efficiently reduced.

102

### 103 ***1.2 Global Stock Take***

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105 As part of the effort to reduce methane emissions and corresponding risk related to  
106 changes in climate, the Paris Agreement resulted in a framework by which countries provide an  
107 accounting of their emissions. A “Global Stock Take” (GST) to track progress in emission  
108 reductions is conducted at five-year intervals, beginning 2023. To support the first GST, Parties  
109 to the Paris Agreement are compiling inventories of GHG emissions and removals to inform  
110 their progress. Inventories are generally estimated using “bottom-up” approaches, in which  
111 emission estimates are generally based on activity data and emission factors. These bottom-up  
112 methods can provide precise and accurate emission estimates when the activity data are well  
113 quantified and emission factors are well understood. However, substantial uncertainties exist for  
114 emissions in many parts of the globe where these measurements are not rigorously made or  
115 tested across multiple sites. Even regions and emissions that are thought to be well measured can  
116 have significant differences between independent assessments and official reports; for example,  
117 Alvarez *et al.* (2018) demonstrates that 2015 oil and gas emissions are under estimated by the  
118 United States Environmental Protection Agency by about 60%. These differences, if they are  
119 representative for emissions across the globe indicate a need for an independent assessment of  
120 emissions and their uncertainties to better evaluate if reported changes in emissions are in fact  
121 occurring or if changes in the natural carbon cycle through wetlands and the methane sink are  
122 substantively affecting atmospheric methane burden. Top down estimates of methane emissions  
123 using atmospheric measurements provide an independent way of testing these inventories as  
124 observed methane concentrations are compared against expected concentrations that result from  
125 reported inventories. The objective of this paper is to demonstrate the use of satellite  
126 observations for testing and updating emissions by sector for use with the Global Stock Take.  
127 While these top-down atmospheric methane budgets cannot replace the detailed activity reports  
128 used to generate bottom-up inventories, they can be combined with those bottom-up products to  
129 produce a more complete and transparent assessment of progress toward greenhouse gas  
130 emission reduction targets. They can also help determine if the natural part of the methane  
131 budget is becoming a strong component of atmospheric methane increases. As discussed next, an

132 important component of this assessment is the evaluation of uncertainties from both bottom-up  
133 inventories and in top-down approaches.

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### 136 ***1.3 Overview of Bottom-Up Emissions And Uncertainties***

137  
138 Bottom-up uncertainties are calculated for the methane budget by comparison between  
139 independent methods or sources, evaluating multiple estimates from a single source, comparison  
140 between models and remote sensing data, and expert opinion. For example, Sauniois *et al.*  
141 (2020) uses a range of results from different studies to quantify uncertainty in the different  
142 sectors of the methane budget. However, these uncertainties are likely underestimated as they  
143 suggest that total anthropogenic agricultural emissions, for example, are known to 10% or  
144 better, whereas comparisons between different global inventories (e.g., Janssens-Maenhout *et al.*  
145 2019) suggest a much larger range of estimates for the global totals (e.g., 129 to 219 Tg CH<sub>4</sub>/yr  
146 for agriculture, and 129 to 164 Tg CH<sub>4</sub>/yr for fossil emissions). Uncertainties in national or  
147 regional total emissions are even more challenging to estimate such that expert opinion is used:  
148 Janssens-Maenhout *et al.* (2019) suggests that Annex 1 (developed) countries have  
149 approximately 15% uncertainty in reported fossil emissions whereas Annex 2 countries have  
150 ~30% uncertainties, essentially asserting that less informed inventories have double the  
151 uncertainty of better informed emissions. Wetland emissions, which comprise ~30-45 % of the  
152 methane budget also show significant differences of up to 40% across wetland models (e.g.  
153 Melton *et al.* 2013; Poulter *et al.* 2017, Ma *et al.* 2021), depending on region. An example of  
154 how these uncertainties are projected to the total methane budget for each of the main sectors is  
155 presented in Table 1 using the prior emissions and their uncertainties for the analysis discussed  
156 in this paper (Section 2.3).

157 However, recent studies challenge even these estimates of emission uncertainties;  
158 emissions for lakes and rivers could be as large or larger than wetlands, with correspondingly  
159 larger uncertainties of 50% or more (Sauniois *et al.* 2020; Rosentreter *et al.* 2021). Primarily  
160 because of this extra term from lakes and rivers, the total budget from bottom-up inventories  
161 discussed in Sauniois *et al.* (2020) ranges from 583 – 861 Tg CH<sub>4</sub>/yr. Contrasting with this much  
162 larger than expected biogenic source is isotopic evidence that suggests fossil emissions are also  
163 much larger than expected, 160 +/- 40 Tg CH<sub>4</sub>/yr (Schweitzke *et al.* 2017). These larger than

164 expected values from aquatic and fossil sources are challenging to reconcile with existing bottom  
165 up estimates and with global estimates from the top down which are primarily constrained by the  
166 methane sink. For example, the methane sink must approximately balance total methane  
167 emissions, leading to total emissions of 560 +/- 60 Tg CH<sub>4</sub>/yr (e.g., Prather *et al.* 2012).  
168 Consequently much larger values in either aquatic emissions or fossil emissions must be  
169 balanced by much lower emissions in other sectors indicating that either our knowledge of the  
170 processes controlling different components of the methane sink are fundamentally wrong or one  
171 or both of these inflated emissions is incorrect, that is, well outside calculated uncertainties.

172

### 173 *1.4 Use of Remote Sensing For Quantifying Emissions and Uncertainties*

174

175 Top-down approaches using in situ or remote sensing measurements of atmospheric  
176 methane can be used to evaluate and update bottom-up emissions (or inventories) by first  
177 projecting bottom up emissions through a chemical transport model to atmospheric  
178 concentrations and then comparing these modeled concentrations to observations (e.g.

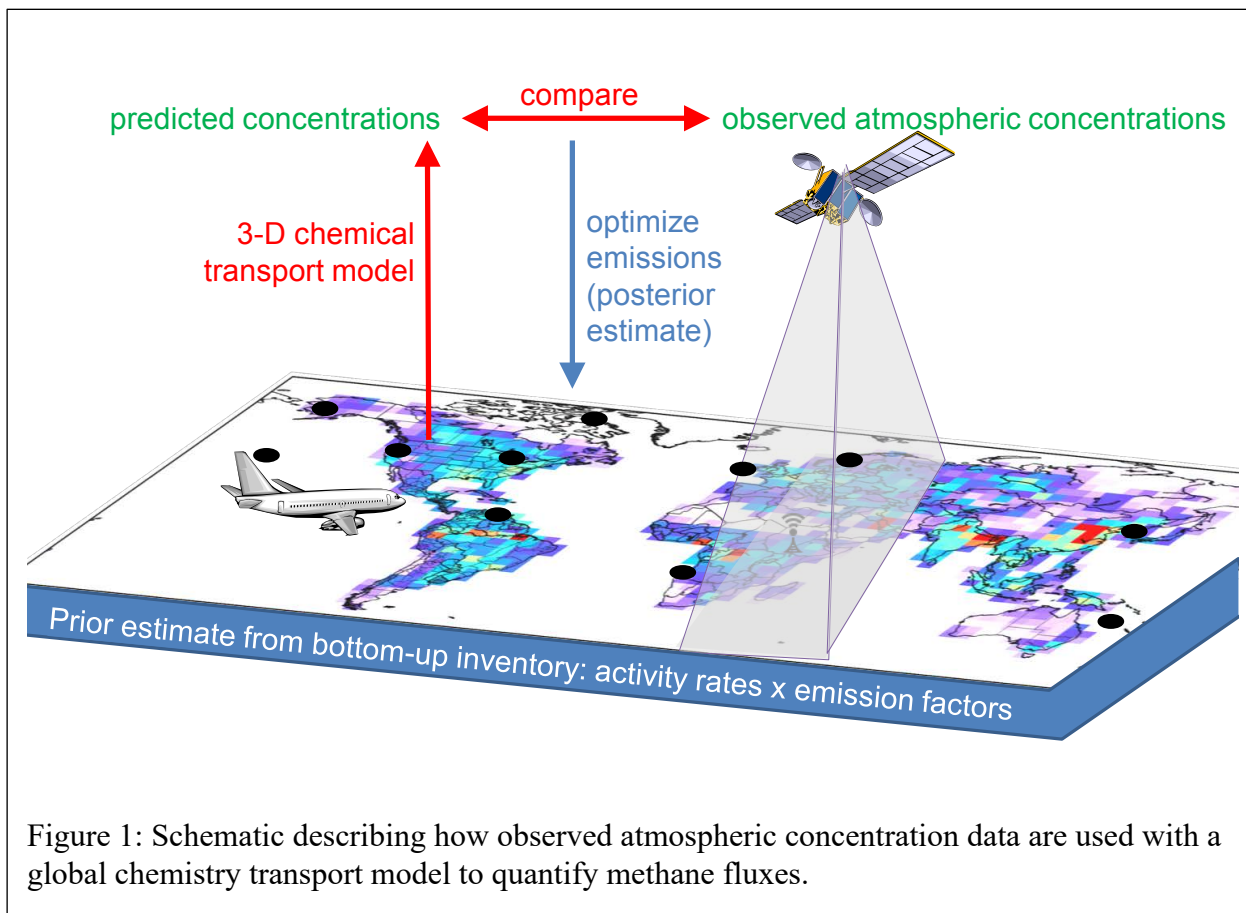


Figure 1: Schematic describing how observed atmospheric concentration data are used with a global chemistry transport model to quantify methane fluxes.

179 Frankenberg *et al.* 2005; Bergamaschi *et al.* 2013, Qu *et al.* 2021 and refs therein). An inverse  
180 method is utilized to update the net flux (or total emissions and surface sinks) within a chosen  
181 grid scale based on the mismatch between modeled and observed concentrations (Figure 1).  
182 When the top-down quantified flux can be uniquely associated with a single source, these tests of  
183 bottom-up inventories provide information about biases in the reported emission (e.g, Duren *et*  
184 *al.* 2019, Varon *et al.* 2019, Pandey *et al.* 2019) which can be used to either update the emissions  
185 or provide evidence that additional research is needed to improve the process knowledge used to  
186 construct the emissions. However, top-down fluxes have other uncertainties that must be  
187 accounted for when comparing to bottom-up inventories, these include 1) systematic and random  
188 uncertainties in the data, 2) systematic errors in the model that relates observed methane  
189 concentrations to fluxes, and 3) smoothing error related to uncertainty in the prior emissions  
190 combined with the spatial resolution of the top-down estimate.

191 Top-down approaches can typically quantify the precision of the fluxes as it is directly  
192 related to the uncertainties of the observations and the prior knowledge of the flux distribution.  
193 However, the accuracy of the top-down fluxes related to data and model is more challenging to  
194 quantify and recent results suggest that these errors can be substantive. For example, Qu *et al.*  
195 (2021) demonstrates that systematic differences between total column CH<sub>4</sub> concentrations from  
196 TROPOMI and GOSAT satellite data, likely related to poorly characterized surface albedo, can  
197 lead to substantial differences when used to constrain top-down fluxes. For example, there is  
198 almost a 100% difference between estimated livestock emissions in Brazil when comparing  
199 TROPOMI versus GOSAT based fluxes, which Qu *et al.* (2021) attributes to biases in the  
200 TROPOMI total column data due to surface albedo variations over Brazil.

201 Errors in model transport and chemistry are another significant uncertainty when  
202 inverting concentration data to fluxes. For example, Mcnorton *et al.* (2020) finds that model  
203 errors in atmospheric concentrations that result from atmospheric transport can be as large or  
204 larger as uncertainties in the data, leading to almost a doubling of the uncertainty in top-down  
205 fluxes. Schuh *et al.* (2019) demonstrates that transport errors can result in biases of up to 1.7  
206 Petagrams of carbon in top-down CO<sub>2</sub> fluxes, about the same as the global net yearly carbon  
207 sink. Jiang *et al.* (2013) also demonstrates that errors in convection can affect surface emissions  
208 estimates of CO by up to 40% in regions of strong convection such as S.E. Asia. Unfortunately,  
209 challenges remain in quantifying how model uncertainties project to flux uncertainty. One



210 approach is to use an ensemble of models for the inversion in which the same data and  
211 constraints are used for the inverse model; a challenge here is to ensure that the inversion  
212 approach used with each model is consistent. For example, the Global Carbon Project (Sauniois *et*  
213 *al.* 2020) uses an ensemble of model inversions using different data sets to evaluate flux  
214 inversion errors; however, as shown in Section 2.2, this approach does not attempt to attribute  
215 differences in results to either the model, data, or spatial resolution and hence it can be  
216 challenging to identify approaches to reduce overall uncertainty. Another approach is to use  
217 different data sets but the same model and inversion setup to quantify emissions, as different  
218 sensitivities of the model to the different observed concentrations are affected by model error  
219 (Jiang *et al.* 2015; Yin *et al.* 2021). A third approach is to mitigate model and transport error. For  
220 example, Jiang *et al.* (2015) assimilates observed CO concentrations over ocean regions before  
221 inverting for continental source emissions to ensure that model/data mismatch over the ocean  
222 does not affect the emissions estimates. As discussed in the next section our flux inversion  
223 jointly estimates OH (the primary methane sink) with methane emissions to mitigate the impact  
224 of OH variability on CH<sub>4</sub> emissions estimates. A latitudinal correction is also applied to both  
225 data and model to ensure that errors in stratospheric chemistry and transport have less of an  
226 impact on the estimated fluxes. However, the residual systematic errors from model transport  
227 and chemistry are not characterized although there is no evidence to suspect significant  
228 systematic errors based on comparing posterior concentrations with independent data as  
229 discussed in the next section. Nonetheless, as stated in the abstract, differences between top-  
230 down emissions reported in this manuscript with those from bottom-up efforts should be  
231 considered as a starting point for new investigation as opposed to confirmation or falsification of  
232 the top-down or bottom up estimate.

233 Smoothing error is also a significant but challenging component of the emissions error  
234 budget to quantify for top-down estimates. This uncertainty depends on the spatial and temporal  
235 resolution of the top-down estimate combined with the prior uncertainty of the emissions  
236 (Rodgers 2000). The spatial resolution of the estimate in turn depends on the sampling, pixel  
237 size, measurement uncertainty, and lifetime of the gas. As typical top-down estimates do not  
238 quantify the terms needed to quantify smoothing error, smoothing error is not usually represented  
239 in top-down error budgets. However, this term can be the largest of the error sources, as  
240 discussed further in Section 2.1, especially if the *a priori* uncertainties for emissions are poorly

241 characterized. Our Bayesian, optimal estimation approach (Rodgers 2000) described here allows  
242 us to quantify smoothing error for the sectoral emissions presented here (Sections 2.2. and 2.3).  
243 Furthermore, by reporting the averaging kernel matrices and fluxes we can remove smoothing  
244 error in comparisons between top-down fluxes and bottom-up models (Ma *et al.* 2021) or greatly  
245 reduce the smoothing error component in comparisons between two different instruments (e.g.  
246 Cusworth *et al.* 2021).

247 Related to the problem of calculating smoothing error is that many top-down fluxes are  
248 projected back to emissions by assuming that all emissions within a grid can be uniformly scaled  
249 by the ratio of posterior to prior flux (e.g., Maasakkers *et al.* 2019 and references therein). This  
250 method, while computationally expedient, diverts from the Bayesian assumptions used with top-  
251 down inversions, potentially adding poorly characterized uncertainty and potentially unphysical  
252 biases (Cusworth *et al.* 2021) to the emissions estimates, because it does not account for the  
253 structure of the errors or their correlations and instead assumes that different types of emissions  
254 within a grid cell (e.g. fires, fossil, livestock, wetlands) are 100% correlated. Shen *et al.* (2021)  
255 addresses this problem by weighting the posterior emissions estimate by their prior uncertainty.  
256 Our approach used here is derived in Cusworth *et al.* (2021) and summarized in Section 2.2,  
257 addresses this problem by accounting for the structure of the errors, following a Bayesian  
258 methodology from the start of the problem (calculation of fluxes using observations) to the end  
259 (calculation of emissions from fluxes).

260

## 261 **2.0 Approach for Quantifying “Top Down” Emissions Using Satellite Data**

262 Our emission quantification approach is described in this section. First optimal estimation  
263 is used (Section 2.1) to quantify methane fluxes on a 2x2.5 grid using the GEOS-Chem global  
264 chemistry transport model with GOSAT satellite data for the year 2019. For our purposes of  
265 emissions attribution, this first inverse step must report the prior as well as the posterior flux  
266 error covariance (or Hessian) matrices (Zhang *et al.* 2021, Qu *et al.* 2021). The posterior error  
267 covariance (or Hessian) can be computationally challenging to calculate so is typically not  
268 reported with variational or adjoint based top-down estimates and instead ensemble approaches  
269 are used to approximate flux uncertainties (e.g. Janadarnan *et al.* 2020). However in our  
270 approach, this first step uses analytic Jacobians derived from the GEOS-Chem model that relate  
271 emissions to concentrations and hence has been traditionally computationally expensive as

272 compared to ensemble or adjoint based inversion methods, but does allow for a straightforward  
273 calculation of the Hessian. The second step (Section 2.2) uses the prior fluxes, the corresponding  
274 constraint and Hessian covariance matrices, and priors and prior covariances for emissions by  
275 sector, to linearly project the fluxes to emissions by sector at 1 degree resolution while  
276 accounting for the prior uncertainty distributions, correlations in the posterior covariance, and  
277 varying spatial resolution. This step can use different prior emissions and prior covariances from  
278 that of the flux inversion as the information from the flux inversion is preserved (Rodgers and  
279 Connor 2003). Critical to this second step is that prior uncertainties and their correlations are  
280 provided for the emissions for the desired sector and spatial resolution (Section 2.3).

### 281 ***2.1 Top Down Flux Estimates***

282  
283  
284 We estimate top-down fluxes based on the approach and results described in Maasackers *et*  
285 *al.* (2021), Zhang *et al.* (2021) and Qu *et al.* (2021) and the reader is referred to these papers for  
286 a more extensive description of the approach and validation of these methane fluxes. To  
287 summarize, we optimize a state vector that consists of (1) 2019 methane emissions from all  
288 sectors on a global 2°×2.5° grid (4020 elements); and (2) tropospheric OH concentrations in  
289 northern and southern hemispheres (2 elements). We assume the seasonal variations of methane  
290 emissions to be correct in the prior inventory and apply posterior/prior ratio equally to all months  
291 in each grid cell. The optimization of annual hemispheric OH concentrations avoids propagating  
292 biases in the simulated interhemispheric OH gradient to the solution for methane emissions  
293 (Zhang *et al.*, 2018). We solve this Bayesian problem analytically, which yields a best posterior  
294 estimate for the state vector, the posterior error covariance matrix, and the averaging kernel  
295 matrix. Unlike in Zhang *et al.* (2021) and Qu *et al.* (2021), wetland fluxes are not treated as  
296 separate elements in the state vector as we found that introduced uncertainties into the sectoral  
297 attribution because the wetland flux areas used in Qu *et al.* (2021) could overlap the different  
298 regions (Table 2) used in our approach to mitigate computational complexity.

299 The inverse problem is regularized by prior estimates for the state vector, which are compiled  
300 from multiple bottom-up studies. The EDGAR v4.3.2 global emission inventory for 2012  
301 (Janssens-Maenhout *et al.*, 2017) is used as default for anthropogenic emissions, superseded in  
302 the U.S. by Maasackers *et al.* (2016) and for the fossil fuel exploitation sector by Scarpelli *et al.*  
303 (2020). Seasonalities of emissions from manure management and rice cultivation are specified

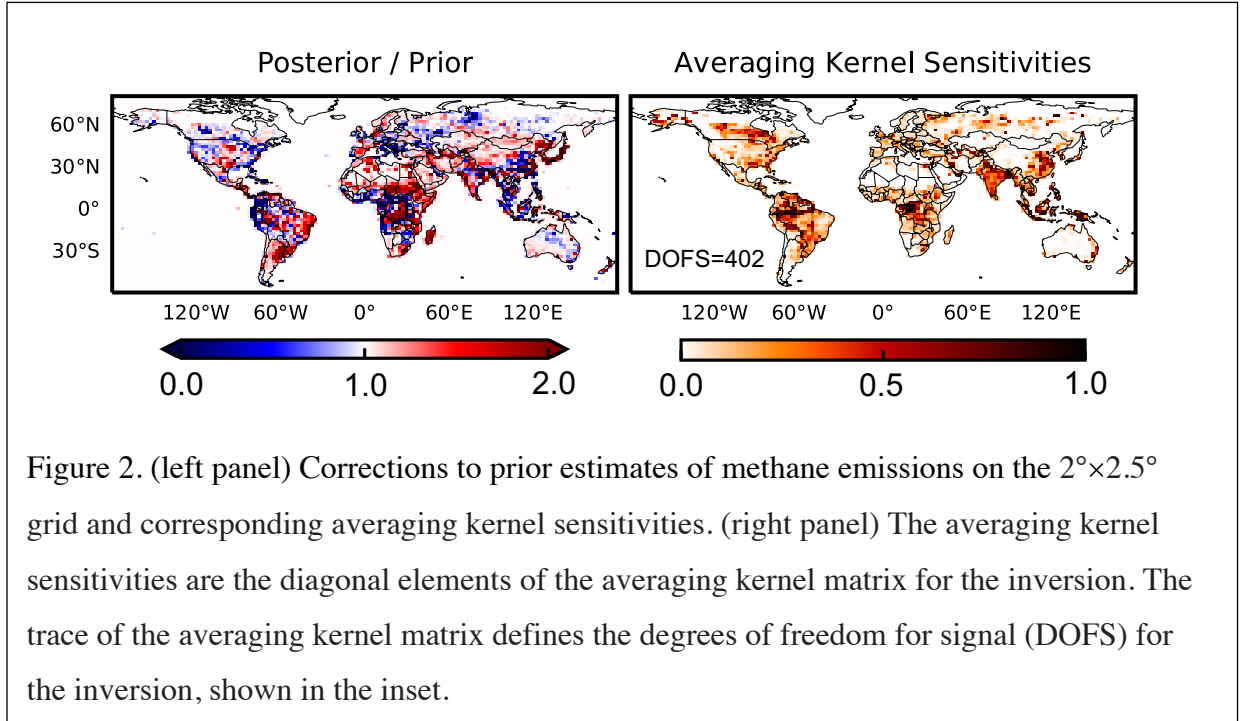
304 following Maasakkers et al. (2016) and B. Zhang et al. (2016), respectively. Monthly wetland  
 305 emissions in 2019 are from the WetCHARTS v1.3.1 18-member ensemble mean (Bloom et al.,  
 306 2017). Note that in Zhang *et al.* (2021) and Qu *et al.* (2021), wetland fluxes are not included in  
 307 the gridded fluxes but instead estimated separately so as to better compare to bottom-up models  
 308 (Ma *et al.* 2021). In the top-down flux inversion used here, wetland fluxes are included with the  
 309 other emissions in each grid as we found that partitioning fluxes back to their sectoral  
 310 contribution (next section) was challenging due to gridding errors when wetland fluxes are  
 311 separately considered in the cost function. Daily global emissions from open fires are taken from  
 312 GFEDv4s (van der Werf et al., 2017). Global geological emissions for the flux inversion are set  
 313 to be 2 Tg a<sup>-1</sup> based on Hmiel et al. (2020) with the spatial distribution from Etiope et al. (2019).  
 314 Termite emissions are from Fung et al. (1991). The prior estimates for the hemispheric  
 315 tropospheric OH concentrations are based on a GEOS-Chem full chemistry simulation (Wecht et  
 316 al., 2014).

317 The GEOS-Chem CTM v12.5.0 (10.5281/zenodo.3403111) is used as forward model for  
 318 the inversion. The simulation is driven by MERRA-2 meteorological fields (Gelaro et al., 2017)  
 319 from the NASA Global Modeling and Assimilation Office (GMAO) with 2°×2.5°  
 320 horizontal resolution and 47 vertical layers (~ 30 layers in the troposphere). We excluded  
 321 observations poleward of 60°, where low Sun angles and extensive cloud cover make the  
 322 retrieval more difficult, and stratospheric CTM bias can affect the inversion (Turner *et al.*, 2015).

324 The posterior estimate as defined by Bayesian inference assuming Gaussian error  
 325 statistics is obtained by minimizing the cost function  $J(x)$ :

$$327 J(x) = (\mathbf{x} - \mathbf{x}_A)^T \mathbf{S}_A^{-1} (\mathbf{x} - \mathbf{x}_A) + \gamma (\mathbf{y} - \mathbf{Kx})^T \mathbf{S}_y^{-1} (\mathbf{y} - \mathbf{Kx}), \quad (1)$$

328  
 329  
 330 where  $\mathbf{K}$  is the Jacobian matrix describing the sensitivity of the observations to the state vector as  
 331 simulated by GEOS-Chem. The vector  $\mathbf{x}_A$  is the prior flux estimate.  $\mathbf{S}_A$  is the *a priori*  
 332 covariance matrix for this inversion and is a diagonal matrix that is constructed by assuming  
 333 50% prior error standard deviation for emissions on the 2°×2.5° grid and 10% prior error  
 334 standard deviation for hemispheric annual mean OH concentrations.  $\mathbf{S}_y$  is the observational error



335 covariance matrix. Diagonal elements of  $\mathbf{S}_y$  are calculated using the residual error method (Heald  
 336 et al., 2004) as the variance of the residual difference between observations and the GEOS-Chem  
 337 prior simulation on the  $2^\circ \times 2.5^\circ$  grid after subtracting the mean difference. We use a  
 338 regularization parameter  $\gamma$  (Hansen et al., 1999; Y. Zhang et al., 2018, 2020; Maasakkers et al.,  
 339 2019; Lu et al., 2021) to account for the off-diagonal structure missing in  $\mathbf{S}_y$ . Based on the corner  
 340 of the L-curve (Hansen et al., 1999) and the expected chi-square distribution of the cost function  
 341 (Lu et al., 2021), we choose  $\gamma = 0.5$  (Qu et al., 2021).

342 Assuming that the problem for quantifying methane fluxes from observed concentrations  
 343 is linear, or only moderately non-linear, then the fluxes,  $\hat{\mathbf{x}}$ , can be related to observed methane  
 344 concentrations using the following equation: (Rodgers 2000):

$$345 \hat{\mathbf{x}} = \mathbf{x}_A + \hat{\mathbf{S}}\mathbf{K}^T\mathbf{S}_y^{-1}(\mathbf{y} - \mathbf{K}\mathbf{x}_A) \quad (2)$$

346  
 347  
 348 The posterior error covariance matrix  $\hat{\mathbf{S}}$  is given by:

$$349 \hat{\mathbf{S}} = (\mathbf{K}^T\mathbf{S}_y^{-1}\mathbf{K} + \mathbf{S}_A^{-1})^{-1}. \quad (3)$$

350  
 351  
 352

353 This top-down flux inversion also provides the spatial resolution matrix or Averaging Kernel  
 354 Matrix  $\mathbf{A}$ , which defines the sensitivity of the solution to the true state:

$$355$$

$$356$$

$$357 \mathbf{A} = \mathbf{I} - \hat{\mathbf{S}}\mathbf{S}_A^{-1}, \quad (4)$$

$$358$$

359 Summing the diagonal elements of the averaging kernel for a given region provides the  
 360 Degrees of Freedom for Signal (or DOFS), a useful metric for the sensitivity of the observing  
 361 system to the underlying fluxes as it describes the sensitivity of the estimated fluxes to the actual  
 362 distribution of fluxes (Rodgers 2000). Figure 2 (right panel) shows the averaging kernel  
 363 sensitivities (or diagonal elements of the averaging kernel matrix) of the inversions. The  
 364 averaging kernel sensitivities are highest over major anthropogenic source regions, where the  
 365 methane emissions are the largest and the observations have a good ability to determine the  
 366 posterior solution independently of the prior estimate. The inversion has ~402 DOFS for  
 367 methane emissions, meaning that it contains 402 independent pieces of information on the  
 368 distribution of methane emissions. Although our flux inversion is based on the top-down setup  
 369 described in Qu *et al.* (2021), this value is larger than the DOFS reported in Qu *et al.* (2021)  
 370 because that estimate separates wetlands from non-wetlands in the inversion scheme whereas the  
 371 flux estimate used here does not. The posterior / prior ratios for the 2019 inversion in Figure 2  
 372 (left panel) show consistent upward adjustments in the south-central US, Venezuela, and the  
 373 Middle East and downward adjustments in the western US and North China Plain, consistent  
 374 with Qu *et al.* (2021) and Zhang *et al.* (2021).

375 If the matrix  $\mathbf{S}_A$  in equations 1 and 3 represents the actual *a priori* uncertainty  
 376 corresponding to the *a priori*  $\mathbf{x}_A$ , then the posterior error covariance describes the total error for  
 377 the estimate (Rodgers 2000). In practice, the matrix  $\mathbf{S}_A$  represents a “constraint matrix” that is  
 378 either a best guess for uncertainties of fluxes (e.g., assumed here to be 50%) within a grid and/or  
 379 it is constructed to ensure the inversion converges, typically because systematic errors in the data  
 380 and/or the model or numerical instabilities make it challenging to find a global minimum in the  
 381 cost function as shown in Equation 1 (Bowman *et al.* 2006). In the case where  $\mathbf{S}_A$  represents a  
 382 constraint matrix, the total posterior error becomes:

$$383$$

$$384 \mathbf{S}_{\text{tot}} = (\mathbf{I} - \mathbf{A})\mathbf{S}_A^{\text{true}}(\mathbf{I} - \mathbf{A})^T + \hat{\mathbf{S}}\mathbf{K}^T\mathbf{S}_y^{-1}\mathbf{K}\hat{\mathbf{S}} \quad (5)$$

385

386 Where the  $\mathbf{S}_A^{\text{true}}$  is the *a priori* uncertainties for the estimate. In practice,  $\mathbf{S}_A^{\text{true}}$  can be  
387 challenging to calculate due to lack of information about the emissions or fluxes and may not  
388 even be invertible because of correlations within the matrix. However, we use a set of informed  
389 inventories and models to generate a prior covariance for methane emissions as described in the  
390 next section. As discussed Worden *et al.* (2004), the smoothing error in the estimate is the first  
391 term on the right side, the error due to measurement uncertainty is the second/middle term, and  
392 the last term is that due to systematic errors in the model. While the variables in Equation 5 are  
393 representative here of the top-down flux estimate, the formulation can be generalized for any  
394 estimate to support interpretation of the results. For example, in a system with perfect resolution  
395 the averaging kernel matrix becomes the identity matrix and the smoothing error becomes zero,  
396 hence the reason that improving the spatial resolution reduces the smoothing error, an important  
397 goal which can be realized with the increased observation density of up-coming satellites such as  
398 CO2M, methane-sat, and Carbon Mapper. Equation 5 also demonstrates that poorly  
399 characterized prior uncertainties in one region affect an estimate in another regions because of  
400 cross-terms in the averaging kernel matrix  $\mathbf{A}$ . This aspect of top-down inversions must therefore  
401 be accounted for when interpreting the seasonality and magnitude of top-down fluxes (e.g. Ma *et*  
402 *al.* 2021).

403 Systematic errors can be included by adding the following term:  $\hat{\mathbf{K}}_{\text{sys}}^T \mathbf{S}_{\text{sys}}^{-1} \mathbf{K}_{\text{sys}}^T \hat{\mathbf{S}}$ ,  
404 where  $\mathbf{K}_{\text{sys}}$  is the Jacobian that describes the sensitivity of the modeled concentrations to different  
405 parameters in the model that relate emissions to concentrations and  $\mathbf{S}_{\text{sys}}$  is a matrix containing  
406 uncertainties for the model or data parameters. In this manuscript we do not explicitly calculate  
407 systematic errors for the fluxes. We are currently studying how to empirically evaluate  
408 systematic errors in the flux estimate, following the approach in Jiang *et al.* (2015) for use in  
409 quantifying uncertainties in methane fluxes and emissions.

410

411 **Evaluation of Top-Down Flux Estimates:** The combination of model (GEOS-chem)  
412 and data (GOSAT) used to quantify methane fluxes have been evaluated previously by  
413 comparing prior and posterior model concentrations to independent data. Maasackers et al  
414 (2019) finds that posterior methane concentrations have correlations ( $R^2$ ) of 0.76, 0.81, and 0.91  
415 with data from surface sites, aircraft, and total column data respectively. These correlations are

416 essentially the same as those for the GEOS-chem prior concentrations, likely because these  
 417 measurements are taken in background regions away from sources. These comparisons between  
 418 posterior concentrations with independent data sets demonstrate that the GEOS-Chem model  
 419 with GOSAT data has skill in quantifying atmospheric methane concentrations and that  
 420 assimilating GOSAT data into GEOS-Chem for the purpose of quantifying fluxes is at least as  
 421 skillful as using prior information when looking at background regions away from emissions  
 422 sources. Changes in fluxes based on GOSAT data are therefore driven entirely by differences in  
 423 satellite observed concentrations over source regions.

424  
 425

## 426 *2.2 Projecting Fluxes To Emissions And Their Uncertainties*

427

428 The derivation that describes how to project top-down fluxes back to emissions by sector  
 429 at arbitrary resolution is described in Cusworth *et al.* (2021) and summarized in this section.

430 For policy-relevance and CH<sub>4</sub> budget quantification, we wish to optimize emissions ( $\mathbf{z}$ ) using  
 431 atmospheric observations, i.e., we want to compute the explicit posterior representation without  
 432 re-simulation of an atmospheric transport model. The relationship we use between emissions  $\mathbf{z}$  and  
 433 fluxes  $\mathbf{x}$  is simple aggregation (the total flux within a grid box is the sum of emissions), and can  
 434 be represented by matrix  $\mathbf{M}$ :

435

$$436 \mathbf{x} = \mathbf{M}\mathbf{z}. \quad (6)$$

437

438 The solution for projecting fluxes back to emissions takes the form (Cusworth *et al.* 2021):

439

$$440 \hat{\mathbf{z}} = \mathbf{z}_A + \hat{\mathbf{Z}}\mathbf{M}^T\hat{\mathbf{S}}^{-1}[(\mathbf{I} - \hat{\mathbf{S}}\mathbf{S}_A^{-1})(\mathbf{x}_A - \mathbf{M}\mathbf{z}_A) + (\hat{\mathbf{x}} - \mathbf{x}_A)] \quad (7)$$

441

442 where the ( $\hat{\mathbf{z}}$ ) is the posterior emissions vector with error covariance ( $\hat{\mathbf{Z}}$ ) and  $\mathbf{I}$  is the identity matrix,  
 443 The posterior emission error covariance matrix  $\hat{\mathbf{Z}}$  is calculated explicitly given  $\mathbf{M}$ ,  $\mathbf{S}_A$ ,  $\hat{\mathbf{S}}$ , and prior  
 444 emissions error covariance matrix  $\mathbf{Z}_A$ :

445

$$446 \hat{\mathbf{Z}} = (\mathbf{M}^T(\hat{\mathbf{S}}^{-1} - \mathbf{S}_A^{-1})\mathbf{M} + \mathbf{Z}_A^{-1})^{-1} = (\mathbf{M}^T(\mathbf{K}^T\mathbf{S}_y^{-1}\mathbf{K})\mathbf{M} + \mathbf{Z}_A^{-1})^{-1} \quad (8)$$



447

448 This solution depends on the top-down flux inversion providing the inversion characterization  
 449 products (i.e., the flux prior  $\mathbf{x}_A$  and flux constraint matrix  $\mathbf{S}_A$  and the flux Hessian  $\hat{\mathbf{S}}$ ). Note that  
 450 here we must use the Hessian as described in Equation 3, not the total posterior covariance as  
 451 described by Equation 5 (Cusworth *et al.* 2021). To quantify the set of sectoral emissions  $\hat{\mathbf{z}}$ , a  
 452 corresponding prior emissions  $\mathbf{z}_A$ , and covariance matrix  $\mathbf{Z}_A$ , must be provided at the desired  
 453 spatial grid; in this study we choose a 1 degree lon/lat grid. Note that the emissions and their  
 454 prior uncertainties used to generate prior fluxes for the top-down flux inversion ( $\mathbf{x}_A$ ) can be  
 455 different from those used to project the top-down fluxes back to sectoral emissions for linear or  
 456 moderately non-linear problems (e.g. Rodgers and Connor 2003; Bowman *et al.* 2006) as the  
 457 information from the measurement is preserved in the  $\mathbf{K}^T \mathbf{S}_y^{-1} \mathbf{K}$  term which is contained in  
 458  $\hat{\mathbf{S}}^{-1} - \mathbf{S}_A^{-1}$  as shown in Equation 8. This means that  $\mathbf{Mz}_A$  can be different from  $\mathbf{x}_A$ , and their  
 459 corresponding covariances, as long as the inversion problem is linear or only moderately  
 460 nonlinear (Bowman *et al.* 2006; Cusworth *et al.* 2021). However, the interpretation of fluxes will  
 461 be different if these matrices ( $\mathbf{S}_A$  and  $\mathbf{Z}_A$ ) are inconsistent (e.g. Shen *et al.* 2021), that is  $\mathbf{S}_A \neq$   
 462  $\mathbf{MZ}_A \mathbf{M}^T$ .

463 The uncertainty for any given element of the state vector  $\mathbf{z}$  is generally given by the  
 464 square root of the diagonal element of the total error covariance and includes the effects of the  
 465 limited spatial resolution of the top-down flux and how this projects uncertainties from one grid  
 466 box and sector into another grid box and sector as discussed in the previous section. For  
 467 example, the estimate for the emissions for some emissions sector “ $i$ ” at some lon/lat grid box “ $j$ ”  
 468 is given by (Rodgers and Connor 2003; Worden *et al.* 2004):

469

$$470 \hat{z}_{ij} = z_a^{ij} + A_{ij,ij}(z_{ij} - z_a^{ij}) + \mathbf{A}_{ij,xy}(\mathbf{z}_{xy} - \mathbf{z}_a^{xy}) + \delta_{ij} \quad (9)$$

471

472 Where the italicized variables in Equation 9 are scalar representations of the variables in  
 473 Equations 7 and 8, the index “ $x$ ” represents all sectors and the index “ $y$ ” represents all other  
 474 lat/lon elements and matrices and vectors are boldfaced. Note that the paired indices  $x$  and  $y$   
 475 exclude the paired indices  $i$  and  $j$ . The variable “ $z_{xy}$ ” represents the “true” value corresponding  
 476 to the estimate “ $\hat{z}_{ij}$ ” and the variable  $\delta_{ij}$  represents the error due to random noise (we exclude

477 systematic error here to simplify the math but Equation 9 can be expanded to include this term).  
 478 Of course we do not actually know the true value and its errors but Equation 9 allows us to  
 479 represent them in a manner than allows us to calculate their statistics. The total error for  $\hat{z}_{ij}$ ,  
 480 equivalent to an element of the total error in Equation 8, is:

$$482 \quad E \left\| \hat{z}_{ij} - z_{xy} \right\| = (1 - A_{ij}) Z_a^{ij} (1 - A_{ij})^T + \mathbf{A}_{ij,xy} \mathbf{Z}_a^{xy} \mathbf{A}_{ij,xy}^T + S_{ij}^n \quad (10)$$

483  
 484 Where the  $E \left\| \right\|$  term describes the expectation operator for calculating the statistics of the  
 485 quantity of interest (Bowman *et al.* 2006). The diagonal elements of the total error covariance  
 486 therefore include the effect of the limited spatial resolution through the second term on the right  
 487 hand side of Equation 10, which projects prior uncertainties from one region and sector (x,y) into  
 488 the region and sector of interest (i,j). The last term is the covariance due to measurement noise.  
 489 As the spatial resolution increases, the averaging kernel matrix converges towards the identity  
 490 matrix; in this limit the first and second terms on the right side converge to zero such that the  
 491 total error is due to noise (last term in Equation 10) and any residual systematic errors (not  
 492 shown in Equation 10 but discussed in the previous section). Improving the spatial resolution of  
 493 the methane emissions estimate therefore improves the accuracy.

494  
 495 In order to calculate the uncertainty for an aggregation of the elements of the state vector  
 496  $\mathbf{z}$  (e.g. the coal sector for a country), instead of an individual element, we must sum the desired  
 497 set of elements  $[z_i]$  that represent this sector and region. The uncertainty for this sum (squared) is  
 498 then:

$$499 \quad \sigma_{ij}^2 = \mathbf{h} \hat{\mathbf{Z}}_{ij} \mathbf{h}^T \quad (11)$$

500  
 501 where  $\mathbf{h}$  is a vector that is the same length as  $[z_{ij}]$ , with values of one in each element and  $\hat{\mathbf{Z}}_{ij}$  is  
 502 the square sub-matrix of the covariance matrix  $\mathbf{Z}$  corresponding  $[z_{ij}]$  (e.g. the country and  
 503 emission sector of interest).  
 504

### 505 **2.3 Generation of Prior Emissions, Covariances, and Uncertainties**

506  
 507

508           In order to project fluxes from a top-down inversion back to emissions using the  
509 approach described in Section 2.2, sectoral emissions and their covariances, or  $\mathbf{z}_A$  and  $\mathbf{Z}_A$ , at the  
510 desired spatial resolution are required. One challenge with the flux to emissions projection is that  
511 the *a priori* covariance matrix  $\mathbf{Z}_A$  must be inverted (Equation 8), which can be computationally  
512 expensive because this matrix can be quite large as the number of sectors and spatial resolution  
513 of the emissions increases and because correlations within the matrix (next section) make it  
514 challenging to invert. In order to reduce computational expense for our chosen spatial resolution  
515 of 1 degree resolution (prior to calculating country wide emissions), we dis-aggregate global  
516 emissions into eight regions (Table 2) chosen by regions with peaks in the inversion sensitivity  
517 to the underlying fluxes as shown by the averaging kernel diagonals in Figure 2. The different  
518 categories are shown in Table 2 for each region and by sector along with the provenance (or  
519 manuscript reference) in the second column. Cross-terms in the averaging kernel (Equations 5,  
520 9, and 10) matrix demonstrate that the change in emissions in one region affect the estimated  
521 emissions in another. Subdividing the fluxes into these eight regions therefore introduces an  
522 extra error term in the total error covariance for each region; however this extra error is  
523 automatically included in the total error covariance for each region as demonstrated by Equation  
524 10.

525 Table 2: *A priori* emissions by source and region used with sectoral attribution

Source Tg CH <sub>4</sub> /yr	Ref	N. America (15%)	S. America (30%)	Africa (30%)	Europe W. Russia N. Africa Mid-East (15%)	E. Russia (30%)	India Eurasia (30%)	Asia (30%)	Indonesia Australia (20%)	Total
Lon / Lat		175W-40W 25N-80N	130W-30W 65S-25N	24W-60E 40S-20N	24W-60E 20N-80N	60E-179E 50N-90N	60E-90E 5N-50N	90E-179E 5N-50N	90E-179E 45S-5N	
Livestock	1,2	7.7 +/-1.2	21.6 +/-3.9	10.7 +/- 2.1	12.4 +/-1.8	0.6 +/-0.1	19.1 +/- 5.0	11.7 +/-2.4	3.9 +/- 0.8	87.6 +/- 7.4-17.2
Rice	2	0.4 +/-0.1	1.2 +/- 0.3	1.8 +/-0.6	0.6 +/-0.1	0.04 +/- 0.01	8.7 +/- 2.4	32.8 +/-8.5	4.4 +/- 0.9	36.9 +/- 8.9-12.9
Waste	2	7.4 +/-1.1	4.1 +/-1.3	7.1 +/-2.0	23.9 +/-3.6	0.9 +/-0.3	4.4 +/-1.3	6.8 +/-1.6	3.1 +/- 0.7	57.7 +/- 5.0 – 11.9
Oil	3	2.7 +/-0.4	4.5 +/-1.4	2.8 +/-0.8	17.7 +/- 2.9	10.6 +/-3.3	0.6 +/-0.2	2.0 +/-0.6	0.7 +/- 0.1	41.6 +/- 4.7-9.7
Coal	3	3.2 +/-0.5	0.4 +/-0.1	0.78 +/- 0.22	2.3 +/-0.3	2.8 +/-0.9	1.6 +/-0.5	19.2 +/-5.9	1.2 +/- 0.3	31.4 +/- 6.1-9.8
Gas	3	7.5 +/-1.1	0.4 +/-0.1	0.7 +/-0.2	8.9 +/-1.3	0.4 +/-0.1	3.7 +/-1.2	0.9 +/-0.3	1.1 +/- 0.2	24.5 +/- 2.1-4.7
Fires	4	1.4 +/-0.3	2.3 +/-0.4	4.9 +/-0.8	0.3 +/-0.03	1.5 +/-0.2	0.1 +/- 0.02	1.1 +/-0.2	3.6 +/- 0.6	15.1 +/- 1.1 – 2.5
Wetlands Aquatic	5,6	37.1 +/-7.2	72.8 +/-16.2	42.4 +/- 16.3	7.5 +/-1.5	8.6 +/-2.0	3.7 +/-1.1	8.6 +/-1.9	19.0 +/- 6.5	199.8 +/- 25.2 - 52.8
Seeps	7	7.8 +/-1.1	2.0 +/-0.6	0.4 +/-0.1	14.1 +/-2.5	2.8 +/-0.8	0.8 +/-0.2	2.7 +/-0.7	1.3 +/- 0.2	32.0 +/- 3.0 – 6.2
Total Tg CH <sub>4</sub> /yr		75.2 +/- 7.6 – 12.9	109.3 +/- 16.8-24.4	71 +/- 16.6–23.1	87.8 +/- 5.9-14.1	28.9 +/- 4.0 – 7.8	42.7 +/- 5.9 – 11.9	85.8 +/- 11.0-22.1	38.3 +/- 6.7-10.4	526 +/- 29.5 – 127.7

526  
 527 Table 2: Prior emissions by source and regions. Single values for uncertainties are calculated by projecting the  
 528 corresponding covariance to a single number for the indicated lon/lat region and taking the square root. Total values  
 529 show a range of uncertainty with the lower bound being the sum (squared) of the individual region or sector  
 530 (assumes errors are un-correlated) and the upper bound being the sum of the errors (assumes errors are completely  
 531 correlated). The following references indicate the source for each emission type: 1) NASA CMS V1.0 (Wolf *et al.*  
 532 2017), 2) EDGAR 6.0 (Crippa *et al.* 2020), 3) NASA GFEI V1 (Scarpelli *et al.* 2020), 4) GFED 4.1 (van der Werf *et*  
 533 *al.* 2017), 5) WETCHARTS 1.3.1 (Bloom *et al.* 2017), 6) GCP (Poulter *et al.* 2017), 7) Etiope *et al.* (2019). The  
 534 target uncertainty for each region and sector is given in brackets underneath each region.

535

536 Our prior emission distribution and magnitude represents, by necessity, a set of ad hoc  
537 choices that are informed by the scientific literature and experience of the co-authors of this  
538 paper with developing top-down flux estimates. For example, our chosen resolution for  
539 reporting sectoral emissions is 1 degree, which represents a compromise between computational  
540 expense while minimizing representation errors when quantifying emissions for each country,  
541 which in turn is needed for these estimates to inform the global stock take. Future research will  
542 evaluate if higher-resolution emissions estimates by sector can be quantified given the  
543 computational expense of inverting Equation 8; our motivation for reporting top-down estimates  
544 at a higher resolution are because many of the inventories are at these scales (e.g. 0.1 degree) and  
545 also to better utilize high-resolution emissions estimates now available by aircraft data (e.g.  
546 Duren *et al.* 2019) and from upcoming satellites such as Carbon Mapper (e.g. Cusworth *et al.*  
547 2019; 2021).

548 We make the following choices for which sectoral emission type is represented: wastewater  
549 is not explicitly estimated as these emissions are spatially correlated with landfill emissions  
550 based on inspection of EDGAR inventories when projected to 1 degree resolution. The waste  
551 category should therefore be interpreted as a combination of landfill and wastewater. We also did  
552 not consider biofuels or termites for this estimate as they represent a small component of the  
553 budget. For these reasons, the biofuel and termite components of the methane budget will  
554 slightly bias our other sectoral estimates by 15-30 Tg CH<sub>4</sub>/yr based on bottom up estimates  
555 reported in (Saunio *et al.* 2020). On the other hand, emissions for seeps are included as bottom-  
556 up inventories suggest these could be as large as 30 Tg CH<sub>4</sub>/yr; however given the co-location of  
557 seep emissions with oil and coal (Figure 3), care must be taken in interpreting our results for  
558 Seep emissions estimates. Our prior emissions for livestock are from a NASA Carbon  
559 Monitoring System product (Wolf *et al.* 2017) and is found from post-processing to be too low  
560 by ~25% due to not including a scaling factor in the overall emissions. Nonetheless we keep the  
561 current set of (low) prior livestock emissions of ~89 Tg CH<sub>4</sub>/yr as they demonstrate (along with  
562 the analysis in Section 3.3, Figure 6) that our total results are largely independent of the choice  
563 of priors because of the sensitivity of the fluxes to the underlying emissions as shown in the right  
564 panel of Figure 2. A future version of these estimates will have an updated prior for livestock  
565 emissions and will include termites, wastewater, and biofuels. Although there can be many

566 emissions within a single grid box, uncertainty can still decrease for each emission type as shown  
567 in Equation 8, which shows that these correlations are quantified in the posterior covariance.  
568 Uncertainty reduction of a particular emission therefore depends on the magnitude of the  
569 emission and its uncertainty, its correlations with nearby emissions of the same type (next  
570 section) and the magnitude and uncertainty of emissions within the same grid box.

571 Prior wetland emissions are based on an ensemble of process models from the  
572 WETCHARTS system and the Global Carbon Project (Bloom *et al.* 2017; Poulter *et al.* 2017;  
573 Ma *et al.* 2021) and include the effects of lakes and rivers. A future version of this system will  
574 separately estimate these other sectors of the methane budget if further analysis using other  
575 satellite data (e.g. TROPOMI) shows that they can be distinguished from these other sectors.

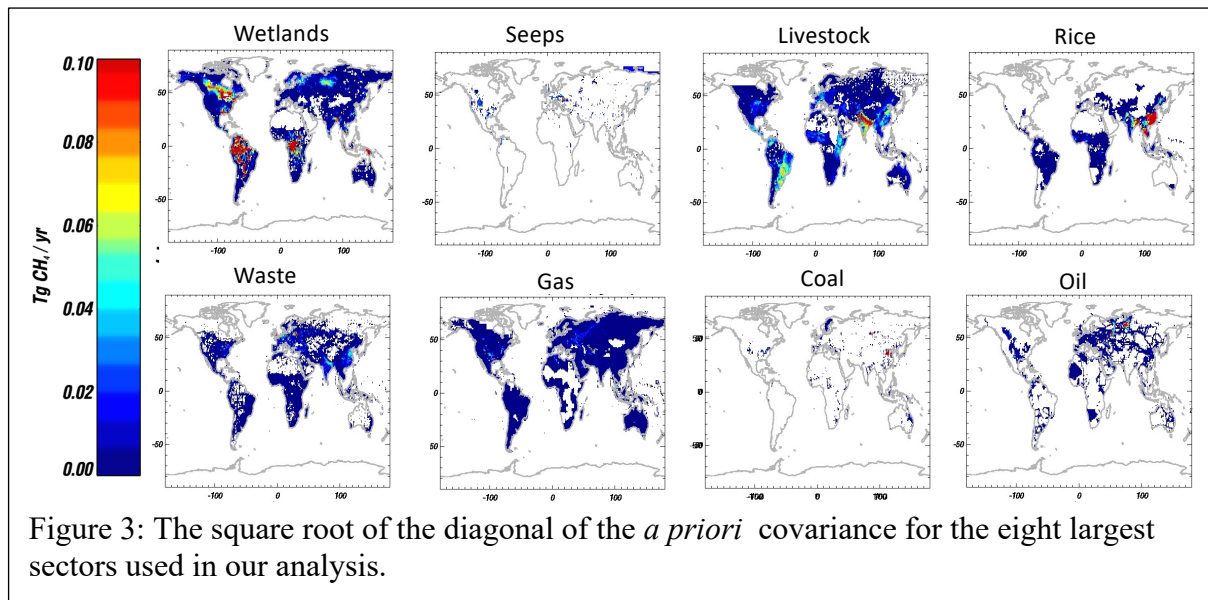
576 **Covariance Generation:** Generating representative prior covariances is challenging as there  
577 are few global studies that allow for accurate representation of uncertainties for emissions across  
578 the globe and their correlations that are based on data and/or well calibrated models. This  
579 problem exists not just for methane emissions but with other inverse problems where there is  
580 little data representative of the quantities of interest (e.g. with remote sensing; Worden *et al.*  
581 2004). For this reason we need to make another set of ad-hoc choices that is based on prior  
582 research in order to generate the covariances for each sector. We therefore use the following  
583 approach: first we assume that the total anthropogenic emissions (by sector) in “Annex 1”  
584 countries have an uncertainty of 15%. For example, we assume the total error for the N.  
585 American Coal sector is ~15%, and so on for each anthropogenic sector. Similarly, the total error  
586 for Annex 2 regions is 30%. These targeted uncertainties are listed underneath the label for each  
587 region in Table 2. These uncertainties are reported in Janssens *et al.* (2019) and are based on  
588 “expert opinion” as quantifying uncertainties over a country or region using bottom up-  
589 approaches can be challenging. Total regional uncertainty for a specific sector is calculated using  
590 Equation 11. In order for sectoral emissions at 1 degree resolution to project to a total regional  
591 uncertainty of 15%, there must be significant uncertainty of any given emission within that 1  
592 degree grid cell. However, even assuming very large uncertainties for an emission within a 1  
593 degree grid cell (e.g. 100%), the regional total uncertainty can be much smaller than 15% once  
594 projected over a large enough number of grid cells if the emission errors are assumed to be  
595 uncorrelated. To address this issue we also add correlations between nearby emissions; we start  
596 the diagonal values at 0.7 (squared) of the prior emissions, or 70% uncertainty, and with a

597 correlation of 0.7 between neighboring emissions of the same type that are within 400 km (or  
598 four grid cells). The diagonal values and correlations are then adjusted until the projected  
599 uncertainty reaches 15% (for Annex 1) or 30% (Annex 2). Final values typically range from 0.6  
600 (squared) to 1.0 for the diagonal and 0.7 to 0.9 for the off-diagonal values with variations in  
601 these numbers because of the different spatial distributions of the emissions. These numbers for  
602 the correlation and length scale are based on regional studies for N. America which also indicate  
603 that uncertainties for nearby emissions should be correlated (e.g. Maasakkers *et al.* 2016, 2019).

604 For wetlands, we use a slightly different approach for generating covariances. Here we  
605 calculate the root mean square (RMS) of an ensemble of different wetland process models  
606 (Bloom *et al.* 2017; Poulter *et al.* 2017; Ma *et al.* 2021) for a given region. We then follow a  
607 similar covariance generation approach as used for the anthropogenic emissions, iterating with  
608 different diagonal and off-diagonal values until the projected uncertainty for a region is  
609 approximately the same as the corresponding variance of the models.

610 While generating representative prior covariances is challenging, Equations 7 and 8 from  
611 the previous section allow us to swap in better priors and prior covariances as these become  
612 available. For example, if a researcher finds that the uncertainties expressed in  $\mathbf{Z}_A$  over a given  
613 region for a given sector should be 10% instead of the value used (approximately 70%), then it is  
614 straightforward to update the covariance matrix to reflect this improved knowledge so that the  
615 attribution to each sector is improved. Of course this improved information could also be used to  
616 improve the  $\mathbf{S}_A$  constraint matrix in Equation 1 to improve convergence of the top-down flux  
617 estimate. Furthermore the updated posterior covariances can be used for the next flux inversion  
618 based on other independent data and at some point these covariances, because they are based on  
619 observations, will best reflect our knowledge of the methane emission. Covariances and prior  
620 emissions are all publicly available, as well as python code that demonstrates how to use these  
621 files, so that a researcher can determine how other priors and changes to their uncertainty  
622 structure affects this top-down result or to use them for their own top-down inversions. Links to  
623 these data and codes are in the Data Repository section (Section 5).

624 **Uncertainty Calculation Approach:** The uncertainties shown in the Tables 1 and 2 are  
625 calculated in the following manner. First the prior uncertainties for each sector and for each  
626 region shown in Table 2 are calculated by projecting the regional (e.g. N. America, S. America)  
627 posterior error covariance to a single number corresponding to the mean emissions for that



628 region using Equation 11. One approach is to then assume that these uncertainties are  
 629 independent of each other in which case they are added in quadrature to get the total value; this is  
 630 the smaller uncertainty shown in the **Total** column in Table 2. However, another method is to  
 631 assume that the uncertainties are 100% correlated such that they should be added linearly; these  
 632 are the values shown as the larger value in Table 2. We expect that the actual uncertainty is  
 633 somewhere between these values. However, to be conservative we only report the larger value in  
 634 Table 1 and for the remainder of the paper.

635 The prior uncertainties generated using the method described here are consistent with  
 636 those reported in the literature even though the methodology differs. For example the values  
 637 shown in the “prior” column of Table 1 are consistent (within reported ranges or uncertainties) of  
 638 the equivalent sectors discussed in Sauniois *et al.* (2020) and with the regional EDGAR v4.3.2  
 639 inventories as discussed in Janssens-Maenhout *et al.* (2019). A caveat is that Janssens-  
 640 Maenhout *et al.* (2019) also reports global totals for each sector, from a range of inventories and  
 641 models, that are 2-3 times larger for each sector than those shown here. Another caveat is that  
 642 Sauniois *et al.* (2020) includes a freshwater category with a 120 +/- 60 Tg CH<sub>4</sub>/yr uncertainty  
 643 whereas this category is subsumed into our Wetlands / Aquatic sector.

644 Figure 3 shows the (square root) diagonal of the covariance for each sector; as discussed  
 645 previously, these are generally correlated with the magnitude of the emissions but also the  
 646 chosen value for the regional total error (Table 2). Most of the sectors have enhancements and  
 647 corresponding uncertainties that are spatially distinct. For example, the largest uncertainties for



648 oil are located in Eastern Europe and Russia; the largest uncertainties for coal are in China, and  
649 the largest uncertainties for gas are in N. America and Central Asia. In turn, these fossil  
650 emissions are spatially distinct from wetlands and livestock. However, the largest uncertainties  
651 for rice and waste can spatially overlap those of livestock, especially in India and Asia, which  
652 indicates that remote sensing will be challenged to distinguish these emissions.

653

### 654 **3.0 Results**

655

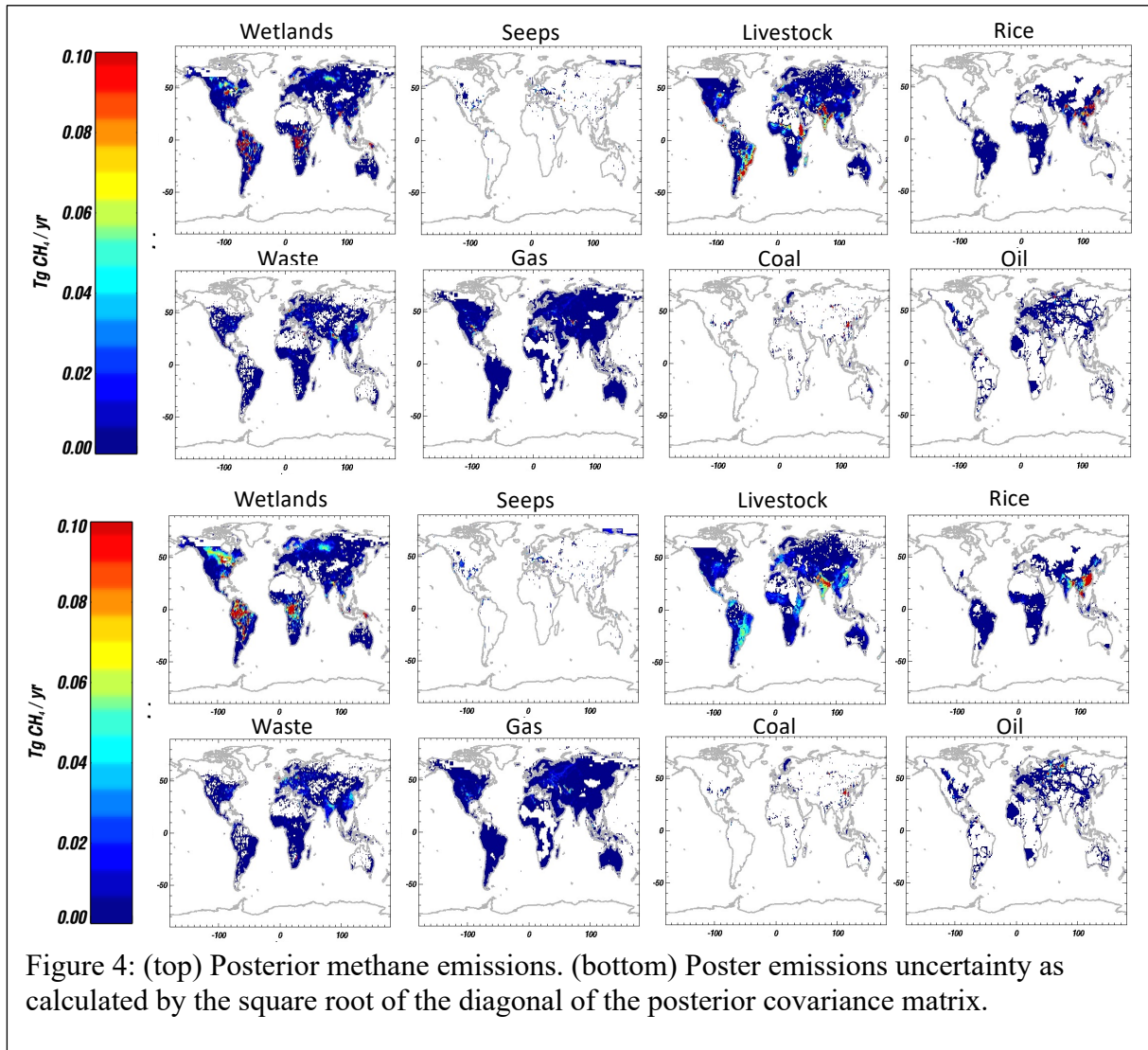
656 In this next section we first present global estimates, followed by a discussion of the  
657 sectoral emissions for the top-10 emitting countries, then emissions for all countries. Finally we  
658 test if different assumptions about bottom-up emissions as discussed in recent literature, i.e.  
659 larger wetland/aquatic emissions (Rosentreter *et al.* 2021), and larger fossil emissions  
660 (Schweitzke *et al.* 2017) affect our conclusions about the top-down results presented here.

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665 **3.1 Global Methane Budget By Sector**

666 Emissions by sector and their uncertainty at 1 degree resolution are shown in Figure 4  
 667 with the top set of panels showing the posterior emissions and the bottom showing the  
 668 uncertainties. As in Figure 3, the uncertainty at each longitude/latitude grid element is given by  
 669 the square root of the diagonal of the total error covariance. Uncertainty can decrease for  
 670 emissions even when there is more than one type of emission in a grid box. As shown in  
 671 Equation 8, this uncertainty reduction depends on the magnitude of the emission and its  
 672 uncertainty, its correlations with nearby emissions of the same type (Section 2.3) and the  
 673 magnitude and uncertainty of emissions within the same grid box.

674 Inspection of Figure 4 (bottom panel) and Figure 3 shows reduction of uncertainty in  
 675 many parts of the world relate to the prior such as the larger wetlands and agricultural regions in

676 India and Asia. The right panel of Table 1 shows the global total posterior emissions by sector.  
677 The increase in sectoral emissions relative to the prior for the agriculture sector and reduction in  
678 fossil emissions reflect the top-down flux estimates (Figure 2) which show a lower posterior flux  
679 relative to the prior in fossil emitting regions such as Russia and N. America (with the exception  
680 of Southern USA) and increases in regions where livestock and rice emissions are expected to be  
681 the largest source relative to other emissions such as in India, Brazil, Argentina, and East Africa.

682 **Comparisons to Previous Top-Down Inversions Using GOSAT and GEOS-Chem:** Our  
683 results are consistent with previous top-down estimates based on the satellite GOSAT data. For  
684 example, the results here are based on the inversion framework from Zhang *et al.* (2021) and Qu  
685 *et al.* (2021), and are therefore generally consistent for the larger emissions such as wetlands, and  
686 livestock, or the emissions which are spatially distinct from other sources and therefore easier to  
687 resolve with remote sensing such as oil and coal. However, our estimates for rice, waste, seeps  
688 are very different and this is likely because our choice of priors for these sectors are different and  
689 because Qu *et al.* (2021) uses a uniform scaling approach to project fluxes to emissions whereas  
690 we account for the prior uncertainties. Similarly, our results for wetlands, livestock, and fossil  
691 emissions are consistent with previous GOSAT based inversions (e.g. Maasackers *et al.* 2019;  
692 Zhang *et al.*, 2021) with the caveat that these estimates are for earlier time periods and changes  
693 in emissions can affect interpretation of any differences. Ma *et al.* (2021) uses GOSAT based  
694 wetland estimates to show that wetland emissions for the years 2010-2018 are likely even lower  
695 than our results. As with results presented here they take into account the spatial resolution and  
696 prior of the top-down fluxes but use a different approach to quantify emissions; they select  
697 “high” performing wetland models based on comparison of an ensemble of models with mean  
698 wetland emissions and temporal variability. The total emissions for these highest performing  
699 models 117 – 189 Tg CH<sub>4</sub>/yr is lower, but within the uncertainty of the results here. These  
700 difference in results, even when using similar models and data, highlight the importance of the  
701 choice of priors as well as the methodology by which fluxes are projected back to emissions as  
702 estimates for sectoral emissions can be very different from one estimate to the other depending  
703 on these choices.

704 **Comparisons to Top-Down Inversions from GCP:** Emissions in Table 4 can be compared  
705 to top-down inversions from the Global Carbon Project (GCP) when aggregated into combined  
706 categories (Saunois *et al.* 2020). For example our agriculture and waste emissions are ~263 +/-

707 24 Tg CH<sub>4</sub>/yr, anthropogenic fossil emissions are 82 +/- 12 Tg CH<sub>4</sub>/yr, and natural  
708 wetland/aquatic emissions are 180 +/- 10 Tg CH<sub>4</sub>/yr. These are within the reported uncertainties  
709 of top-down inversions in GCP which are [205-246 Tg CH<sub>4</sub>/yr], [91-121 Tg CH<sub>4</sub>/yr], and [155-  
710 217 Tg CH<sub>4</sub>/yr] respectively, but on the high side for agriculture and waste and on the low side  
711 for fossil emissions. These differences between GCP and emissions reported here likely  
712 represent the differences in information content and sampling from satellite versus ground-based  
713 data as most of top-down ensembles reported in Sauniois *et al.* (2020) are based on in situ  
714 measurements which are typically in background regions and which are therefore not as sensitive  
715 to the spatial distribution of emissions as the satellite based estimates (e.g. Figure 6 from Yin *et*  
716 *al.* 2021). However, one set of results included with the top-down GCP results that is based on  
717 GOSAT data (i.e. Tsuruta *et al.* 2017) is consistent with our results as they report biospheric  
718 emissions of ~172 +/- 29 Tg CH<sub>4</sub>/yr. Note the other paper citations in the GCP methane paper  
719 that indicate use GOSAT data describe the model setup and results for CO emissions or for  
720 regional results so we cannot explicitly compare to their results.

721 **Fossil Emissions:** Our posterior results for anthropogenic fossil emissions (82 +/- 12 Tg  
722 CH<sub>4</sub>/yr) and natural (22.5 +/- 3.8) are lower than our prior and in general do not reflect recent  
723 papers that suggest much higher fossil emissions using measurements of δ<sup>13</sup>CH<sub>4</sub> (e.g.  
724 Schwietzke *et al.* 2016 indicates 211 +/- 33 Tg CH<sub>4</sub>/yr for anthro + natural fossil emission) or  
725 upscaled from aircraft measurements over USA basins (e.g. Alvarez *et al.* 2018). However, as  
726 discussed in Turner *et al.* (2019), care must be taken in using isotope measurements to infer the  
727 partitioning of methane sources because of large uncertainties in the emission factors of different  
728 sources at different latitudes. Upscaling also can have large uncertainties as emission factors that  
729 relate activity data to emissions can vary significantly from region to region. Our global  
730 posterior fossil emissions are consistent with more recent reports of fossil emissions, ~84 Tg  
731 CH<sub>4</sub>/yr, to the UNFCCC (Scarpelli *et al.* 2022) for 2019, suggesting that our lower posterior  
732 estimates of fossil emissions are not unreasonable.

733 Onshore geological seeps represent another largely uncertain source of fossil emissions  
734 with values ranging from 2 to 30 Tg CH<sub>4</sub>/yr. For example, the top-down flux estimate, used as a  
735 basis for the sectoral emissions attribution, assumes a prior of ~2 Tg CH<sub>4</sub>/yr. However, our  
736 choice of prior (part of the **z<sub>A</sub>** vector, Equation 7) is based on Etiope *et al.* (2019) with a value of  
737 32.0 +/- 6.2, resulting in a posterior of 22.5 +/- 3.8 Tg CH<sub>4</sub>/yr. This reduction in uncertainty is

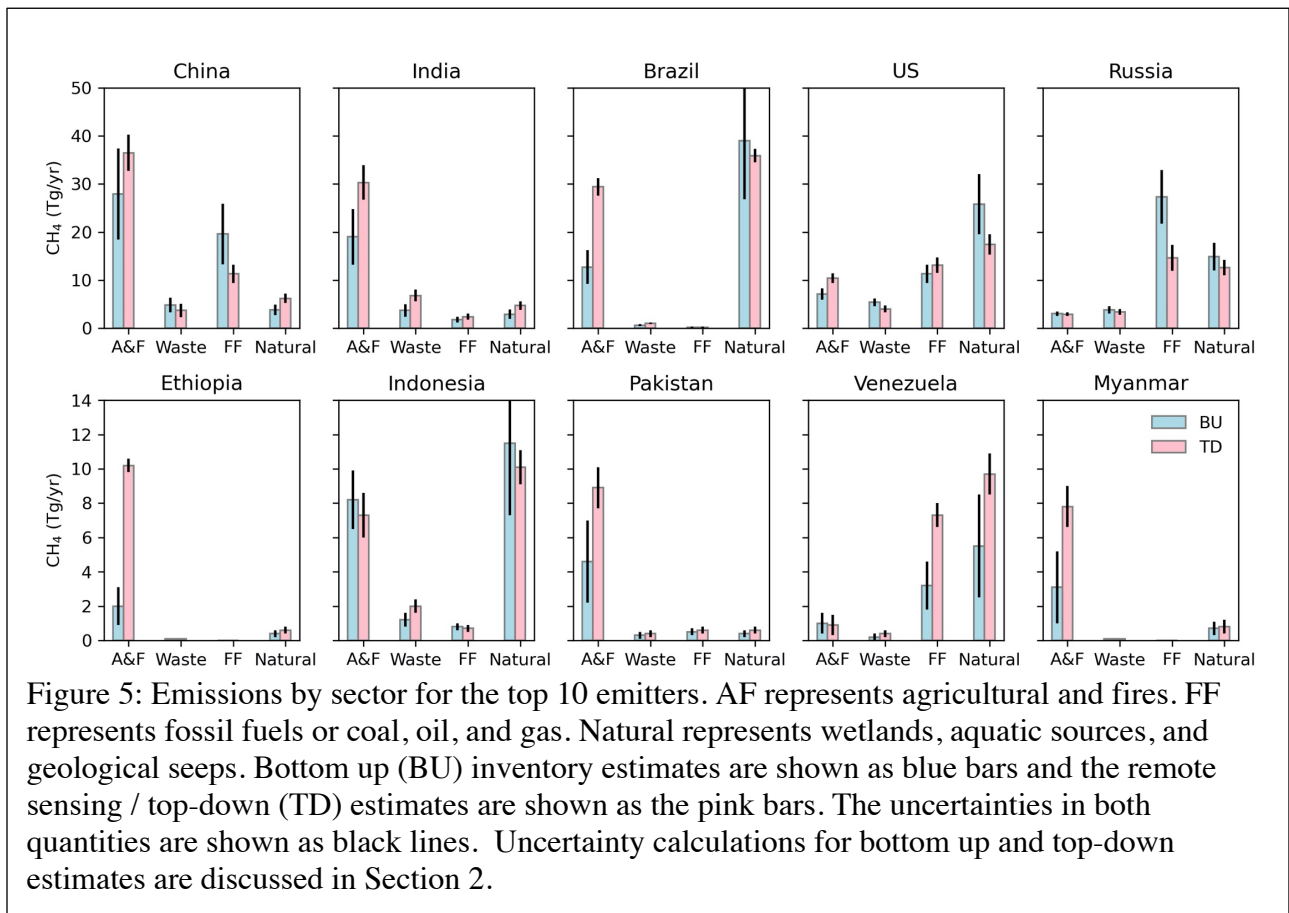
738 substantial suggesting that remote sensing is providing good information about this source. A  
 739 caveat is that seep emissions tend to overlap those from coal and oil (Figure 4) suggesting a  
 740 potential equifinality between these emissions estimates. Combining fossil emissions from the  
 741 seep category with anthropogenic fossil emissions increases the overall fossil total and would  
 742 make the total fossil emissions (natural + anthropogenic) consistent with top-down results from  
 743 GC. Based on these results, we suggest this category attention deserves measurements, especially  
 744 from the up and coming high-resolution greenhouse gas measurements such as Carbon Mapper.

745

### 746 *3.2 Top 10 Emitting Countries*

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750

751 Figure 5 lists the top 10 emitting Countries ranked by total anthropogenic emissions as  
 752 calculated using this remote sensing system. Sectoral attribution is based on the nine categories

753 in Table 3; here we combine categories so that they are similar to what is being reported for the  
754 CO<sub>2</sub> based carbon inventories. The different categories are AF, which includes the sectors for  
755 agriculture (livestock and rice) and fires. This category is similar to the Agriculture, Forestry,  
756 and Land Use category or “AFOLU” a used in CO<sub>2</sub> based carbon inventories. W is the waste  
757 category, FF is the fossil category, which includes extraction, transport and use of coal, oil, and  
758 natural gas (Scarpelli *et al.* 2020; 2021). The Natural category, includes wetlands and geological  
759 seeps. The top five emitting countries are essentially the same from the bottom-up and top-down.  
760 However, top emitting countries with most emissions from the agriculture sector, likely due to  
761 livestock (see table in Section 4). While top-down and inventory emissions for China, USA, and  
762 Indonesia are consistent; there are major differences between our top-down results and  
763 inventories for the other countries. We next compare these results to those of previous studies;  
764 however, as stated earlier, these results should be treated cautiously and as a starting point for  
765 future research as differences can also be due to unquantified uncertainties in either the remote  
766 sensing data or the transport model used to relate concentrations to fluxes.

767 Our results are consistent with those from Maasakkers *et al.* (2019), Zhang *et al.* (2021)  
768 and Qu *et al.* (2021); however this is not too surprising as emissions that are reported here are  
769 based on the flux inversion system from these studies. A notable difference in methodology is  
770 that Qu *et al.* (2021) who also derives fluxes based on total column data from the Tropospheric  
771 Monitoring Instrument (TROPOMI). However, Qu *et al.* (2021) finds that country totals for the  
772 top-5 are essentially the same based on GOSAT and TROPOMI except for Brazil, but attributed  
773 large differences between TROPOMI and GOSAT to systematic errors in the TROPOMI total  
774 column data related to low surface albedo over Brazil; consequently, the TROPOMI based  
775 estimates in this region should be treated more cautiously.

776 Comparisons of these results to other estimates discussed in the literature can show  
777 substantial differences in either total emissions or attribution or both. For example Ganesan *et al.*  
778 (2017), using in situ and satellite atmospheric methane data, finds much lower total Indian  
779 emissions of 22 +/- 2.3 Tg CH<sub>4</sub>/yr for the 2010-2015 time period as compared to 39.5 +/- 5.4 for  
780 our study (and the Qu *et al.* 2021, Zhang *et al.* 2021 studies) and 36.5 +/-5.3 from Janardanan *et*  
781 *al.* (2020). Miller *et al.* (2019) provides similar total emissions for China of 61.5 +/- 2.7 Tg  
782 CH<sub>4</sub>/yr but different partitioning; for example they find that Coal is the largest source of  
783 emissions based on comparison of top-down fluxes to EDGAR emissions and using a relative

784 weighting attribution flux to emissions attribution approach, whereas we find that agriculture  
785 (primarily Rice, Table 3 Section 4) is the largest sector. A major caveat is that attribution of  
786 emissions from total fluxes is challenging for China because many of the strongest emissions  
787 (e.g. coal, livestock, and rice as shown in Figures 3 and 4) overlap within the spatial resolution of  
788 the top-down estimate which is less than 2.5 degrees based on gridding used for the flux  
789 inversion and the variable sensitivity of the averaging kernel. While in principal these  
790 uncertainties due to limited spatial resolution are quantified based on our assumed prior  
791 covariance for each sector, it is quite possible that both our choice of the location of the  
792 emissions and corresponding prior covariance are incorrect due to less confidence in the  
793 emissions characterization in this region (Janssens-Maenhout *et al.* 2019). Our results are  
794 consistent (within uncertainties) for recent results by Deng *et al.* (2021); total anthropogenic  
795 emissions from Table 3 are within uncertainty of reported bottom-up and top-down total  
796 anthropogenic emissions shown in Figure 4 of Deng *et al.* (2021), even if the attribution of  
797 emissions may differ. Similarly, top-down based country level anthropogenic emissions from  
798 Stavert *et al.* (2022) are consistent, when we are able to directly compare emissions country to  
799 country, although many of their emissions only agree at the outer edge of the reported  
800 uncertainties.

801 We find that Myanmar has anonymously large agricultural emissions (primarily from  
802 livestock, Table 3 Section 4) relative to prior assumptions. Given that the DOFS reported for  
803 Myanmar is 2.7, we expect that the fluxes here are well resolved such that it is possible that  
804 poorly characterized prior emissions drive this difference between prior and posterior. For  
805 example, Janardanan *et al.* (2020) also reports similar top-down emissions of 6.1 +/- 0.8 Tg  
806 using a higher resolution satellite based flux inversion. However, an alternative explanation  
807 could be that errors in model transport could project to larger than expected fluxes (Equation 9)  
808 in this region as Jiang *et al.* (2013) finds that regions with substantial atmospheric convection  
809 can have large biases in top-down surface emission estimates.

810 Ethiopia also has larger than expected agricultural (livestock emissions) as compared to  
811 the prior. As with Myanmar, the prior emissions could be too low. For example, the amount of  
812 cattle and other livestock, between 80 and 90 million in 2015 and growing (Bachewe *et al.* 2018,  
813 statista.com) is not that different in size than USA livestock, ~93 million in 2021 (statista.com),  
814 suggesting that they could also have comparable livestock emissions. An alternative explanation

815 for this discrepancy are very low prior emissions in neighboring Sudan despite possible large  
816 numbers of cattle in this region as well (knoema.com) suggesting that livestock inventories in the  
817 E. African regions need to be re-examined.

818 Russian posterior fossil emissions are substantially lower than those initially reported in  
819 Scarpelli *et al.* (2020), which are based on reports to the UNFCCC in 2017. However, more recent  
820 reporting to the UNFCCC also suggest a much smaller bottom-up fossil estimate of  $\sim 7$  Tg CH<sub>4</sub>/yr  
821 (Scarpelli *et al.* 2021). Table 3 (next section) indicates that remote sensing provides the best  
822 information about Russian oil and to some extent coal emissions as the reduction of uncertainty  
823 is largest for these sectors but has little change for gas emissions. Total emissions for oil and coal  
824 are 11.2 +/- 1.9 indicating that total fossil emissions are likely larger than expected for the latest  
825 reports to the UNFCCC but smaller than previous. As discussed previously, these top-down  
826 estimates should be treated cautiously and only as a starting point for future studies due to the  
827 limited sensitivity and potential uncertainties in both top down and bottom up.

828

### 829 ***3.3 Results for all Countries***

830

831 This section presents the complete table (Table 3, Appendix 1) of emissions by sector and  
832 country. As discussed previously in Section 2.1, we project the sectoral emissions in each 1  
833 degree grid to each country using a country map to quantify the emissions and their uncertainties  
834 for each country. The table is ordered by Degrees of Freedom for Signal (DOFS), which is a  
835 metric of sensitivity for inversion problems. As discussed in Section 2.1, the DOFS is a metric  
836 for the sensitivity of the flux estimate. For example, a DOFS of 1 means that this remote sensing  
837 system (GOSAT plus GEOS-Chem) can generally resolve the countries total emissions,  
838 assuming the sensitivity is evenly distributed across the country. More DOFS means that more  
839 emissions can be spatially resolved. However, even a DOFS of 0.5 means that half of the  
840 estimate is weighted by the measurement, with the estimate increasingly weighted by the *a priori*  
841 as the DOFS approaches zero. For these reasons we report estimates for all countries, even if the  
842 DOFS are effectively zero as information about the *a priori* inventories from the measurement  
843 might be useful even if not well informed by the satellite data. To distinguish these different  
844 levels of sensitivity, we color countries with corresponding DOFS greater than 1.0 as green,  
845 between 0.5 and 1.0 as yellow, and below 0.5 as red.

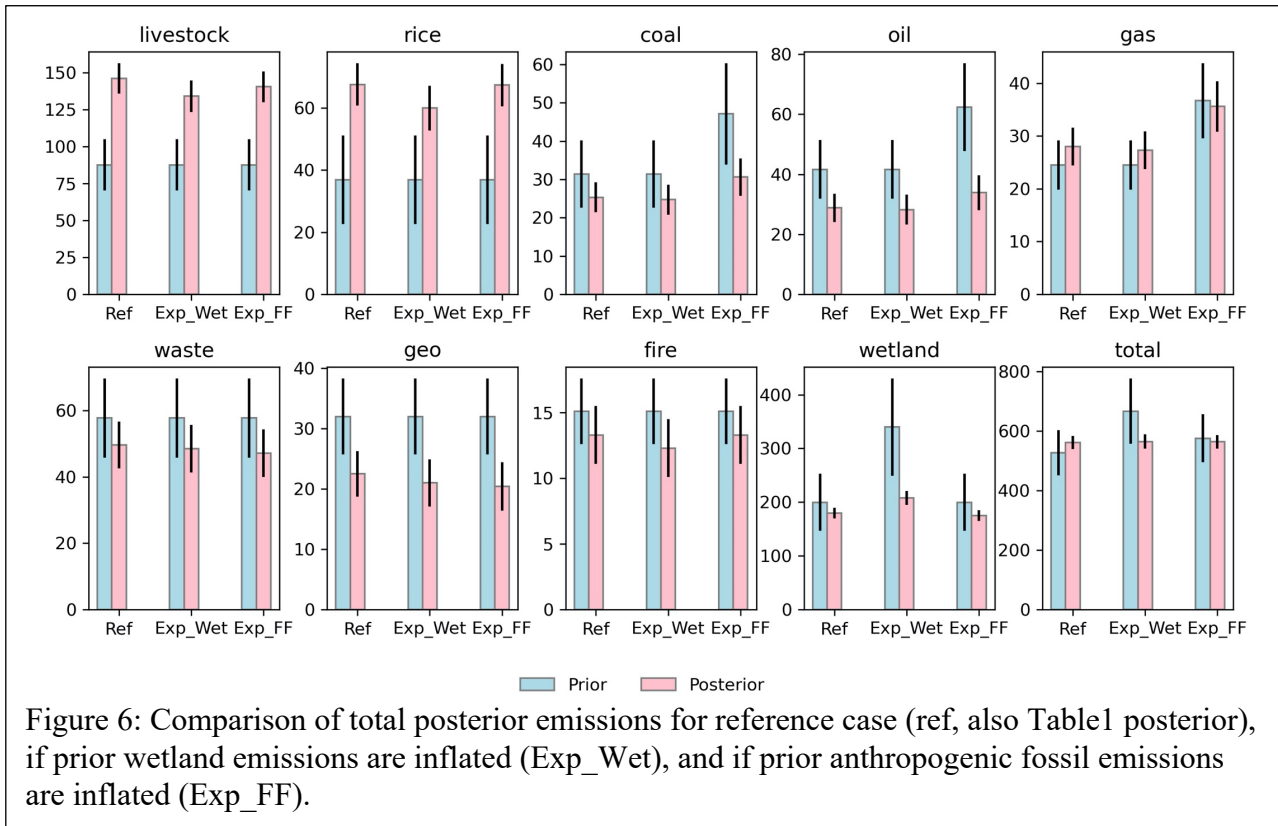


846 The DOFS are calculated from the Averaging Kernel matrix provided by the GEOS-  
847 Chem based inversion (Section 2.1). To calculate the DOFS for a given country we project the  
848 diagonal of the Averaging Kernel (Figure 2) to 1-degree resolution and then add up these values  
849 based on the 1-degree country map used in this study. Note that the total DOFS between the  
850 reduced resolution flux inversion and the 1-degree map is preserved. Table 3 indicates that the  
851 GOSAT based top-down estimate can quantify total emissions (i.e. reduce uncertainty) for  
852 approximately 57 countries as the DOFS for the 57<sup>th</sup> country is more than 1 and less than 1 for  
853 the 58<sup>th</sup> country. As discussed previously, As DOFS approaches zero there is less reduction in  
854 uncertainty using the top-down system discussed here. Furthermore, inspection of Table 3 shows  
855 that even countries where DOFS are between 1 and 2 show little reduction of uncertainty; this  
856 happens because of cross-terms in the sensitivity project uncertainty from one sector or region  
857 into another as shown in Equation 10.

858 The astute reader will notice negative emissions in some countries in Table 3. Negative  
859 emissions are a possible solution for inverse problems using linear updates, such as used here,  
860 even if they are not physically possible. Typically negative emissions occur when there are  
861 limited constraints on emissions in one region with large values in the state vector in a  
862 neighboring region; this is also known as “jack-knifing” in the inverse community. For example,  
863 livestock emissions for Peru are shown to be negative in Table 3, likely because Peru is near the  
864 Amazon basin which has substantive wetland emissions and the cross-correlations between these  
865 regions result in negative values in Peru livestock. In this case we would assume there is no  
866 information from this remote sensing system on this category and ignore these results.

### 867 ***3.4 What Happens to (Top Down) Methane Budget if Priors for Wetland/Aquatic and*** 868 ***Fossil Emissions are Substantially Increased?***

869  
870  
871 Equations 7 and 8 also allow us to test other prior emission inventories to determine if  
872 they are consistent with top-down fluxes. This approach is similar to the “prior swapping”  
873 approach described in Rodgers and Connor (2003) but can also include “prior covariance  
874 swapping” as discussed in Cusworth *et al.* (2021). This approach involves replacing the  $\mathbf{z}_A$  and  
875  $\mathbf{Z}_A$  shown in Section 2.2 with different formulations. In this section we test what happens if we  
876 inflate the prior emissions for the wetland or fossil fuel categories such that they are consistent  
877 with other studies indicating much higher values than expected from top-down estimates, e.g.



878 Rosentreter *et al.* (2021) for wetland/aquatic emissions and Schwietzke *et al.* (2017) for fossil  
 879 emissions. Figure 6 shows the results of these two studies. The bars labeled “Ref” indicate the  
 880 prior used for the results reported in this manuscript. The bars labeled “Wet” indicated the  
 881 increased wetland study (which also includes increases to lake and river emissions as the wetland  
 882 models include these categories, Bloom *et al.* 2017) and the bars labeled “FF” indicate the study  
 883 where anthropogenic fossil fuels are increased by 50%. We find that even with a very large prior  
 884 emissions for wetland/aquatic sources, the posterior gives an estimate of 208 +/- 12.8 Tg CH<sub>4</sub>/yr  
 885 as compared to 179.8 +/-10 for the reference values. This decrease from the inflated prior of  
 886 ~340 Tg CH<sub>4</sub>/ yr to 208 Tg CH<sub>4</sub>/yr happens because the global total is constrained to ~560 Tg  
 887 CH<sub>4</sub>/yr through knowledge of the methane sink and because wetland emissions tend to be  
 888 spatially distinct from other sources. For the same reasons, fossil emissions, especially coal,  
 889 and geological seeps show a substantial decrease in uncertainty. Consequently, the posterior  
 890 emissions difference between the reference and inflated fossil studies are consistent within  
 891 uncertainty and generally these emissions are much less than either the reference or inflated  
 892 priors. For these reasons, it is challenging to reconcile these inflated aquatic emissions or inflated  
 893 fossil emissions with top-down results. As noted previously, these comparisons should still be

894 treated cautiously and as a starting point for further research because of poorly characterized  
895 systematic errors in the chemistry transport model used to related observed concentrations to  
896 fluxes and because sources that are not included in the prior state vector but co-located with  
897 other sectors cannot be distinguished. For example, if there are significant (unspecified) aquatic  
898 emissions that are co-located with livestock emissions then the corresponding livestock  
899 emissions estimate would be biased high.

900

#### 901 **4.0 Summary and Future Directions**

902 In this paper we demonstrate, using a new Bayesian algorithm, estimates of emissions by  
903 sector at 1 degree resolution and by country, by using a combination of prior information of the  
904 emissions, satellite data, and a global chemistry transport model. Uncertainties are provided for  
905 representation (or smoothing) error and data precision but not for systematic errors in the  
906 transport model or data. Using a metric called the degrees-of-freedom for signal (DOFS), we  
907 show that the combination of GOSAT based satellite data with the GEOS-Chem model and prior  
908 uncertainties can estimate total emissions for about 57 of the 242 countries, with only partial  
909 information for the remaining countries. Our results can be used for comparison to country  
910 level, bottom-up inventories by sector that might be, for example, provided by the global stock  
911 take. However, any discrepancies between these top-down and inventory based estimates should  
912 be considered as a starting point for future investigations given the potential for systematic errors  
913 affecting the top-down results such as from accuracy limitations in the data or in the chemistry  
914 transport model used to estimate fluxes from the data (e.g. Buchwitz *et al.* 2015; Jiang *et al.*  
915 2015; McNorton *et al.* 2020; Schuh *et al.* 2019. Alternatively, countries with little capability for  
916 quantifying bottom-up emissions could use these results, along with other published top-down  
917 estimates (e.g. Deng *et al.* 2021; Stavert *et al.* 2022) for their contribution to the global stock  
918 take.

919 In the absence of systematic errors, we find robust estimates for livestock, coal, oil, seeps,  
920 fires, and wetlands as these can (on average) be distinguished from other sources using remote  
921 sensing given their distinct locations. Our results are consistent (within uncertainty) with  
922 previous top-down estimates such as the 2017 Global Carbon Project that are primarily based on  
923 in situ data. However, these remote sensing estimates are on the high side for agricultural and  
924 waste emissions and the low side for fossil and wetland emissions. On the other hand, total fossil

925 emissions reported here are consistent with recent reports of fossil emissions to the UNFCCC  
926 (Scarpelli *et al.* 2022).

927 The new Bayesian algorithm we demonstrate can be used to test if different prior emissions  
928 are consistent with our posterior emissions estimates. For example, we find that inflating the  
929 priors for wetland/aquatic fluxes, or alternatively fossil emissions do not fundamentally alter our  
930 estimates for these sectors. Consequently, the remote sensing estimates reported here show much  
931 lower wetland and fossil emissions than these studies based on bottom-up models and isotope  
932 data, and much larger agricultural and waste emissions. The largest differences between remote  
933 sensing and these other estimates occur in Brazil and India (primarily related to livestock),  
934 Russia (fossil emissions), and Central and E. Africa (livestock). These contrasting differences  
935 between the remote sensing based results and bottom-up models suggest that additional research  
936 is needed in these geographical areas to reconcile global methane budget estimates.

937 **Future Directions:** We are evaluating how to characterize systematic errors related to the  
938 atmospheric chemistry transport model (e.g. Schuh *et al.* 2019) and in the satellite data to our  
939 error analysis and we expect the next version of these estimates to contain these uncertainties We  
940 also expect to add isotopic information through new flux estimates based on the surface network  
941 and the GEOS-Chem model; these independent data can be used to test the partitioning of  
942 biogenic, fossil, and pyrogenic emissions (e.g. Worden *et al.* 2017). We are also examining how  
943 to combine high-resolution emissions estimates based on aircraft data and imaging spectrometers  
944 such as GHG-Sat or Carbon Mapper to the top-down fluxes to improve inventory estimates at  
945 finer spatial scales than reported here. Finally, the posterior emissions and covariances  
946 demonstrated in this manuscript can be used as priors in subsequent emissions estimates using  
947 data from other measurements such as from the upcoming CO2M, Methane-Sat, and Carbon  
948 Mapper instruments.

949

950

## 951 **5.0 Data Repositories**

952

953 The prior and posterior emissions and covariances are stored on <https://cmsflux.jpl.nasa.gov/>.

954

955 Please refer to Qu *et al.* (2021) for data related to the top-down flux inversion.

956

957 The provenance of individual inventories that are used to generate the emissions and inventories  
958 are shown in Table 2.

959

## 960 **6.0 Author Contributions**

961

962 JW led the integration of results and writing and developed the prior covariances. DC provided  
963 the emissions attribution with JW and AB and co-wrote Section 2.2. ZQ and YZ provided the  
964 flux estimates and co-wrote section 2.1. YY SM and AB supported the attribution derivation and  
965 analysis. BB and DC helped link results to the global stock take. TS and JM supported the  
966 inventory description and analysis. RD and DJ helped design the overall flux inversion and  
967 emissions attribution system described in the paper. All co-authors have read the paper and  
968 provided feedback.

969

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971

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978

979

980

981 **8.0 Appendix table of emissions for each country ordered by DOFS**

982

983 Table 3: Table of Emissions for Each Country.

984 This table provides the top-down and bottom up estimates for each sector based on the  
 985 methodology described in this paper. The table is ordered by DOFS which is the metric for  
 986 sensitivity for the remote sensing system described in this paper. The first row for each country  
 987 provides the top-down result and the second row is the bottom-up. Prior inventories are shown in  
 988 Table 2. Green are for results where DOFS > 1. Yellow corresponds to 0.5 < DOFS < 1. Red  
 989 corresponds to DOFS < 0.5

Sector	Livestock Tg CH <sub>4</sub> /yr	Rice Tg CH <sub>4</sub> /yr	Waste Tg CH <sub>4</sub> /yr	Fire Tg CH <sub>4</sub> /yr	Oil Tg CH <sub>4</sub> /yr	Coal Tg CH <sub>4</sub> /yr	Gas Tg CH <sub>4</sub> /yr	Seeps Tg CH <sub>4</sub> /yr	Wetland/ Aquatic Tg CH <sub>4</sub> /yr	DOFS	Total Anthro
1) Brazil	27.5+/- 1.3	0.20+/- 0.10	1.0+/- 0.2	1.7+/- 0.4	0.18+/- 0.05	0.05+/- 0.02	0.00+/- 0.00	0.05+/- 0.02	35.9+/- 1.4	46	30.6+/- (1.4- 2.0)
Inventory	11.0+/- 3.0	0.26+/- 0.09	0.55+/- 0.20	1.5+/- 0.4	0.16+/- 0.05	0.05+/- 0.02	0.00+/- 0.00	0.06+/- 0.02	39.0+/- 12.2		13.5+/- (3.0- 3.7)
2) Russian Federation	1.3+/-0.2	0.07+/- 0.02	3.4+/- 0.6	1.5+/- 0.2	7.6+/- 1.4	3.6+/- 0.5	3.3+/- 0.7	1.4+/- 0.4	11.3+/- 1.2	35.8	20.9+/- (1.8- 3.7)
Inventory	1.3+/-0.3	0.09+/- 0.02	3.8+/- 0.8	1.6+/- 0.2	20.4+/- 3.9	2.5+/- 0.9	4.4+/- 0.8	2.6+/- 0.6	12.3+/- 2.3		34.1+/- (4.2- 6.8)
3) United States of America	9.9+/-0.9	0.27+/- 0.07	4.0+/- 0.7	0.22+/- 0.04	2.4+/- 0.3	2.8+/- 0.4	7.9+/- 0.9	2.7+/- 0.8	14.6+/- 1.3	32.2	27.6+/- (1.5- 3.3)
Inventory	6.4+/-1.1	0.38+/- 0.06	5.4+/- 0.8	0.26+/- 0.06	1.7+/- 0.3	3.0+/- 0.5	6.5+/- 1.1	6.7+/- 1.1	19.0+/- 5.3		23.8+/- (1.9- 3.9)
4) Canada	0.90+/- 0.15	0.00+/- 0.00	0.43+/- 0.37	0.76+/- 0.20	0.74+/- 0.26	0.05+/- 0.01	0.82+/- 0.17	1.1+/- 0.2	9.2+/- 0.7	31.5	3.7+/- (0.5- 1.2)
Inventory	0.91+/- 0.15	0.00+/- 0.00	1.2+/- 0.4	1.1+/- 0.3	0.88+/- 0.27	0.05+/- 0.01	0.80+/- 0.18	1.1+/- 0.2	18.0+/- 4.6		5.0+/- (0.6- 1.3)
5) China	6.6+/-1.7	29.6+/- 2.1	3.7+/- 1.4	0.23+/- 0.03	1.1+/- 0.3	10.1+/- 1.6	0.11+/- 0.03	1.2+/- 0.3	5.0+/- 0.8	26.5	51.5+/- (3.4- 7.1)
Inventory	8.6+/-2.1	19.1+/- 7.4	4.8+/- 1.5	0.23+/- 0.03	0.99+/- 0.28	18.5+/- 5.9	0.12+/- 0.03	1.0+/- 0.3	2.8+/- 0.8		52.3+/- (9.8- 17.3)
6) India	23.9+/- 2.0	6.3+/- 1.6	6.8+/- 1.2	0.09+/- 0.02	0.03+/- 0.01	0.91+/- 0.37	1.5+/- 0.2	0.12+/- 0.06	4.6+/- 0.8	20.8	39.5+/- (2.8- 5.4)
Inventory	13.0+/- 4.1	5.9+/- 1.7	3.7+/- 1.3	0.09+/- 0.02	0.03+/- 0.01	0.84+/- 0.38	0.90+/- 0.24	0.13+/- 0.06	2.8+/- 0.9		24.5+/- (4.6- 7.7)

7) Democratic Republic of the Congo	0.05+/-0.02	0.06+/-0.03	0.22+/-0.05	1.5+/-0.3	-0.07+/-0.04	0.00+/-0.00	0.00+/-0.00	0.04+/-0.01	17.6+/-1.0	16.9	1.8+/- (0.4-0.5)
Inventory	0.06+/-0.02	0.07+/-0.03	0.24+/-0.05	1.1+/-0.4	0.07+/-0.05	0.00+/-0.00	0.01+/-0.00	0.04+/-0.01	21.2+/-11.1		1.6+/- (0.4-0.5)
8) Indonesia	0.95+/-0.23	4.2+/-0.6	2.0+/-0.4	2.1+/-0.5	0.48+/-0.14	0.13+/-0.05	0.08+/-0.01	0.65+/-0.17	9.4+/-0.8	16.1	10.0+/- (0.9-1.9)
Inventory	0.83+/-0.23	4.3+/-0.9	1.2+/-0.4	3.0+/-0.6	0.54+/-0.14	0.14+/-0.05	0.09+/-0.01	0.62+/-0.17	10.9+/-4.0		10.1+/- (1.2-2.4)
9) Peru	-0.52+/-0.20	-0.11+/-0.10	0.04+/-0.07	0.02+/-0.01	0.07+/-0.05	0.00+/-0.00	0.02+/-0.01	0.05+/-0.02	7.8+/-0.5	6.9	-0.48+/- (0.24-0.43)
Inventory	0.48+/-0.26	0.15+/-0.09	0.14+/-0.08	0.02+/-0.01	0.07+/-0.05	0.00+/-0.00	0.02+/-0.01	0.06+/-0.02	10.9+/-8.1		0.88+/- (0.29-0.49)
10) Australia	1.3+/-0.3	0.02+/-0.00	3.0+/-0.3	0.48+/-0.05	0.02+/-0.00	1.7+/-0.2	0.38+/-0.06	0.22+/-0.07	1.0+/-0.2	6.9	6.9+/- (0.5-0.9)
Inventory	2.2+/-0.5	0.03+/-0.00	1.4+/-0.5	0.48+/-0.05	0.02+/-0.00	1.0+/-0.3	0.37+/-0.06	0.27+/-0.08	1.1+/-0.2		5.5+/- (0.8-1.4)
11) Venezuela (Bolivarian Republic of)	0.77+/-0.52	0.02+/-0.03	0.41+/-0.17	0.08+/-0.03	7.3+/-0.7	0.00+/-0.00	0.01+/-0.00	1.3+/-0.4	8.4+/-0.9	5	8.6+/- (0.9-1.5)
Inventory	0.85+/-0.55	0.03+/-0.02	0.25+/-0.18	0.08+/-0.03	3.2+/-1.4	0.00+/-0.00	0.00+/-0.00	0.66+/-0.37	4.8+/-2.6		4.4+/- (1.5-2.1)
12) Colombia	-1.97+/-0.64	0.05+/-0.14	0.18+/-0.31	0.03+/-0.01	0.33+/-0.10	0.32+/-0.14	0.01+/-0.00	0.37+/-0.23	-0.79+/-0.73	5	-1.05+/- (0.74-1.34)
Inventory	1.3+/-0.8	0.16+/-0.12	0.46+/-0.33	0.03+/-0.01	0.26+/-0.11	0.37+/-0.14	0.01+/-0.00	0.40+/-0.24	3.7+/-2.0		2.6+/- (0.9-1.5)
13) Argentina	6.6+/-0.6	0.03+/-0.04	0.22+/-0.07	0.09+/-0.03	0.29+/-0.10	0.00+/-0.00	0.06+/-0.02	0.26+/-0.08	5.2+/-0.6	4.6	7.3+/- (0.6-0.9)
Inventory	2.6+/-1.2	0.04+/-0.03	0.15+/-0.07	0.08+/-0.03	0.31+/-0.10	0.00+/-0.00	0.06+/-0.02	0.18+/-0.09	2.4+/-1.3		3.2+/- (1.2-1.4)
14) Papua New Guinea	0.04+/-0.02	0.00+/-0.00	0.02+/-0.00	0.08+/-0.02	0.03+/-0.02	0.01+/-0.00	0.01+/-0.00	0.13+/-0.05	2.8+/-0.4	4.4	0.19+/- (0.03-0.06)
Inventory	0.04+/-0.02	0.00+/-0.00	0.02+/-0.00	0.08+/-0.02	0.04+/-0.02	0.01+/-0.00	0.01+/-0.00	0.15+/-0.05	6.0+/-4.4		0.19+/- (0.03-0.06)
15) Iran (Islamic Republic of)	2.2+/-0.2	0.18+/-0.06	0.69+/-0.12	0.00+/-0.00	3.0+/-0.4	0.02+/-0.00	0.73+/-0.16	0.26+/-0.07	0.46+/-0.13	4.3	6.8+/- (0.5-1.0)
Inventory	0.74+/-0.36	0.15+/-0.05	0.41+/-0.12	0.00+/-0.00	3.4+/-1.6	0.02+/-0.00	0.47+/-0.17	0.26+/-0.07	0.19+/-0.14		5.2+/- (1.7-2.3)
16) Bolivia (Plurinational State of)	0.60+/-0.28	0.02+/-0.02	0.03+/-0.02	0.31+/-0.16	0.05+/-0.02	0.00+/-0.00	0.02+/-0.01	0.18+/-0.08	2.2+/-0.5	4.3	1.0+/- (0.3-0.5)

Inventory	0.61+/- 0.32	0.03+/- 0.02	0.03+/- 0.02	0.34+/- 0.16	0.05+/- 0.02	0.00+/- 0.00	0.02+/- 0.01	0.19+/- 0.08	3.4+/- 2.4		1.1+/- (0.4- 0.5)
17) Mexico	4.1+/-0.5	0.00+/- 0.00	1.2+/- 0.5	0.12+/- 0.04	0.07+/- 0.03	0.12+/- 0.04	0.55+/- 0.12	0.19+/- 0.07	1.1+/- 0.3	3.7	6.1+/- (0.7- 1.2)
Inventory	2.0+/-0.9	0.01+/- 0.00	2.4+/- 1.3	0.12+/- 0.04	0.07+/- 0.03	0.09+/- 0.04	0.34+/- 0.12	0.19+/- 0.07	0.81+/- 0.32		5.0+/- (1.5- 2.3)
18) Pakistan	6.7+/-0.6	2.2+/- 0.5	0.39+/- 0.16	0.01+/- 0.00	0.26+/- 0.09	0.06+/- 0.04	0.29+/- 0.11	0.53+/- 0.16	0.08+/- 0.03	3.6	9.9+/- (0.9- 1.6)
Inventory	3.4+/-1.9	1.2+/- 0.5	0.28+/- 0.16	0.01+/- 0.00	0.19+/- 0.09	0.06+/- 0.04	0.25+/- 0.11	0.35+/- 0.18	0.08+/- 0.03		5.4+/- (2.0- 2.8)
19) Congo	0.01+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.06+/- 0.04	- 0.26+/- 0.11	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	7.5+/- 0.9	3.4	- 0.18+/- (0.12- 0.16)
Inventory	0.01+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.07+/- 0.04	0.21+/- 0.14	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	8.0+/- 6.4		0.30+/- (0.15- 0.19)
20) United Republic of Tanzania	2.8+/-0.4	0.18+/- 0.13	0.13+/- 0.04	0.34+/- 0.10	0.00+/- 0.00	0.00+/- 0.00	0.05+/- 0.03	0.06+/- 0.02	1.9+/- 0.4	3	3.5+/- (0.4- 0.7)
Inventory	0.96+/- 0.59	0.20+/- 0.14	0.12+/- 0.04	0.23+/- 0.10	0.00+/- 0.00	0.00+/- 0.00	0.05+/- 0.03	0.06+/- 0.02	1.5+/- 0.8		1.6+/- (0.6- 0.9)
21) South Africa	1.9+/-0.2	0.00+/- 0.00	0.72+/- 0.15	0.05+/- 0.01	0.00+/- 0.00	0.71+/- 0.13	0.00+/- 0.00	0.04+/- 0.01	0.21+/- 0.07	3	3.4+/- (0.3- 0.5)
Inventory	0.52+/- 0.30	0.00+/- 0.00	0.65+/- 0.25	0.05+/- 0.01	0.00+/- 0.00	0.43+/- 0.19	0.00+/- 0.00	0.04+/- 0.01	0.16+/- 0.07		1.6+/- (0.4- 0.7)
22) Ethiopia	10.1+/- 0.4	0.01+/- 0.00	0.12+/- 0.04	0.09+/- 0.05	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.14+/- 0.04	0.43+/- 0.11	2.9	10.3+/- (0.4- 0.5)
Inventory	1.9+/-1.1	0.01+/- 0.00	0.10+/- 0.04	0.08+/- 0.05	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.12+/- 0.05	0.27+/- 0.12		2.1+/- (1.1- 1.2)
23) Angola	0.13+/- 0.03	0.00+/- 0.00	0.08+/- 0.05	0.75+/- 0.22	- 1.38+/- 0.21	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	1.4+/- 0.1	2.8	- 0.41+/- (0.31- 0.51)
Inventory	0.15+/- 0.03	0.01+/- 0.00	0.14+/- 0.05	0.74+/- 0.31	0.63+/- 0.36	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.41+/- 0.16		1.7+/- (0.5- 0.8)
24) Myanmar	0.67+/- 0.47	6.9+/- 0.6	0.05+/- 0.01	0.23+/- 0.06	0.00+/- 0.00	0.01+/- 0.00	0.01+/- 0.00	0.08+/- 0.04	0.72+/- 0.31	2.7	7.8+/- (0.8- 1.2)
Inventory	0.83+/- 0.56	2.0+/- 1.4	0.05+/- 0.01	0.24+/- 0.06	0.00+/- 0.00	0.01+/- 0.00	0.01+/- 0.00	0.09+/- 0.04	0.64+/- 0.33		3.2+/- (1.5- 2.1)
25) Thailand	0.21+/- 0.18	2.7+/- 0.8	0.27+/- 0.16	0.10+/- 0.03	0.10+/- 0.16	0.02+/- 0.01	0.07+/- 0.06	0.06+/- 0.02	0.18+/- 0.35	2.4	3.5+/- (0.8- 1.4)
Inventory	0.31+/- 0.18	2.9+/- 2.2	0.26+/- 0.16	0.10+/- 0.03	0.21+/- 0.16	0.02+/- 0.01	0.09+/- 0.06	0.06+/- 0.02	0.62+/- 0.39		3.8+/- (2.2- 2.8)
26) Nigeria	1.4+/-0.4	1.2+/- 0.3	0.53+/- 0.15	0.12+/- 0.05	0.13+/- 0.08	0.38+/- 0.12	0.25+/- 0.13	0.04+/- 0.01	1.6+/- 0.3	2.3	4.0+/- (0.6- 1.2)



Inventory	0.87+/- 0.52	0.49+/- 0.40	0.47+/- 0.15	0.12+/- 0.05	0.15+/- 0.08	0.25+/- 0.12	0.20+/- 0.13	0.04+/- 0.01	0.84+/- 0.49		2.5+/- (0.7- 1.5)
27) Malaysia	0.04+/- 0.02	0.10+/- 0.07	0.26+/- 0.20	0.04+/- 0.01	0.11+/- 0.03	0.00+/- 0.00	0.11+/- 0.08	0.27+/- 0.13	0.68+/- 0.27	2.2	0.66+/- (0.23- 0.41)
Inventory	0.05+/- 0.02	0.19+/- 0.06	0.47+/- 0.22	0.04+/- 0.01	0.11+/- 0.03	0.00+/- 0.00	0.30+/- 0.08	0.27+/- 0.13	1.1+/- 0.5		1.2+/- (0.2- 0.4)
28) Sudan	0.32+/- 0.03	0.00+/- 0.00	0.08+/- 0.02	0.02+/- 0.02	0.14+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.17+/- 0.03	2.1	0.57+/- (0.05- 0.10)
Inventory	0.04+/- 0.04	0.00+/- 0.00	0.07+/- 0.02	0.03+/- 0.02	0.06+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.11+/- 0.03		0.21+/- (0.06- 0.11)
29) Zambia	0.13+/- 0.05	0.00+/- 0.00	0.07+/- 0.03	0.81+/- 0.16	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.91+/- 0.24	2.1	1.0+/- (0.2- 0.2)
Inventory	0.13+/- 0.05	0.00+/- 0.00	0.08+/- 0.04	0.42+/- 0.19	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.87+/- 0.43		0.64+/- (0.20- 0.27)
30) South Sudan	0.05+/- 0.03	0.00+/- 0.00	0.02+/- 0.00	- 0.07+/- 0.16	0.26+/- 0.06	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	3.1+/- 0.4	2.1	0.25+/- (0.17- 0.25)
Inventory	0.03+/- 0.03	0.00+/- 0.00	0.02+/- 0.00	0.34+/- 0.16	0.11+/- 0.06	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	1.8+/- 1.3		0.50+/- (0.18- 0.26)
31) Turkey	0.89+/- 0.28	0.04+/- 0.02	1.8+/- 0.5	0.01+/- 0.00	0.02+/- 0.01	0.23+/- 0.04	0.10+/- 0.03	0.33+/- 0.15	0.10+/- 0.05	2	3.1+/- (0.6- 0.9)
Inventory	0.70+/- 0.33	0.05+/- 0.02	2.0+/- 0.8	0.01+/- 0.00	0.02+/- 0.01	0.22+/- 0.04	0.10+/- 0.03	0.47+/- 0.17	0.10+/- 0.05		3.1+/- (0.9- 1.2)
32) Saudi Arabia	0.16+/- 0.05	0.00+/- 0.00	0.29+/- 0.07	0.00+/- 0.00	0.12+/- 0.09	0.00+/- 0.00	0.65+/- 0.21	0.09+/- 0.03	0.00+/- 0.00	1.9	1.2+/- (0.2- 0.4)
Inventory	0.10+/- 0.06	0.00+/- 0.00	0.23+/- 0.07	0.00+/- 0.00	0.29+/- 0.11	0.00+/- 0.00	0.53+/- 0.26	0.10+/- 0.03	0.00+/- 0.00		1.2+/- (0.3- 0.5)
33) Kazakhstan	0.58+/- 0.08	0.02+/- 0.01	0.15+/- 0.03	0.05+/- 0.01	0.12+/- 0.06	1.2+/- 0.3	0.15+/- 0.05	0.25+/- 0.07	0.39+/- 0.09	1.9	2.3+/- (0.4- 0.6)
Inventory	0.54+/- 0.08	0.03+/- 0.01	0.13+/- 0.04	0.05+/- 0.01	0.20+/- 0.07	0.90+/- 0.38	0.17+/- 0.06	0.21+/- 0.07	0.36+/- 0.10		2.0+/- (0.4- 0.6)
34) Central African Republic	0.04+/- 0.07	0.00+/- 0.00	0.02+/- 0.00	- 0.79+/- 0.17	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.04+/- 0.01	-1.00+/- 0.19	1.8	- 0.73+/- (0.18- 0.25)
Inventory	0.13+/- 0.07	0.00+/- 0.00	0.02+/- 0.00	0.40+/- 0.19	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.04+/- 0.01	0.52+/- 0.32		0.55+/- (0.20- 0.27)
35) Viet Nam	0.58+/- 0.21	3.6+/- 0.9	0.20+/- 0.10	0.08+/- 0.02	0.02+/- 0.04	0.09+/- 0.03	0.04+/- 0.03	0.08+/- 0.02	0.61+/- 0.50	1.7	4.6+/- (0.9- 1.3)
Inventory	0.35+/- 0.22	2.7+/- 1.6	0.19+/- 0.10	0.07+/- 0.02	0.12+/- 0.10	0.09+/- 0.03	0.04+/- 0.03	0.08+/- 0.02	1.0+/- 0.6		3.6+/- (1.7- 2.1)
36) France	2.2+/-0.4	0.00+/- 0.00	0.86+/- 0.28	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.05+/- 0.01	0.20+/- 0.06	0.09+/- 0.05	1.7	3.1+/- (0.5- 0.7)
Inventory	1.2+/-0.6	0.00+/- 0.00	0.70+/- 0.33	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.05+/- 0.01	0.19+/- 0.06	0.08+/- 0.05		2.0+/- (0.7- 1.0)

37) Uzbekistan	0.79+/- 0.23	0.02+/- 0.01	0.10+/- 0.04	0.00+/- 0.00	0.04+/- 0.02	0.01+/- 0.00	2.9+/- 0.4	0.04+/- 0.01	0.04+/- 0.02	1.6	3.9+/- (0.5- 0.8)
Inventory	0.56+/- 0.26	0.03+/- 0.01	0.08+/- 0.04	0.00+/- 0.00	0.03+/- 0.02	0.01+/- 0.00	2.3+/- 1.0	0.04+/- 0.01	0.04+/- 0.02		3.0+/- (1.1- 1.4)
38) Turkmenistan	0.35+/- 0.11	0.04+/- 0.01	0.02+/- 0.01	0.00+/- 0.00	1.5+/- 0.3	0.00+/- 0.00	1.1+/- 0.2	1.2+/- 0.2	0.01+/- 0.00	1.6	3.0+/- (0.4- 0.6)
Inventory	0.22+/- 0.11	0.05+/- 0.01	0.02+/- 0.01	0.00+/- 0.00	0.85+/- 0.33	0.00+/- 0.00	0.58+/- 0.26	0.58+/- 0.30	0.01+/- 0.00		1.7+/- (0.4- 0.7)
39) Philippines	0.25+/- 0.14	- 0.20+/- 0.52	0.84+/- 0.31	0.01+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.01+/- 0.00	0.29+/- 0.15	0.45+/- 0.15	1.5	0.96+/- (0.62- 0.99)
Inventory	0.26+/- 0.14	1.6+/- 0.9	0.52+/- 0.33	0.01+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.01+/- 0.00	0.32+/- 0.15	0.25+/- 0.16		2.4+/- (1.0- 1.4)
40) Paraguay	0.64+/- 0.40	0.01+/- 0.02	0.03+/- 0.03	0.05+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	1.4+/- 0.6	1.5	0.74+/- (0.40- 0.47)
Inventory	0.59+/- 0.48	0.02+/- 0.02	0.03+/- 0.03	0.05+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	1.5+/- 1.1		0.69+/- (0.49- 0.56)
41) Guyana	0.01+/- 0.01	0.07+/- 0.07	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	1.5+/- 0.3	1.5	0.09+/- (0.08- 0.09)
Inventory	0.01+/- 0.01	0.08+/- 0.07	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	1.4+/- 1.3		0.10+/- (0.07- 0.08)
42) Mozambique	0.09+/- 0.02	0.04+/- 0.03	0.08+/- 0.02	0.64+/- 0.14	0.00+/- 0.00	0.02+/- 0.01	0.01+/- 0.01	0.04+/- 0.01	1.2+/- 0.2	1.4	0.87+/- (0.15- 0.22)
Inventory	0.10+/- 0.03	0.04+/- 0.03	0.08+/- 0.02	0.35+/- 0.15	0.00+/- 0.00	0.02+/- 0.01	0.01+/- 0.01	0.04+/- 0.01	0.62+/- 0.25		0.60+/- (0.16- 0.24)
43) Egypt	1.1+/-0.3	0.23+/- 0.13	2.0+/- 0.3	0.00+/- 0.00	0.43+/- 0.11	0.00+/- 0.00	0.09+/- 0.04	0.04+/- 0.01	0.06+/- 0.02	1.4	3.9+/- (0.4- 0.8)
Inventory	0.44+/- 0.29	0.22+/- 0.12	0.66+/- 0.41	0.00+/- 0.00	0.33+/- 0.12	0.00+/- 0.00	0.07+/- 0.04	0.04+/- 0.01	0.04+/- 0.02		1.7+/- (0.5- 1.0)
44) Cameroon	0.42+/- 0.15	0.05+/- 0.04	0.13+/- 0.10	0.08+/- 0.05	0.01+/- 0.02	0.00+/- 0.00	0.04+/- 0.03	0.04+/- 0.01	-0.69+/- 0.30	1.3	0.71+/- (0.20- 0.39)
Inventory	0.23+/- 0.18	0.04+/- 0.04	0.24+/- 0.10	0.09+/- 0.05	0.03+/- 0.02	0.00+/- 0.00	0.03+/- 0.03	0.04+/- 0.01	0.72+/- 0.47		0.67+/- (0.22- 0.42)
45) Algeria	0.25+/- 0.11	0.00+/- 0.00	0.16+/- 0.08	0.00+/- 0.00	0.05+/- 0.01	0.00+/- 0.00	3.2+/- 0.3	0.12+/- 0.02	0.04+/- 0.03	1.3	3.7+/- (0.3- 0.5)
Inventory	0.22+/- 0.12	0.00+/- 0.00	0.19+/- 0.09	0.00+/- 0.00	0.05+/- 0.01	0.00+/- 0.00	1.2+/- 0.6	0.11+/- 0.02	0.05+/- 0.03		1.6+/- (0.6- 0.8)
46) Bangladesh	1.0+/-0.5	1.2+/- 1.3	0.15+/- 0.08	0.01+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.03	0.04+/- 0.01	1.4+/- 0.6	1.3	2.4+/- (1.4- 2.0)
Inventory	0.92+/- 0.60	2.6+/- 1.5	0.12+/- 0.08	0.01+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.03	0.04+/- 0.01	0.98+/- 0.60		3.7+/- (1.6- 2.2)
47) Ukraine	0.44+/- 0.16	0.00+/- 0.00	0.48+/- 0.16	0.05+/- 0.01	0.07+/- 0.02	0.57+/- 0.19	0.99+/- 0.39	- 0.05+/- 0.24	0.33+/- 0.17	1.3	2.6+/- (0.5- 0.9)

Inventory	0.36+/- 0.16	0.01+/- 0.00	0.50+/- 0.17	0.05+/- 0.01	0.07+/- 0.02	0.66+/- 0.20	1.0+/- 0.5	0.67+/- 0.31	0.31+/- 0.18		2.7+/- (0.6- 1.0)
48) Germany	1.7+/-0.5	0.00+/- 0.00	2.0+/- 0.6	0.00+/- 0.00	0.01+/- 0.00	0.10+/- 0.03	0.18+/- 0.10	0.22+/- 0.09	0.09+/- 0.06	1.3	4.0+/- (0.8- 1.2)
Inventory	1.0+/-0.6	0.00+/- 0.00	1.6+/- 0.8	0.00+/- 0.00	0.01+/- 0.00	0.10+/- 0.03	0.18+/- 0.10	0.21+/- 0.09	0.08+/- 0.06		2.9+/- (1.0- 1.5)
49) Madagascar	1.3+/-0.2	0.56+/- 0.13	0.02+/- 0.00	0.12+/- 0.04	0.01+/- 0.00	0.00+/- 0.00	0.05+/- 0.02	0.04+/- 0.01	1.1+/- 0.2	1.3	2.1+/- (0.2- 0.4)
Inventory	0.32+/- 0.21	0.18+/- 0.15	0.02+/- 0.00	0.09+/- 0.04	0.01+/- 0.00	0.00+/- 0.00	0.04+/- 0.02	0.04+/- 0.01	0.34+/- 0.20		0.66+/- (0.26- 0.42)
50) Spain	1.1+/-0.2	0.02+/- 0.01	0.94+/- 0.27	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.03+/- 0.01	0.09+/- 0.02	0.09+/- 0.05	1.2	2.1+/- (0.4- 0.5)
Inventory	0.57+/- 0.31	0.03+/- 0.01	0.81+/- 0.37	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.03+/- 0.01	0.09+/- 0.02	0.08+/- 0.05		1.4+/- (0.5- 0.7)
51) Gabon	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.55+/- 0.21	1.2	0.02+/- (0.01- 0.01)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.01+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.69+/- 0.60		0.03+/- (0.01- 0.01)
52) Kenya	1.5+/-0.4	0.01+/- 0.01	0.08+/- 0.03	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.10+/- 0.04	0.48+/- 0.15	1.2	1.6+/- (0.4- 0.4)
Inventory	0.92+/- 0.67	0.01+/- 0.01	0.07+/- 0.03	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.10+/- 0.04	0.34+/- 0.17		1.0+/- (0.7- 0.7)
53) Suriname	0.01+/- 0.00	0.02+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	2.3+/- 0.3	1.1	0.04+/- (0.02- 0.03)
Inventory	0.01+/- 0.00	0.02+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	1.7+/- 1.5		0.04+/- (0.02- 0.03)
54) Chad	1.9+/-0.2	0.00+/- 0.03	0.03+/- 0.01	- 0.02+/- 0.05	0.02+/- 0.04	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	1.7+/- 0.3	1.1	2.0+/- (0.2- 0.3)
Inventory	0.32+/- 0.22	0.03+/- 0.03	0.03+/- 0.01	0.09+/- 0.05	0.07+/- 0.04	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.67+/- 0.40		0.55+/- (0.23- 0.36)
55) Ecuador	-0.31+/- 0.21	0.01+/- 0.12	0.01+/- 0.01	0.00+/- 0.00	0.03+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.02	-0.32+/- 0.34	1	- 0.26+/- (0.24- 0.36)
Inventory	0.30+/- 0.24	0.13+/- 0.11	0.01+/- 0.01	0.00+/- 0.00	0.04+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.06+/- 0.02	0.72+/- 0.79		0.48+/- (0.27- 0.38)
56) Uganda	0.17+/- 0.34	0.01+/- 0.01	0.01+/- 0.00	0.05+/- 0.04	0.01+/- 0.00	0.00+/- 0.00	0.05+/- 0.05	0.04+/- 0.01	0.23+/- 0.37	1	0.31+/- (0.35- 0.45)
Inventory	0.47+/- 0.41	0.01+/- 0.01	0.01+/- 0.00	0.07+/- 0.04	0.01+/- 0.00	0.00+/- 0.00	0.06+/- 0.05	0.04+/- 0.01	0.82+/- 0.68		0.63+/- (0.41- 0.51)
57) Japan	0.42+/- 0.10	3.0+/- 0.4	0.51+/- 0.17	0.01+/- 0.00	0.00+/- 0.00	0.02+/- 0.00	0.01+/- 0.01	5.7+/- 0.4	1.2+/- 0.2	1	4.0+/- (0.4- 0.7)
Inventory	0.22+/- 0.10	0.89+/- 0.46	0.28+/- 0.18	0.01+/- 0.00	0.00+/- 0.00	0.02+/- 0.00	0.01+/- 0.01	0.96+/- 0.58	0.44+/- 0.21		1.4+/- (0.5- 0.8)

58) Cambodia	0.13+/- 0.11	1.4+/- 0.4	0.02+/- 0.01	0.21+/- 0.08	0.00+/- 0.00	0.00+/- 0.00	0.02+/- 0.02	0.05+/- 0.02	0.86+/- 0.57	0.95	1.8+/- (0.4- 0.7)
Inventory	0.12+/- 0.11	0.66+/- 0.66	0.02+/- 0.01	0.21+/- 0.08	0.00+/- 0.00	0.00+/- 0.00	0.02+/- 0.02	0.05+/- 0.02	0.87+/- 0.72		1.0+/- (0.7- 0.9)
59) Poland	0.31+/- 0.23	0.00+/- 0.00	0.19+/- 0.40	0.00+/- 0.00	0.05+/- 0.01	0.42+/- 0.16	0.07+/- 0.04	0.22+/- 0.12	0.08+/- 0.06	0.95	1.0+/- (0.5- 0.8)
Inventory	0.42+/- 0.24	0.00+/- 0.00	0.95+/- 0.48	0.00+/- 0.00	0.05+/- 0.01	0.52+/- 0.17	0.08+/- 0.04	0.28+/- 0.12	0.10+/- 0.06		2.0+/- (0.6- 0.9)
60) Italy	0.30+/- 0.22	0.06+/- 0.04	0.66+/- 0.41	0.01+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.16+/- 0.09	- 0.61+/- 0.55	0.13+/- 0.08	0.93	1.2+/- (0.5- 0.8)
Inventory	0.55+/- 0.24	0.07+/- 0.03	0.88+/- 0.45	0.01+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.17+/- 0.09	2.9+/- 1.1	0.13+/- 0.08		1.7+/- (0.5- 0.8)
61) Uruguay	1.8+/-0.3	0.05+/- 0.07	0.04+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.18+/- 0.09	0.89	1.9+/- (0.3- 0.4)
Inventory	0.62+/- 0.55	0.08+/- 0.07	0.03+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.17+/- 0.09		0.73+/- (0.56- 0.64)
62) Iraq	0.27+/- 0.08	0.01+/- 0.00	0.23+/- 0.08	0.00+/- 0.00	0.13+/- 0.05	0.00+/- 0.00	0.01+/- 0.00	0.16+/- 0.06	0.02+/- 0.01	0.88	0.65+/- (0.12- 0.22)
Inventory	0.13+/- 0.09	0.01+/- 0.00	0.15+/- 0.09	0.00+/- 0.00	0.13+/- 0.06	0.00+/- 0.00	0.01+/- 0.00	0.13+/- 0.07	0.02+/- 0.01		0.43+/- (0.14- 0.24)
63) Mali	1.2+/-0.2	0.19+/- 0.10	0.04+/- 0.01	0.05+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.22+/- 0.07	0.86	1.5+/- (0.2- 0.3)
Inventory	0.52+/- 0.33	0.13+/- 0.12	0.04+/- 0.01	0.05+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.18+/- 0.07		0.75+/- (0.35- 0.49)
64) Chile	0.43+/- 0.12	0.00+/- 0.00	0.49+/- 0.11	0.01+/- 0.01	0.01+/- 0.01	0.01+/- 0.00	0.02+/- 0.01	0.15+/- 0.05	0.28+/- 0.07	0.85	0.97+/- (0.16- 0.26)
Inventory	0.24+/- 0.14	0.00+/- 0.00	0.18+/- 0.12	0.01+/- 0.01	0.01+/- 0.01	0.01+/- 0.00	0.02+/- 0.01	0.13+/- 0.05	0.27+/- 0.08		0.48+/- (0.18- 0.29)
65) United Kingdom of Great Britain and Northern Ireland	0.61+/- 0.41	0.00+/- 0.00	0.55+/- 0.74	0.00+/- 0.00	0.01+/- 0.00	0.02+/- 0.01	0.16+/- 0.10	0.55+/- 0.21	0.12+/- 0.08	0.78	1.3+/- (0.8- 1.3)
Inventory	0.75+/- 0.44	0.00+/- 0.00	3.8+/- 2.3	0.00+/- 0.00	0.01+/- 0.00	0.02+/- 0.01	0.16+/- 0.10	0.55+/- 0.22	0.12+/- 0.08		4.8+/- (2.3- 2.8)
66) Republic of Korea	0.30+/- 0.12	1.5+/- 0.2	0.08+/- 0.05	0.00+/- 0.00	0.14+/- 0.09	0.02+/- 0.01	0.12+/- 0.08	0.04+/- 0.01	0.06+/- 0.04	0.78	2.2+/- (0.3- 0.6)
Inventory	0.15+/- 0.13	0.35+/- 0.29	0.06+/- 0.05	0.00+/- 0.00	0.10+/- 0.09	0.02+/- 0.01	0.08+/- 0.08	0.04+/- 0.01	0.05+/- 0.04		0.77+/- (0.34- 0.64)
67) New Zealand	1.5+/-0.2	0.00+/- 0.00	0.26+/- 0.11	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.01+/- 0.00	0.18+/- 0.07	0.43+/- 0.12	0.77	1.8+/- (0.3- 0.4)
Inventory	0.70+/- 0.41	0.00+/- 0.00	0.21+/- 0.12	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.01+/- 0.00	0.17+/- 0.07	0.27+/- 0.12		0.93+/- (0.43- 0.53)

68) Afghanistan	0.70+/- 0.19	0.04+/- 0.01	0.03+/- 0.01	0.00+/- 0.00	0.01+/- 0.01	0.13+/- 0.05	0.01+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0.74	0.92+/- (0.20- 0.28)
Inventory	0.40+/- 0.27	0.05+/- 0.01	0.03+/- 0.01	0.00+/- 0.00	0.01+/- 0.01	0.11+/- 0.05	0.01+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.60+/- (0.28- 0.35)
69) Niger	1.5+/-0.2	0.01+/- 0.01	0.13+/- 0.05	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.08+/- 0.02	0.72	1.6+/- (0.2- 0.3)
Inventory	0.50+/- 0.34	0.01+/- 0.01	0.12+/- 0.05	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.04+/- 0.02		0.65+/- (0.35- 0.41)
70) Cote d'Ivoire	0.04+/- 0.05	0.02+/- 0.04	0.03+/- 0.02	0.05+/- 0.03	0.78+/- 0.31	0.00+/- 0.00	0.11+/- 0.09	0.04+/- 0.01	-0.03+/- 0.29	0.72	1.0+/- (0.3- 0.5)
Inventory	0.06+/- 0.05	0.04+/- 0.04	0.04+/- 0.02	0.05+/- 0.03	0.65+/- 0.41	0.00+/- 0.00	0.11+/- 0.09	0.04+/- 0.01	0.46+/- 0.35		0.94+/- (0.43- 0.64)
71) Sweden	0.12+/- 0.04	0.00+/- 0.00	0.12+/- 0.05	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	1.8+/- 0.4	0.71	0.25+/- (0.07- 0.09)
Inventory	0.11+/- 0.04	0.00+/- 0.00	0.11+/- 0.05	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.86+/- 0.56		0.22+/- (0.07- 0.10)
72) Zimbabwe	0.01+/- 0.11	0.00+/- 0.00	0.01+/- 0.05	0.04+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.03+/- 0.03	0.71	0.05+/- (0.12- 0.18)
Inventory	0.16+/- 0.13	0.00+/- 0.00	0.14+/- 0.07	0.03+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.06+/- 0.04		0.33+/- (0.15- 0.22)
73) United Arab Emirates	0.04+/- 0.02	0.00+/- 0.00	0.37+/- 0.18	0.00+/- 0.00	0.72+/- 0.21	0.00+/- 0.00	0.05+/- 0.05	0.04+/- 0.01	0.01+/- 0.01	0.71	1.2+/- (0.3- 0.5)
Inventory	0.03+/- 0.02	0.00+/- 0.00	0.27+/- 0.20	0.00+/- 0.00	1.3+/- 0.7	0.00+/- 0.00	0.07+/- 0.05	0.04+/- 0.01	0.01+/- 0.01		1.6+/- (0.7- 1.0)
74) Romania	0.14+/- 0.15	0.00+/- 0.00	0.09+/- 0.18	0.01+/- 0.00	0.14+/- 0.04	0.19+/- 0.10	0.18+/- 0.15	0.79+/- 0.45	0.02+/- 0.05	0.7	0.75+/- (0.29- 0.62)
Inventory	0.22+/- 0.16	0.00+/- 0.00	0.30+/- 0.19	0.01+/- 0.00	0.13+/- 0.05	0.24+/- 0.10	0.22+/- 0.15	2.1+/- 1.0	0.06+/- 0.05		1.1+/- (0.3- 0.6)
75) Nepal	-1.08+/- 0.29	- 0.04+/- 0.24	0.09+/- 0.05	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.02	0.06+/- 0.03	0.19+/- 0.08	0.69	- 0.98+/- (0.38- 0.60)
Inventory	0.54+/- 0.45	0.40+/- 0.25	0.06+/- 0.05	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.02	0.07+/- 0.03	0.10+/- 0.09		1.0+/- (0.5- 0.8)
76) Botswana	0.08+/- 0.04	0.00+/- 0.00	0.40+/- 0.24	0.03+/- 0.01	0.00+/- 0.00	0.01+/- 0.01	0.00+/- 0.00	0.04+/- 0.01	0.16+/- 0.11	0.66	0.52+/- (0.24- 0.29)
Inventory	0.09+/- 0.04	0.00+/- 0.00	3.9+/- 1.8	0.03+/- 0.01	0.00+/- 0.00	0.01+/- 0.01	0.00+/- 0.00	0.04+/- 0.01	0.20+/- 0.13		4.0+/- (1.8- 1.9)
77) Finland	0.07+/- 0.03	0.00+/- 0.00	0.11+/- 0.29	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.17+/- 0.32	0.63	0.18+/- (0.29- 0.32)
Inventory	0.07+/- 0.03	0.00+/- 0.00	0.60+/- 0.36	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.68+/- 0.49		0.67+/- (0.36- 0.38)
78) Ghana	0.02+/- 0.08	0.01+/- 0.04	0.08+/- 0.04	0.06+/- 0.05	0.04+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	-0.10+/- 0.29	0.63	0.21+/- (0.12- 0.25)

Inventory	0.10+/- 0.09	0.05+/- 0.05	0.09+/- 0.04	0.09+/- 0.05	0.05+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.49+/- 0.39		0.37+/- (0.12- 0.26)
79) Lao People's Democratic Republic	0.09+/- 0.10	- 0.27+/- 0.18	0.01+/- 0.01	0.10+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.05+/- 0.01	0.07+/- 0.14	0.59	- 0.06+/- (0.21- 0.32)
Inventory	0.12+/- 0.10	0.25+/- 0.21	0.01+/- 0.01	0.10+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.05+/- 0.01	0.21+/- 0.15		0.49+/- (0.23- 0.35)
80) Democratic People's Republic of Korea	0.06+/- 0.03	0.34+/- 0.09	0.15+/- 0.08	0.00+/- 0.00	0.00+/- 0.00	0.63+/- 0.22	0.00+/- 0.00	0.05+/- 0.01	0.10+/- 0.04	0.55	1.2+/- (0.3- 0.4)
Inventory	0.05+/- 0.03	0.15+/- 0.08	0.10+/- 0.08	0.00+/- 0.00	0.00+/- 0.00	0.48+/- 0.27	0.00+/- 0.00	0.05+/- 0.01	0.07+/- 0.05		0.78+/- (0.29- 0.47)
81) French Guiana	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.37+/- 0.17	0.48	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.30+/- 0.36		0.00+/- (0.00- 0.00)
82) Tajikistan	0.27+/- 0.13	0.00+/- 0.00	0.06+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.16+/- 0.08	0.05+/- 0.01	0.01+/- 0.01	0.47	0.50+/- (0.16- 0.26)
Inventory	0.18+/- 0.16	0.01+/- 0.00	0.04+/- 0.04	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.13+/- 0.10	0.05+/- 0.01	0.01+/- 0.01		0.37+/- (0.19- 0.30)
83) Honduras	0.54+/- 0.11	0.00+/- 0.00	0.08+/- 0.04	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.08+/- 0.03	0.80+/- 0.24	0.46	0.65+/- (0.12- 0.17)
Inventory	0.15+/- 0.14	0.00+/- 0.00	0.05+/- 0.04	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.07+/- 0.03	0.55+/- 0.48		0.22+/- (0.15- 0.20)
84) Burkina Faso	0.36+/- 0.17	0.02+/- 0.02	0.02+/- 0.01	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.03+/- 0.02	0.04+/- 0.01	0.02+/- 0.01	0.45	0.44+/- (0.17- 0.23)
Inventory	0.32+/- 0.26	0.02+/- 0.02	0.02+/- 0.01	0.02+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.03+/- 0.02	0.04+/- 0.01	0.02+/- 0.01		0.41+/- (0.26- 0.32)
85) Syrian Arab Republic	0.15+/- 0.08	0.00+/- 0.00	0.15+/- 0.06	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.02+/- 0.01	0.09+/- 0.02	0.00+/- 0.00	0.41	0.33+/- (0.10- 0.15)
Inventory	0.12+/- 0.09	0.00+/- 0.00	0.13+/- 0.08	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.02+/- 0.01	0.09+/- 0.02	0.00+/- 0.00		0.28+/- (0.12- 0.18)
86) Azerbaijan	0.46+/- 0.14	0.00+/- 0.00	0.06+/- 0.03	0.00+/- 0.00	0.36+/- 0.25	0.00+/- 0.00	0.03+/- 0.02	- 0.35+/- 0.51	0.03+/- 0.02	0.41	0.92+/- (0.29- 0.44)
Inventory	0.20+/- 0.16	0.00+/- 0.00	0.05+/- 0.03	0.00+/- 0.00	0.48+/- 0.25	0.00+/- 0.00	0.03+/- 0.02	2.8+/- 1.7	0.02+/- 0.02		0.76+/- (0.30- 0.46)
87) Morocco	0.31+/- 0.12	0.00+/- 0.00	0.11+/- 0.09	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.02	0.08+/- 0.02	0.00+/- 0.00	0.4	0.48+/- (0.16- 0.24)
Inventory	0.25+/- 0.15	0.00+/- 0.00	0.21+/- 0.10	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.05+/- 0.02	0.09+/- 0.02	0.00+/- 0.00		0.51+/- (0.18- 0.28)
88) Somalia	1.4+/-0.2	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.02+/- 0.01	0.04+/- 0.01	0.21+/- 0.06	0.39	1.4+/- (0.2- 0.3)

Inventory	0.52+/- 0.41	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.02+/- 0.01	0.04+/- 0.01	0.13+/- 0.06		0.58+/- (0.41- 0.43)
89) Kyrgyzstan	0.15+/- 0.03	0.00+/- 0.00	0.12+/- 0.05	0.00+/- 0.00	0.02+/- 0.01	0.00+/- 0.00	0.15+/- 0.06	0.05+/- 0.01	0.07+/- 0.06	0.39	0.44+/- (0.08- 0.15)
Inventory	0.14+/- 0.04	0.00+/- 0.00	0.07+/- 0.05	0.00+/- 0.00	0.02+/- 0.01	0.00+/- 0.00	0.09+/- 0.06	0.04+/- 0.01	0.08+/- 0.06		0.32+/- (0.09- 0.16)
90) Libya	0.04+/- 0.02	0.00+/- 0.00	0.04+/- 0.02	0.00+/- 0.00	0.43+/- 0.10	0.00+/- 0.00	0.01+/- 0.00	0.17+/- 0.05	0.01+/- 0.01	0.38	0.53+/- (0.11- 0.15)
Inventory	0.05+/- 0.02	0.00+/- 0.00	0.05+/- 0.02	0.00+/- 0.00	0.32+/- 0.12	0.00+/- 0.00	0.01+/- 0.00	0.15+/- 0.05	0.02+/- 0.01		0.44+/- (0.12- 0.17)
91) Oman	0.04+/- 0.02	0.00+/- 0.00	0.03+/- 0.01	0.00+/- 0.00	0.12+/- 0.03	0.00+/- 0.00	0.01+/- 0.00	0.04+/- 0.01	0.03+/- 0.02	0.38	0.19+/- (0.04- 0.07)
Inventory	0.03+/- 0.02	0.00+/- 0.00	0.02+/- 0.01	0.00+/- 0.00	0.12+/- 0.04	0.00+/- 0.00	0.01+/- 0.00	0.04+/- 0.01	0.03+/- 0.02		0.18+/- (0.04- 0.07)
92) Bulgaria	0.01+/- 0.05	0.00+/- 0.00	- 0.21+/- 0.16	0.01+/- 0.00	0.00+/- 0.00	0.03+/- 0.01	0.01+/- 0.00	- 0.04+/- 0.16	0.02+/- 0.05	0.38	- 0.14+/- (0.17- 0.23)
Inventory	0.07+/- 0.05	0.00+/- 0.00	0.31+/- 0.20	0.01+/- 0.00	0.00+/- 0.00	0.03+/- 0.01	0.01+/- 0.00	0.31+/- 0.17	0.06+/- 0.05		0.43+/- (0.21- 0.27)
93) Nicaragua	0.56+/- 0.17	0.01+/- 0.01	0.03+/- 0.03	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.16+/- 0.08	0.52+/- 0.16	0.37	0.61+/- (0.17- 0.21)
Inventory	0.23+/- 0.21	0.01+/- 0.01	0.03+/- 0.03	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.14+/- 0.09	0.23+/- 0.22		0.28+/- (0.21- 0.25)
94) Namibia	0.04+/- 0.04	0.00+/- 0.00	0.01+/- 0.00	0.02+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	-0.01+/- 0.03	0.34	0.07+/- (0.04- 0.06)
Inventory	0.08+/- 0.04	0.00+/- 0.00	0.01+/- 0.00	0.02+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.05+/- 0.04		0.11+/- (0.04- 0.06)
95) Austria	0.06+/- 0.11	0.00+/- 0.00	0.02+/- 0.08	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.02+/- 0.01	0.19+/- 0.10	0.03+/- 0.02	0.33	0.10+/- (0.14- 0.21)
Inventory	0.18+/- 0.14	0.00+/- 0.00	0.13+/- 0.09	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.02+/- 0.01	0.25+/- 0.11	0.03+/- 0.02		0.33+/- (0.17- 0.25)
96) Guinea	0.06+/- 0.11	0.37+/- 0.14	0.02+/- 0.01	0.09+/- 0.05	0.00+/- 0.00	0.00+/- 0.00	0.02+/- 0.01	0.04+/- 0.01	0.03+/- 0.01	0.32	0.56+/- (0.18- 0.32)
Inventory	0.15+/- 0.13	0.19+/- 0.18	0.02+/- 0.01	0.08+/- 0.05	0.00+/- 0.00	0.00+/- 0.00	0.02+/- 0.01	0.04+/- 0.01	0.03+/- 0.01		0.46+/- (0.22- 0.37)
97) Sri Lanka	0.07+/- 0.04	0.41+/- 0.23	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.72+/- 0.18	0.3	0.49+/- (0.23- 0.27)
Inventory	0.06+/- 0.04	0.37+/- 0.25	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.25+/- 0.23		0.44+/- (0.25- 0.30)
98) Greece	0.04+/- 0.06	0.00+/- 0.00	- 0.04+/- 0.15	0.00+/- 0.00	0.00+/- 0.00	0.03+/- 0.01	0.00+/- 0.00	0.17+/- 0.06	0.03+/- 0.06	0.3	0.04+/- (0.16- 0.23)
Inventory	0.10+/- 0.07	0.01+/- 0.00	0.24+/- 0.17	0.00+/- 0.00	0.00+/- 0.00	0.03+/- 0.01	0.00+/- 0.00	0.18+/- 0.06	0.06+/- 0.06		0.39+/- (0.19- 0.25)

99) Malawi	0.15+/- 0.05	0.01+/- 0.01	0.02+/- 0.01	0.07+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.58+/- 0.12	0.29	0.25+/- (0.05- 0.08)
Inventory	0.06+/- 0.05	0.01+/- 0.01	0.02+/- 0.01	0.03+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.21+/- 0.15		0.12+/- (0.05- 0.09)
100) Guatemala	0.60+/- 0.17	0.00+/- 0.00	0.11+/- 0.06	0.02+/- 0.01	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.08+/- 0.04	0.13+/- 0.05	0.29	0.73+/- (0.18- 0.25)
Inventory	0.23+/- 0.21	0.00+/- 0.00	0.07+/- 0.06	0.02+/- 0.01	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.08+/- 0.04	0.10+/- 0.06		0.33+/- (0.22- 0.30)
101) Mongolia	0.55+/- 0.08	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.02+/- 0.01	0.01+/- 0.00	0.00+/- 0.00	0.11+/- 0.04	0.14+/- 0.03	0.28	0.64+/- (0.09- 0.12)
Inventory	0.37+/- 0.09	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.02+/- 0.01	0.01+/- 0.00	0.00+/- 0.00	0.09+/- 0.04	0.13+/- 0.03		0.45+/- (0.09- 0.12)
102) Czech Republic	0.01+/- 0.07	0.00+/- 0.00	0.00+/- 0.13	0.00+/- 0.00	0.00+/- 0.00	0.23+/- 0.11	0.02+/- 0.02	0.09+/- 0.05	0.01+/- 0.01	0.27	0.26+/- (0.19- 0.33)
Inventory	0.09+/- 0.08	0.00+/- 0.00	0.23+/- 0.16	0.00+/- 0.00	0.00+/- 0.00	0.29+/- 0.12	0.02+/- 0.02	0.11+/- 0.05	0.01+/- 0.01		0.63+/- (0.21- 0.37)
103) Eritrea	0.67+/- 0.06	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.10+/- 0.03	0.02+/- 0.01	0.27	0.68+/- (0.06- 0.07)
Inventory	0.08+/- 0.08	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.08+/- 0.03	0.02+/- 0.01		0.10+/- (0.08- 0.08)
104) Norway	0.07+/- 0.01	0.00+/- 0.00	0.02+/- 0.01	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.41+/- 0.15	0.26	0.11+/- (0.02- 0.04)
Inventory	0.06+/- 0.01	0.00+/- 0.00	0.02+/- 0.01	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.26+/- 0.17		0.11+/- (0.02- 0.04)
105) Belarus	0.28+/- 0.17	0.00+/- 0.00	1.2+/- 0.5	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.03+/- 0.01	0.04+/- 0.01	0.07+/- 0.10	0.26	1.6+/- (0.5- 0.7)
Inventory	0.24+/- 0.17	0.00+/- 0.00	2.3+/- 1.5	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.03+/- 0.01	0.04+/- 0.01	0.11+/- 0.10		2.6+/- (1.5- 1.7)
106) Switzerland	0.25+/- 0.13	0.00+/- 0.00	0.04+/- 0.05	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.16+/- 0.06	0.06+/- 0.05	0.24	0.30+/- (0.13- 0.18)
Inventory	0.17+/- 0.15	0.00+/- 0.00	0.05+/- 0.05	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.15+/- 0.07	0.05+/- 0.05		0.23+/- (0.16- 0.21)
107) Hungary	0.03+/- 0.05	0.00+/- 0.00	0.17+/- 0.16	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.02+/- 0.02	0.05+/- 0.02	0.03+/- 0.02	0.24	0.23+/- (0.16- 0.23)
Inventory	0.05+/- 0.05	0.00+/- 0.00	0.28+/- 0.20	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.02+/- 0.02	0.06+/- 0.02	0.03+/- 0.02		0.36+/- (0.20- 0.27)
108) Senegal	0.03+/- 0.12	0.05+/- 0.05	0.04+/- 0.02	0.02+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.02+/- 0.02	0.23	0.15+/- (0.14- 0.21)
Inventory	0.18+/- 0.15	0.05+/- 0.06	0.04+/- 0.02	0.03+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.03+/- 0.02		0.30+/- (0.17- 0.25)
109) Netherlands	1.2+/-0.3	0.00+/- 0.00	0.36+/- 0.13	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.03+/- 0.02	0.05+/- 0.01	0.03+/- 0.03	0.23	1.6+/- (0.3- 0.4)



Inventory	0.37+/- 0.30	0.00+/- 0.00	0.20+/- 0.15	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.02+/- 0.02	0.05+/- 0.01	0.03+/- 0.03		0.60+/- (0.33- 0.47)
110) Serbia	-0.02+/- 0.05	0.00+/- 0.00	0.01+/- 0.07	0.00+/- 0.00	0.02+/- 0.01	0.03+/- 0.01	0.01+/- 0.01	0.04+/- 0.02	0.01+/- 0.02	0.23	0.05+/- (0.09- 0.15)
Inventory	0.06+/- 0.06	0.00+/- 0.00	0.11+/- 0.08	0.00+/- 0.00	0.02+/- 0.01	0.03+/- 0.01	0.01+/- 0.01	0.05+/- 0.02	0.01+/- 0.02		0.23+/- (0.10- 0.16)
111) Panama	0.09+/- 0.07	0.01+/- 0.01	0.03+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.05+/- 0.02	0.85+/- 0.18	0.23	0.13+/- (0.08- 0.11)
Inventory	0.09+/- 0.07	0.01+/- 0.01	0.04+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.05+/- 0.02	0.30+/- 0.25		0.15+/- (0.08- 0.11)
112) Georgia	0.10+/- 0.06	0.00+/- 0.00	0.07+/- 0.05	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.07+/- 0.05	0.47+/- 0.17	0.01+/- 0.01	0.23	0.25+/- (0.10- 0.17)
Inventory	0.07+/- 0.07	0.00+/- 0.00	0.07+/- 0.05	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.07+/- 0.06	0.41+/- 0.19	0.01+/- 0.01		0.22+/- (0.10- 0.18)
113) Tunisia	-0.01+/- 0.06	0.00+/- 0.00	0.03+/- 0.03	0.00+/- 0.00	0.02+/- 0.01	0.00+/- 0.00	0.02+/- 0.01	0.05+/- 0.02	0.01+/- 0.02	0.23	0.06+/- (0.07- 0.12)
Inventory	0.09+/- 0.06	0.00+/- 0.00	0.07+/- 0.04	0.00+/- 0.00	0.03+/- 0.01	0.00+/- 0.00	0.02+/- 0.01	0.07+/- 0.02	0.02+/- 0.02		0.20+/- (0.08- 0.12)
114) Mauritania	0.49+/- 0.10	0.01+/- 0.01	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.01+/- 0.00	0.22	0.51+/- (0.10- 0.12)
Inventory	0.19+/- 0.15	0.01+/- 0.01	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.01+/- 0.00		0.22+/- (0.15- 0.17)
115) Yemen	0.16+/- 0.10	0.00+/- 0.00	0.07+/- 0.03	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.09+/- 0.02	0.02+/- 0.01	0.22	0.24+/- (0.11- 0.14)
Inventory	0.14+/- 0.11	0.00+/- 0.00	0.06+/- 0.03	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.08+/- 0.02	0.01+/- 0.01		0.22+/- (0.12- 0.15)
116) Cuba	0.12+/- 0.15	0.03+/- 0.04	0.13+/- 0.15	0.02+/- 0.01	0.10+/- 0.06	0.00+/- 0.00	0.01+/- 0.00	0.08+/- 0.04	0.07+/- 0.17	0.22	0.40+/- (0.23- 0.42)
Inventory	0.24+/- 0.16	0.05+/- 0.04	0.24+/- 0.16	0.02+/- 0.01	0.11+/- 0.06	0.00+/- 0.00	0.01+/- 0.00	0.08+/- 0.04	0.26+/- 0.19		0.66+/- (0.24- 0.44)
117) Portugal	0.12+/- 0.08	0.01+/- 0.01	- 0.29+/- 0.22	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.01+/- 0.01	0.2	- 0.16+/- (0.24- 0.31)
Inventory	0.11+/- 0.09	0.01+/- 0.00	0.42+/- 0.28	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.01+/- 0.01		0.55+/- (0.30- 0.38)
118) Jordan	0.03+/- 0.02	0.00+/- 0.00	0.14+/- 0.08	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.02	0.04+/- 0.01	0.00+/- 0.00	0.2	0.22+/- (0.09- 0.13)
Inventory	0.02+/- 0.02	0.00+/- 0.00	0.14+/- 0.12	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.03+/- 0.02	0.04+/- 0.01	0.00+/- 0.00		0.20+/- (0.12- 0.16)
119) Bahamas	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0.2	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)

120) Benin	-0.08+/- 0.08	0.00+/- 0.01	0.03+/- 0.01	0.02+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.02+/- 0.01	0.04+/- 0.01	0.02+/- 0.03	0.19	- 0.01+/- (0.09- 0.14)
Inventory	0.09+/- 0.10	0.01+/- 0.01	0.03+/- 0.01	0.02+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.03+/- 0.03		0.17+/- (0.10- 0.16)
121) Rwanda	-0.02+/- 0.05	0.00+/- 0.01	0.02+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.02+/- 0.02	0.04+/- 0.01	0.19+/- 0.09	0.17	0.03+/- (0.06- 0.10)
Inventory	0.05+/- 0.06	0.01+/- 0.01	0.02+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.02+/- 0.02	0.04+/- 0.01	0.10+/- 0.12		0.10+/- (0.06- 0.10)
122) Slovakia	0.02+/- 0.02	0.00+/- 0.00	0.05+/- 0.06	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.04+/- 0.04	0.07+/- 0.02	0.00+/- 0.00	0.17	0.12+/- (0.07- 0.12)
Inventory	0.02+/- 0.02	0.00+/- 0.00	0.09+/- 0.07	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.05+/- 0.04	0.08+/- 0.02	0.00+/- 0.00		0.17+/- (0.08- 0.13)
123) Croatia	0.00+/- 0.04	0.00+/- 0.00	0.02+/- 0.04	0.00+/- 0.00	0.00+/- 0.00	0.03+/- 0.01	0.01+/- 0.00	0.06+/- 0.05	0.01+/- 0.01	0.16	0.06+/- (0.06- 0.10)
Inventory	0.05+/- 0.04	0.00+/- 0.00	0.06+/- 0.04	0.00+/- 0.00	0.00+/- 0.00	0.03+/- 0.01	0.01+/- 0.00	0.11+/- 0.05	0.01+/- 0.01		0.15+/- (0.06- 0.10)
124) Israel	0.03+/- 0.02	0.00+/- 0.00	0.33+/- 0.11	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.02	0.04+/- 0.01	0.00+/- 0.00	0.16	0.40+/- (0.12- 0.16)
Inventory	0.02+/- 0.02	0.00+/- 0.00	0.23+/- 0.18	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.03+/- 0.02	0.04+/- 0.01	0.00+/- 0.00		0.29+/- (0.18- 0.23)
125) Belize	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.22+/- 0.09	0.16	0.02+/- (0.01- 0.01)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.14+/- 0.14		0.02+/- (0.01- 0.01)
126) Bhutan	0.01+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0.14	0.02+/- (0.02- 0.02)
Inventory	0.01+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.02+/- (0.02- 0.02)
127) Dominican Republic	-0.09+/- 0.15	0.02+/- 0.07	0.02+/- 0.05	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.05+/- 0.01	-0.02+/- 0.06	0.14	- 0.05+/- (0.17- 0.26)
Inventory	0.19+/- 0.17	0.07+/- 0.06	0.05+/- 0.05	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.05+/- 0.01	0.09+/- 0.07		0.31+/- (0.19- 0.28)
128) Burundi	0.01+/- 0.03	0.00+/- 0.01	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.13+/- 0.04	0.14	0.04+/- (0.04- 0.06)
Inventory	0.03+/- 0.04	0.00+/- 0.01	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.03+/- 0.05		0.05+/- (0.04- 0.06)
129) Sierra Leone	0.02+/- 0.03	0.16+/- 0.07	0.02+/- 0.01	0.04+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.10+/- 0.09	0.14	0.25+/- (0.08- 0.14)
Inventory	0.03+/- 0.03	0.07+/- 0.09	0.02+/- 0.01	0.03+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.11+/- 0.09		0.16+/- (0.10- 0.16)

130) Costa Rica	0.17+/- 0.08	0.01+/- 0.01	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.11+/- 0.05	0.64+/- 0.12	0.13	0.18+/- (0.08- 0.10)
Inventory	0.09+/- 0.09	0.01+/- 0.01	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.10+/- 0.06	0.16+/- 0.16		0.11+/- (0.09- 0.11)
131) Liberia	0.00+/- 0.00	0.01+/- 0.01	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.05+/- 0.06	0.12	0.04+/- (0.01- 0.03)
Inventory	0.00+/- 0.00	0.01+/- 0.01	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.08+/- 0.06		0.04+/- (0.01- 0.03)
132) Belgium	0.29+/- 0.10	0.00+/- 0.00	0.15+/- 0.07	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.00+/- 0.00	0.12	0.45+/- (0.12- 0.18)
Inventory	0.12+/- 0.11	0.00+/- 0.00	0.10+/- 0.09	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.00+/- 0.00		0.24+/- (0.14- 0.21)
133) Togo	-0.02+/- 0.04	0.00+/- 0.01	0.02+/- 0.01	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.03+/- 0.04	0.12	0.03+/- (0.05- 0.09)
Inventory	0.03+/- 0.04	0.01+/- 0.01	0.02+/- 0.01	0.02+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.05+/- 0.04		0.09+/- (0.05- 0.09)
134) Taiwan	0.00+/- 0.00	0.01+/- 0.08	- 0.11+/- 0.12	0.00+/- 0.00	0.01+/- 0.02	0.00+/- 0.00	0.02+/- 0.02	- 0.21+/- 0.15	0.02+/- 0.03	0.11	- 0.07+/- (0.15- 0.25)
Inventory	0.00+/- 0.00	0.08+/- 0.08	0.14+/- 0.13	0.00+/- 0.00	0.02+/- 0.02	0.00+/- 0.00	0.03+/- 0.02	0.20+/- 0.16	0.03+/- 0.03		0.27+/- (0.15- 0.25)
135) Equatorial Guinea	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	- 0.12+/- 0.09	0.01+/- 0.00	0.01+/- 0.01	0.05+/- 0.02	-0.15+/- 0.06	0.11	- 0.11+/- (0.09- 0.10)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.15+/- 0.09	0.01+/- 0.00	0.01+/- 0.01	0.05+/- 0.02	0.05+/- 0.07		0.16+/- (0.09- 0.10)
136) Cyprus	0.01+/- 0.01	0.00+/- 0.00	0.02+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0.1	0.03+/- (0.02- 0.03)
Inventory	0.01+/- 0.01	0.00+/- 0.00	0.02+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.03+/- (0.02- 0.03)
137) Kuwait	0.00+/- 0.00	0.00+/- 0.00	0.35+/- 0.30	0.00+/- 0.00	0.05+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.09+/- 0.04	0.00+/- 0.00	0.1	0.40+/- (0.30- 0.33)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.53+/- 0.41	0.00+/- 0.00	0.06+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.09+/- 0.04	0.00+/- 0.00		0.59+/- (0.41- 0.45)
138) Trinidad and Tobago	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.11+/- 0.04	0.00+/- 0.00	0.07+/- 0.04	0.22+/- 0.06	0.00+/- 0.00	0.1	0.19+/- (0.05- 0.09)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.06+/- 0.04	0.00+/- 0.00	0.05+/- 0.04	0.10+/- 0.07	0.00+/- 0.00		0.12+/- (0.06- 0.09)
139) Ireland	0.19+/- 0.28	0.00+/- 0.00	0.06+/- 0.05	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.05+/- 0.06	0.09	0.26+/- (0.28- 0.33)
Inventory	0.39+/- 0.30	0.00+/- 0.00	0.07+/- 0.05	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.06+/- 0.06		0.47+/- (0.31- 0.36)

140) Haiti	-0.03+/- 0.07	0.00+/- 0.01	0.03+/- 0.04	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.02+/- 0.01	0.04+/- 0.01	0.00+/- 0.00	0.09	0.02+/- (0.08- 0.13)
Inventory	0.09+/- 0.08	0.01+/- 0.01	0.04+/- 0.04	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.02+/- 0.01	0.04+/- 0.01	0.00+/- 0.00		0.15+/- (0.09- 0.14)
141) Denmark	0.57+/- 0.14	0.00+/- 0.00	0.25+/- 0.09	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.03+/- 0.02	0.09	0.82+/- (0.16- 0.23)
Inventory	0.18+/- 0.14	0.00+/- 0.00	0.13+/- 0.10	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.02+/- 0.02		0.32+/- (0.17- 0.24)
142) Lesotho	0.14+/- 0.02	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0.09	0.15+/- (0.02- 0.03)
Inventory	0.02+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.03+/- (0.03- 0.03)
143) Estonia	0.01+/- 0.01	0.00+/- 0.00	- 0.01+/- 0.07	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	-0.06+/- 0.07	0.08	0.01+/- (0.07- 0.08)
Inventory	0.02+/- 0.01	0.00+/- 0.00	0.11+/- 0.08	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.07+/- 0.08		0.13+/- (0.08- 0.09)
144) Qatar	0.00+/- 0.00	0.00+/- 0.00	0.02+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.01	0.04+/- 0.01	0.00+/- 0.00	0.08	0.03+/- (0.02- 0.03)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.02+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.00+/- 0.00		0.03+/- (0.02- 0.03)
145) Latvia	0.03+/- 0.03	0.00+/- 0.00	0.01+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.04+/- 0.01	0.00+/- 0.05	0.08	0.05+/- (0.04- 0.06)
Inventory	0.03+/- 0.03	0.00+/- 0.00	0.05+/- 0.04	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.04+/- 0.01	0.05+/- 0.05		0.09+/- (0.04- 0.07)
146) Guinea-Bissau	0.00+/- 0.03	0.05+/- 0.04	0.01+/- 0.00	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.02+/- 0.06	0.08	0.07+/- (0.05- 0.09)
Inventory	0.03+/- 0.03	0.04+/- 0.05	0.01+/- 0.00	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.08+/- 0.07		0.09+/- (0.06- 0.10)
147) Bosnia and Herzegovina	-0.02+/- 0.04	0.00+/- 0.00	0.00+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.03+/- 0.02	0.00+/- 0.00	0.07	- 0.02+/- (0.05- 0.07)
Inventory	0.04+/- 0.04	0.00+/- 0.00	0.04+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.05+/- 0.02	0.00+/- 0.00		0.08+/- (0.05- 0.08)
148) Albania	-0.03+/- 0.05	0.00+/- 0.00	- 0.01+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.07+/- 0.04	0.00+/- 0.01	0.06	- 0.04+/- (0.06- 0.08)
Inventory	0.05+/- 0.05	0.00+/- 0.00	0.04+/- 0.04	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.10+/- 0.04	0.01+/- 0.01		0.10+/- (0.06- 0.09)
149) Lithuania	0.05+/- 0.04	0.00+/- 0.00	- 0.02+/- 0.06	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.01+/- 0.03	0.06	0.04+/- (0.08- 0.12)
Inventory	0.06+/- 0.04	0.00+/- 0.00	0.09+/- 0.08	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.04+/- 0.01	0.02+/- 0.03		0.17+/- (0.09- 0.13)

150) Armenia	0.06+/- 0.03	0.00+/- 0.00	0.02+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.03+/- 0.02	0.08+/- 0.03	0.01+/- 0.02	0.06	0.10+/- (0.04- 0.07)
Inventory	0.03+/- 0.03	0.00+/- 0.00	0.02+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.03+/- 0.03	0.08+/- 0.04	0.01+/- 0.02		0.07+/- (0.04- 0.07)
151) Lebanon	0.01+/- 0.01	0.00+/- 0.00	0.07+/- 0.06	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0.06	0.09+/- (0.06- 0.08)
Inventory	0.01+/- 0.01	0.00+/- 0.00	0.10+/- 0.09	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.11+/- (0.09- 0.10)
152) El Salvador	0.16+/- 0.05	0.00+/- 0.00	0.02+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.16+/- 0.07	0.05	0.18+/- (0.05- 0.06)
Inventory	0.04+/- 0.05	0.00+/- 0.00	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.06+/- 0.08		0.05+/- (0.05- 0.07)
153) Kosovo	-0.01+/- 0.03	0.00+/- 0.00	- 0.02+/- 0.04	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0.05	- 0.03+/- (0.05- 0.07)
Inventory	0.03+/- 0.03	0.00+/- 0.00	0.04+/- 0.04	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.08+/- (0.05- 0.07)
154) Swaziland	0.04+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0.05	0.05+/- (0.02- 0.02)
Inventory	0.01+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.02+/- (0.02- 0.02)
155) The former Yugoslav Republic of Macedonia	0.00+/- 0.02	0.00+/- 0.00	- 0.01+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0.05	0.00+/- (0.03- 0.04)
Inventory	0.02+/- 0.02	0.00+/- 0.00	0.02+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.05+/- (0.03- 0.04)
156) Brunei Darussalam	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.02+/- 0.03	0.00+/- 0.00	- 0.01+/- 0.04	0.04+/- 0.01	0.00+/- 0.00	0.04	0.01+/- (0.05- 0.07)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.03+/- 0.03	0.00+/- 0.00	0.04+/- 0.04	0.04+/- 0.01	0.00+/- 0.00		0.07+/- (0.05- 0.07)
157) Grenada	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0.04	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
158) Slovenia	0.01+/- 0.02	0.00+/- 0.00	0.00+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.02+/- 0.02	0.03	0.02+/- (0.03- 0.04)
Inventory	0.02+/- 0.02	0.00+/- 0.00	0.01+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.01+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.02+/- 0.02		0.04+/- (0.03- 0.04)
159) Montenegro	-0.01+/- 0.02	0.00+/- 0.00	0.00+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.01+/- 0.01	0.03	- 0.01+/- (0.02- 0.03)
Inventory	0.02+/- 0.02	0.00+/- 0.00	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.01+/- 0.01		0.03+/- (0.02- 0.03)

160) Svalbard and Jan Mayen Islands	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.01+/-0.00	0.00+/-0.00	0.04+/-0.01	0.00+/-0.00	0.03	0.02+/- (0.00-0.01)
Inventory	0.01+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.01+/-0.00	0.00+/-0.00	0.04+/-0.01	0.00+/-0.00		0.02+/- (0.00-0.01)
161) Western Sahara	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.04+/-0.01	0.00+/-0.00	0.03	0.01+/- (0.00-0.00)
Inventory	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.04+/-0.01	0.00+/-0.00		0.01+/- (0.00-0.00)
162) Puerto Rico	0.00+/-0.00	0.00+/-0.00	0.05+/-0.06	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.04+/-0.01	0.00+/-0.00	0.02	0.06+/- (0.06-0.06)
Inventory	0.00+/-0.00	0.00+/-0.00	0.06+/-0.06	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.04+/-0.01	0.00+/-0.00		0.06+/- (0.06-0.06)
163) Djibouti	0.02+/-0.02	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.01+/-0.01	0.00+/-0.00	0.00+/-0.00	0.05+/-0.01	0.01+/-0.01	0.02	0.04+/- (0.02-0.03)
Inventory	0.01+/-0.02	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.01+/-0.01	0.00+/-0.00	0.00+/-0.00	0.04+/-0.01	0.01+/-0.01		0.02+/- (0.02-0.03)
164) Republic of Moldova	0.01+/-0.01	0.00+/-0.00	0.05+/-0.06	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.01+/-0.01	0.13+/-0.09	0.00+/-0.00	0.02	0.07+/- (0.06-0.08)
Inventory	0.01+/-0.01	0.00+/-0.00	0.07+/-0.06	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.01+/-0.01	0.17+/-0.10	0.00+/-0.00		0.09+/- (0.06-0.08)
165) Jamaica	0.01+/-0.01	0.00+/-0.00	0.07+/-0.06	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.07+/-0.03	0.00+/-0.00	0.02	0.08+/- (0.06-0.07)
Inventory	0.01+/-0.01	0.00+/-0.00	0.07+/-0.06	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.06+/-0.03	0.00+/-0.00		0.08+/- (0.07-0.08)
166) Sao Tome and Principe	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.04+/-0.01	0.00+/-0.00	0.02	0.00+/- (0.00-0.00)
Inventory	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.04+/-0.01	0.00+/-0.00		0.00+/- (0.00-0.00)
167) Turks and Caicos Islands	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.04+/-0.01	0.00+/-0.00	0.02	0.00+/- (0.00-0.00)
Inventory	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.04+/-0.01	0.00+/-0.00		0.00+/- (0.00-0.00)
168) Jersey	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.04+/-0.01	0.00+/-0.00	0.01	0.00+/- (0.00-0.00)
Inventory	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.00+/-0.00	0.04+/-0.01	0.00+/-0.00		0.00+/- (0.00-0.00)
169) Timor-Leste	0.02+/-0.01	0.01+/-0.00	0.01+/-0.01	0.00+/-0.00	0.03+/-0.01	0.01+/-0.00	0.00+/-0.00	0.09+/-0.04	0.00+/-0.00	0.01	0.08+/- (0.02-0.04)
Inventory	0.01+/-0.01	0.01+/-0.00	0.01+/-0.01	0.00+/-0.00	0.03+/-0.01	0.01+/-0.00	0.00+/-0.00	0.08+/-0.04	0.00+/-0.00		0.08+/- (0.02-0.04)

170) Bonaire Saint Eustatius and Saba	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0.01	0.01+/- (0.00- 0.01)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.01+/- (0.00- 0.01)
171) Cayman Islands	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0.01	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
172) Fiji	0.01+/- 0.01	0.00+/- 0.00	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0.01	0.01+/- (0.02- 0.02)
Inventory	0.02+/- 0.01	0.00+/- 0.00	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.03+/- (0.02- 0.02)
173) Saint Vincent and the Grenadines	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0.01	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
174) Saint Pierre and Miquelon	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0.01	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
175) United States Minor Outlying Islands	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0.01	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
176) Iceland	0.01+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.02+/- 0.02	0.01	0.02+/- (0.01- 0.01)
Inventory	0.01+/- 0.00	0.00+/- 0.00	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.02+/- 0.02		0.02+/- (0.01- 0.01)
177) Aland Islands	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
178) Mayotte	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
179) Solomon Islands	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.01+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.01+/- (0.00- 0.00)

180) French Southern Territories	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
181) Comoros	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.01+/- (0.01- 0.01)
Inventory	0.00+/- 0.00	0.00+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.01+/- (0.01- 0.01)
182) New Caledonia	-0.01+/- 0.02	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.00+/- (0.02- 0.03)
Inventory	0.04+/- 0.03	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.04+/- (0.03- 0.03)
183) Vanuatu	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.01+/- (0.01- 0.01)
Inventory	0.01+/- 0.01	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.01+/- (0.01- 0.01)
184) United States Virgin Islands	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
185) British Virgin Islands	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
186) Anguilla	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
187) Montserrat	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
188) Seychelles	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
189) Saint Lucia	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)









Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
222) Bouvet Island	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
223) Tokelau	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
224) South Georgia and the South Sandwich Islands	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
225) Niue	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
226) Norfolk Island	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
227) British Indian Ocean Territory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)
228) Heard Island and McDonald Islands	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00	0	0.00+/- (0.00- 0.00)
Inventory	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.00+/- 0.00	0.04+/- 0.01	0.00+/- 0.00		0.00+/- (0.00- 0.00)

991 **9.0References**

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