

Response to comments on “Global Observations and Modeling of Atmosphere-Surface Exchange of Elementary Mercury – A Critical Review” by W. Zhu et al.

Anonymous Referee #2-technical corrections

Line 18: Change “air-surfaces flux” to “air-surface fluxes”. Line 20: Change “devoting” to “devoted”. Line 21: In “the” past three decades... Change “uncertainty remains” to “uncertainties remain”. Line 24: Change “air-surfaces” to “air-surface”. Line 28: “and the” presence... Change “drives” to “drive”. Line 29: “the” effects. Line 32: on “the” global... Change “flux” to “fluxes”... “measurement” to “measurements”. Line 33: Change “flux” to “fluxes”. Line 36: of “the” evasion flux. Line 40: Change “constrains” to “constraints”... “analysis of atmospheric” to “analyses of the atmospheric”. Line 44: Change “concerns” to “concern”. Line 57: Remove “the”. Line 60: Change “velocity” to “velocities”. Line 61: Change “hemisphere” to “hemispheric”. Line 63: Remove “the”... Change “cycle” to “cycles”. Line 69: Change “gradient” to “gradients”. Line 71: Change “measurement” to “measurements”: : in “the” 1980s. Line 72: Change “advancement” to “advancements”: : “chamber” to “chambers”. Line 73: “the” Hg₀/222Rn... “the” open-path... and “the” Hg₀/CO. Line 77: Remove “the” from “in the peer-reviewed”. Line 78: Change “literatures” to “literature”. Line 93: Change “accounted” to “account”. Line 101: Application of “the” appropriate. Line 105: which “relies” on this principle. Line 109: “a” Lumex. Line 110: limit “of” ~1 ng m⁻³. Line 111: Change “concentration” to “concentrations”: : Remove “K.”: : recently, “a” high. Line 113: suffers from “the” sensor’s. Line 114: technique, “the” laser-induced. Line 116-117: Change “not been yet proved” to “not yet been proven for application in long-term field measurements”. Line 120: Change “exciding” to “exceeding”. Line 127: configuration “being” by far. Line 128: Dynamic flux “bags” (DFB) “have” been applied for flux “measurements”. Line 134: Change sentence to “Reported DFC volumes and flushing flow rates range from”. Line 135: resulting “in” a turnover. Line 136: “the” Hg₀ flux. Line 138: “the” Hg₀ flux: : “the” DFC: : “the” DFC. Line 140: Change “calculation” to “calculations”. Line 142: Change “designed” to “design”. Line 144: designed “DFCs”: : “and” showed that the. Line 147: “and” chamber dimensions. Line 148: “the” flushing flow rate. Line 151: transfer “has” indicated that “a” smaller. Line 152: “a” higher flushing: : “a” higher measured. Line 153: “the” measured : : “the” flushing. Line 154: when “the fluxes” obtained. Line 156: Change “condition” to “conditions”. Line 157: Change “estimation” to “estimations”. Line 158: provide an “aerodynamically-designed” chamber. Line 160: allows “the utilization of the” ambient : : calculate “the” flux. Line 162: Change “condition” to “conditions”: : is “the” overall. Line 165: Change “balance” to “balances” and “flux” to “fluxes”. Line 166: “The” DFC flux. Line 167: Change “assumed” to “assumes” and “was” to “is”. Line 168: Change “concentration” to “concentrations”. Line 170: for each “of the” calculated “fluxes”. Line 174: replication “of” DFC. Line 178: and “the” spatial scale of flux “footprints” Line 179: Change “flux” to “fluxes”. Line 180: Remove “a”. Line 181: measurements “are” currently “comprised” of “the” relaxed: : “the” aerodynamic. Line 182: “the” modified. Line 183: “is” a direct. Line 184: Is it possible to find another word for “realized”? Line 185 and 186: Change “measurement” to “measurements”. Line 189: “sampling heights” not “heights sampling”. Line 190: that “the” REA. Line 191: Remove “, which”: : change “heights” to “height”. Line 192: “samplings” in “using” gradient: : introduced “through the” forming. Line 196: “The” REA: : change

“measurement” to “measurements”. Line 198: “The” AGM method: : : change “saltmarsh” to “saltmarshes”. Line 200: “The” MBR method. Line 201: Change “floor” to “floors”. Line 203: “requirements” of micrometeorology “are” less. Line 207: Change “surface” to “surfaces”. Line 209: Remove “the” from “advection of Hg₀ from the”. Line 211: gradient “fluxes resulting” in.. vertical “fluxes” at: : : downwind of “an’ NH₃. Line 213: in “the” Nevada. Line 214: Change “error” to “errors” and “flux” to “fluxes”. Line 215: terms on “the” net: : : evaluated. “Multiple” heights. Line 217: at “a” high. Line 218: Change “flux” to “fluxes”. Line 221: Change “occur” to “occurs”. Line 222: Change “coefficient” to “coefficients”. Line 223: Change “is” to “were” typically. Line 225: Change “flux” to “fluxes”. Line 227: “the” summer. Line 228: that “the” AGM and MBR “methods” observed. Line 229: Change “is” to “was” not satisfactory. Line 234: Change “understand” to “understanding. Line 236: Change “flux” to “fluxes”. Line 239: Change “flux” to “fluxes”. Line 240: were not sufficient “in” “eliminating” the. Line 243: Although “the” MBR “methods showed” substantial. Line 246: upwind “from” the sampling. Line 250: “the” MM fluxes: : : “the” DFCs. Line 251: to those “for” temperature. Line 255: times “that” of. Line 256: reduced “the” uncertainty. Lines 257-258: MBR “fluxes” are weak because of “the” high variability “in the” MM “fluxes”: : : mean “fluxes” from simultaneous “measurements”. Lines 264-265: factor of “approximately two”: : : result “of” the fact: : : utilized a “relatively” low. Line 266: underestimating “the” surface: : : “a” Mann-Whitney. Line 267: Change “Probability” to “Probabilities”. Line 269: “as well as differences in the measurement sites and periods.”. Line 270: of “the” MM methods. Line 272: compared “to” DFC measurements “which” lasted. Line 276: “found that the observed median MM flux”. Line 277: Change “flux” to “fluxes”. Line 278: “suggested that an elevated flushing flow rate generated a partial vacuum inside the DFC and created an artificial Hg₀ flux from the soil”. Line 280: “the” DFC. Line 281: Change “DFC” to “DFCs”. Line 282: Change “difference” to differences”. Line 283: “differences in the median fluxes.”. Line 289: Change “of” to “in”. Line 290: “the” formation: : :”the” mass transfer. Line 291: found “to be” highly. Lines 296-297: by “the” Arrhenius (both times): : : explain “the” Hg₀ flux. Line 298: implying “that” other. Line 299: “i.e. wind and surface friction”. Line 300: factor “that drives” the Hg₀ release. Line 306: Change “molecular” to “molecules” and “replaces” to “replace”. Line 309: moisture, “a” maximum. Line 310: Change “become” to “became”. Line 311: showed “a” smaller increase. Line 318: Change “less” to “lesser”. Line 320: by reducing “the” Hg₀. Line 322: Remove “the”. Line 327: Change “interacts” to “interact”. Line 335: Change “provide” to “providing”. Line 336: Change “surface” to “surfaces”. Line 338: Change “suggested” to “suggesting”. Line 340: Change “debates” to debate”. Line 347: Change “measurement” to “measurements”. Line 350: source of Hg in “the” leaf. Line 355: Remove “on”. Line 357: instance, “the” higher Hg concentration: : :”suggests”. Line 361: content in “the” leaf. Line 363: Change “flux” to “fluxes”. Line 368: “biologically assimilated Hg retained in the leaf”. Line 370: from “the” leaf. Line 372: Change “drive” to “drives”. Line 373: hypothesis of “a” compensation point. Line 374: Hg in “the” vegetation. Line 375: Change “mechanism” to mechanisms”. Line 377: Hg by “the” leaf occurs: : : bonded in “the” leaf. Line 379: on “the” leaf : : : finding is “that” the negative. Line 382: of “chemically-bonded” Hg in “the” leaf. Line 383: uptake by “the” plant. Line 387: “The” bulk method: : : Change “measurement” to “measurements”. Line 388: approach for “the” oceanic. Line 389: which “is” generally. Lines 393-396: DGM is “the” dissolved: : : GEM is “the” near: : : HT is “the dimensionless” Henry’s: : : is “the” wind speed: : : is “the” Hg₀ diffusion: : :DGM in “the” water phase. Line 398: has “a” much higher. Line 399: by “the” water transfer: : : Should Eq (5) be Eq (3)? Line 403: Change “controlled” to “controlling” and “regulated” to “regulates”. Line 406: summarized “the” Hg: : : “Eq. (4)” instead of 6? Line 407: Change

“resembling” to “resembles”. Line 411: Change “was” to “were”. Line 415: Change “photo-oxidant” to “photo-oxidants”. Line 427: Change “droplet” to “droplets”. Line 435: production in “the” Baltic Sea. Line 437: is reduced in “the” cell’s cytoplasm. Line 439: manganese as “a” terminal Lines 441-442: also “show capabilities in oxidizing” Hg⁰. Line 447: Change “arrays” to “array”. Line 465: under “the” canopy. Line 478: studies “that” periodically: : : change “flux” to “fluxes”. Line 479: fluxes of all “of the” campaigns “were” used. Line 481: Change “model” to “models”. Line 482: Change “landscapes” to “landscape” and “into” to “to”. Line 486: into “naturally enriched” and “anthropogenically contaminated” sites. Line 491: noted that “the fluxes” reported. Line 497: Change “investigation” to “investigations”. Line 510: Change “of” to “or” and “statistics” to “statistic”. Line 520: the “fluxes” over: : : results of “the” reemission. Line 524: Change “ranges” to “range”. Line 531: Change “evasions” to “evasion”. Line 538: Change “homogenized” to “homogeneous”. Line 539: Change “measurement” to “measurements”. Line 540: Change “was” to “were”. Line 541: Hg⁰ “fluxes” observed in East Asia “are” consistently. Line 544: The “fluxes” over freshwater in Europe “are” somewhat. Line 550: Change “flux” to “fluxes”. Lines 551 & 554: Change “mine” to “mines”. Line 554: evasion “in the” daytime: : : pattern “for” most “of the” Earth surfaces. Line 556: uptake through “the” stomata. Line 557: during “the” daytime. Line 558: in “the” warm season: : : in “the” cold season. Lines 559-560: in “the” Adirondack: : : in “the” summer: : : in “the” winter. Line 564: Change “observation” to “observations” and “measurement” to “measurements”. Lines 565-566: in “the” summer during “the” corn : : : uptake by “the” corn leaf: : : observed in “the” winter. Line 584: accuracy of “the” global: : : based on “the” empirical. Line 586: Change “uncertainty” to “uncertainties”. Line 595: contributing to “the” regional : : : Hg⁰ “fluxes” from. Line 596: by using “the” LIDAR. Lines 599-600: “the” Alamden mine: : : “concentrations” and “fluxes” were estimated to be 0.1-5 “and” 600-1200. Line 603: Change “measurement” to “measurements” and remove “of flux”. Line 604: Change “flux” to “fluxes”. Line 606: “the” Idrijca River. Line 607: Change “flux” to “fluxes”. Line 609: Change “is” to “are” and “areas” to “area”. Line 615: Change “nearby” to “near”. Line 619: Change “system” to “systems” and “pack” to “packs”. Line 623: Change “investigation” to “investigations”. Line 627: Change “Flux” to “Fluxes” and “remains” to “remain”. Line 628: Change “flux” to “fluxes”. Line 630: Change “source” to “sources” and “sink” to “sinks”. Line 632: “have” suggested that “plants are” a net sink “for” atmospheric Hg. Line 633: Change “concentration” to “concentrations”. Line 636: deposition, and “the” forest. Line 640: suggested “that the” forest. Lines 642-643: Change “observation” to “observations” and “is” to “are”...useful “in helping” to understand: : : . Change “forest” to “forests”. Line 646: Change “was” to “is”. Line 647: Change “parameterization” to “parameterizations” and “calculates” to “calculate”. Line 648: that Hg “is” passed. Line 649: and “is then” transferred: : : Remove “in”. Line 656: Change “flux” to “fluxes”. Lines 659&661: Change “simulation” to “simulations”. Line 667: Change “Change” to “Changing”. Line 668: models with “a” compensation. Line 673: model-estimated “fluxes were” 1-2. Line 675: flux “models require”. Line 676: Presently, “in the” bidirectional. Line 680: Change “in” to “as”. Line 681: Change “cell” to “cells”. Line 686: of “the” HgII. Line 695: in “the” presence of. Lines 696-697: Change “model” to “models” and “surface” to “surfaces”. Line 700: Remove “in”: : : since “the” mid-1980s. “A” substantial. Line 704: Change “flux” to “fluxes” and “is” to “are”. Line 706: “a” strong anthropogenic. Line 707: Change “constrains” to “constraints”: : : analysis of “the” atmospheric. Line 708: Change “measurement” to “measurements”. Line 709: Remove “in”: : : Change “flux” to “fluxes”. Line 710: Change “limited” to “limits”. Lines 715-717: “sensitive sensors for determining Hg⁰ concentration gradients is of prime importance in improving flux data quality and in reducing uncertainties in the global assessment of the Hg

budget.”. Line 719: “establishment of a data comparison strategy”. Line 720: large, “a” standardized. Line 721: Change “flux” to “fluxes”: : “A” fundamental. Line 722: Change “flux” to “fluxes”. Line 727: Change “response” to “responses”. Line 728: defined in “a” statistical sense. Line 731: Change “analysis” to “analyses”. Line 732: Change “flux” to “fluxes”. Line 733: “Forests are most”. Line 735: Change “database” to “databases”. Line 737: Change “flux” to “fluxes”. Line 738: providing “a” better. Line 740: Change “model” to “models”. Line 744: Change “address” to “addressing”. Line 745: Change “benefits” to “benefit” and “parameterization” to “parameterizations”. Line 799: “Fig. 6” should be in bold: : : Change “flux” to “fluxes”.

Response: We deeply appreciate the reviewer’s generous effort to provide the detailed editorial remarks, which significantly improved the readability of our paper. These specific technical corrections have been carefully addressed and added in the revised manuscript. The revised words/sentences have been marked in blue in the revised manuscript.