

## ***Interactive comment on “Global Observations and Modeling of Atmosphere-Surface Exchange of Elemental Mercury – A Critical Review” by W. Zhu et al.***

### **Anonymous Referee #2**

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#### 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:

C1

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”  $\sim 1$  ng m<sup>-3</sup>. 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

C2

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 “salt-marsh” 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.

C3

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)”

C4

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” Hg<sup>0</sup>. 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: Hg<sup>0</sup> “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... Hg<sup>0</sup> “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

C5

“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 Hg<sup>0</sup> 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

C6

745: Change “benefits” to “benefit” and “parameterization” to “parameterizations”. Line  
799: “Fig. 6” should be in bold. . . Change “flux” to “fluxes”.

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