Dear editors and referee,

Thanks for the reviewers and editors' comments concerning our manuscript entitled **"Mercury dynamics and mass balance/transport based on forest field in an old-growth subtropical forest, southwestern China" (acp-2015-664)**. The comments are all valuable and very helpful for revising and improving our paper, as well as the important guiding significance to our research. We have studied the comments carefully and made corrections which we hope meet with approval.

A1: We did collect continuous data of Hg fluxes through throughfall, litterfall and runoff(stream) in different seasons (Fig.1). We collected the air-surface exchange of gaseous elemental Hg from the subtropical forest field during eight intensive field campaigns in 2012 and 2013(Fig.2). We introduced the changes in throughfall deposition flux in the whole year in the cold and warm seasons; we also analyzed the Hg exchange fluxes between forest soil and air in the four seasons during the whole year, respectively.

"Study station has obscure seasons and clear rainy and dry seasons, throughfall deposition fluxes were also seasonal, with highermonthly THg deposition appearing during rainy months (June toAugust) (Fig. 1). THg throughfall deposition in summer at the study sites representsover 40% of total annual Hg deposition. It is, however, still a higher throughfall flux observed in September and October. This maybecause that therainfall in this month was influenced by Indian Monsoonresulting in a high rainfall (Fu et al., 2008a). The lowestmonthlyvalues of THg deposition appeared in the cold season." in 3.1.

"Unlike some other studies, in which average fluxes of Hg in spring (12.24 ± 5.1 ng m^{-2} h^{-1}) was slightly lower than that in summer (14.24 ± 4.7 ng m^{-2} h^{-1}), it appeared that warm temperature with low canopy density in spring at mid subtropical forest were more likely to release GEM. Because the branches and leaves were not so luxuriant but well spacedin spring and received more sunlight, which increased therate of reduction of $Hg^{2+}$by photochemical and thermal processesand biological activities." in 3.2.

A2: We appreciate very much for this question ofthe referee. The steam outflow of THg was estimated by multiplying the mean THg concentration in stream water and the water discharge rate in the forest field of Mt. Simian. The export flux of THg via runoff/stream was 0.73 kg yr^{-1}, and subtropical forest field in the study area is 100.1 km^{-2}. So the export mass of THg via stream water was 7.23 μg m^{-2} yr^{-1}. The referee is right that choosing smaller catchment or using soil water Hg leaching instead may be better, so we will pay attention to it in future research. But now, this area is still the ideal area considering all aspects.

A3: Yes, you are right.

Volume-weighted mean concentration is calculated with the formula introduced in Acid Deposition Monitoring Network in East Asia, 2012:

Volume-weighted mean concentration $=(X_1\times V_1+X_2\times V_2+\cdots+X_t\times V_t)/(V_1+V_2+\cdots+V_t)=\sum(X_t\times V_t)/\sum V_t$

where, X_t means the ion concentration in each precipitation event (ng L^{-1}), V_t means the volume of each rainfall (mm).

Hg flux was determined by multiplying Hg concentrationsby the volume of precipitation collected.Wet deposition fluxes of THg and MeHg were calculated accordingto the following equation:

$$F_W = \frac{1}{1000}\sum_{i=1}^{i=n}(C_R^i\, p^i)$$

Where, F_w is the annual THg or MeHg wet deposition flux(mg m-2 yr-1), $C_i$is the volume-weighted concentration (ng L-1) ofeach rain sample (Wang et al., 2012), and Pi (mm) is the precipitation or throughfall amount.

We averaged concentrations ofMeHgandTHginthroughfallfirstforall sites. Throughfall deposition of MeHg and THg was estimated by multiplying an overall volumeweighted mean concentration of MeHg and THg calculatedfromallthroughfalleventbythemeanannual throughfallvolume.

We will add the two formulas in the coming version.

A4: We appreciate very much for this adviceofthe referee. The suggestionswill benefit the improvement of the paper.We will re-write the ambiguous sentence in the coming manuscript(provide data support).

A5: Thanks for the referee's question.We know that atmospheric Hg emissions in China are predicted to increasedue to fast economic development. The hugeemissions have resulted in elevated atmospheric Hgdepositions in industrial and urban areas, and have thepotential to cause Hg pollution in surrounding areas and evenremote areas of China via long-range atmospheric transport.Some Studies already showed extremely high Hg deposition fluxes. These results suggested that many urbanized areas of China were exposed to atmospheric Hg contaminations due to regional anthropogenic emissions. However, there are still limitations to fully describe temporal and spatial distributions of Hg in China. Hence, there is a great need to conduct long-term continuous measurements of Hg and deposition fluxes in remote areas of China.

At the sometime, research in recent years showed that if there is no other obvious mercury pollution sources, mercury levels in its runoff/stream water can reflect the characteristics of mercury inputs and risks of a remote forest. Studies in remote areas of forest already emphasized the role of forested catchments as filters between atmosphere and hydrosphere. As for Hg accumulated in the forest soils, one part of them transfers through food webs, threatening the balance of forest ecosystems; one part of them releases into the atmosphere again; the other parts of them probably transfer with the runoff/stream, becoming one of the Hg sources of downstream aquatic ecosystem. Therefore, to a certain extent, the role of forested catchments as Hg filters can be characterized by Hg output (runoff/stream) from forest field. Therefore, even the higher Hg deposition fluxes in throughfall, it can be concluded that "THg concentration in stream/runoff was lower than that in contaminated sites under the same geological background, indicating that the study area did not suffer from severe anthropogenic Hg pollution." On one hand, this means that forested field has the filtering effect of Hg in precipitation and throughfall, even in the elevated atmospheric Hg area.

A6: The precipitation samples were collected at an open-air site near a meteorological station, which belongs to the Simian Mountain Alpine Ecosystem station of the Southwest University. Precipitation was taken from the nearest meteorological station (1318 m from the sample site in Ma et al., 2015) at an catchment of Mt. Simian with an elevation of 1427 m, which can be fully representative of the study area. Precipitation samples were collected by automatic APS-3A rain collectors installed in an unshadowed field at the sampling sites.

A7: Thanks for the good suggestion. We'll add the detailed month in fig.2 in the coming version.

A8: Here we want to say that the input fluxes through throughfall accounted for **nearly** 40% (exactly 42.9%) of the total Hg inputs, which is lower than that through litterfall. We will use the exact number (42.9%) or add the word "nearly" before 40% in the coming version.

A9: Thanks for your suggestion, but we discussed this question and believed that not changing the place was better.

A10: Good suggestion! We'll add the definitions of DHg, PHg, DMgHg, PMeHg in table 1. As for the analyticalmethods, we'll add the reference in Material and Methods.

A11: Very good suggestion! We'll add a column header, "total", for the last two values (5148.7, 20 192.6) in table 2 in the coming version.

A12: Very good suggestion! We'll add the meaning of the three *Os* in Table 2 and the main body (Materials and Methods)in the coming version.

A13: Very good suggestion! The method to calculate "Volume-weighted mean concentrations" was introduced in A3. And we'll add this introduction in the coming version.

A14: Very good suggestion! Combing with the question 12, we will delete the introduction of *Os* here and define it in Materials and Methods. But we do think Line 18-22 is reasonable, so we think it should not be deleted.

For Editorial comments/suggestions:

Thanks very much for the good suggestions on English expressions! Under the help of an English teacher from the USA in our university, the English in this paper has changed a lot and we think it can meet the requirement of ACP.

A1: The awkward word choices, such as obvious, obviously, formerly, fishes, whole etc. had been modified.

P35858, Line 7, obviously→ remarkably; "formerly" is deleted; "fishes" → "fish".

P35859, Line 11, "whole" is deleted; Line 22, "whole" is deleted;

P35860, Line 20, "whole" is deleted;

P35861, Line 4, "whole" is deleted; Line 16, "whole" is deleted; line 17: "during the whole year" → "during the study period"

P35865, Line 9, "It was obviously that" → "Obviously,"

A2: The awkward phrases, such as "Hg as a gas phase can travel; higher data; bound up; One of the possible reasons perhaps was; Normally it was supposed; mean average, and so on had been modified.

P35858,line 17: "Hg as a gas phase" → "gaseous Hg"

P35864, line 21, "with higher data appearing in wet-season" → "with higher fluxes appearing in wet-season"

P35865, line 15-17, "were probably bound up with" → "probably related with"

P35866, line 26-27, "One of the possible reasons perhaps was" → "Perhaps the primary reason lies that"

P35867, line 13, "Normally it was supposed that" → "It was supposed that"

P35869, line 5-7: "mean average" → "average".

A3: Awkward sentences:

P35858, line 24-26: "Hg transformation processes in the forest is considered as a vital part of global Hg cycling and possible climate changes." →

"Hg transformation processes in the forest is considered asa vital part of global Hg cycling."

P35860, line 7-8: "The study area has . . .., which means that this area has . . ."; →

"The study area has a subtropical monsoon climate, with abundant rainfall every year."

P35861, line 6-8: "The stream/runoff was carried out at the edge of the forest catchment. The measured data of . . ….were collected by the local hydrological departments in the outlets." →

"The stream/runoff was collected at the edge of the forest catchment. For the water yield of the stream/runoff, it was monitored in the outletsof the forest catchment by the local hydrological departments."

P35864, Line 23-24:

"It is, however, still in September and October that a higher throughfall flux is observed." →

"However, it is still in September and October that a higher throughfall flux is observed."

P35867, Line 11-12:

"and thus only several data were observed with Hg deposition in the night"→

"At Mt. Simian, the estimated net GEM fluxes were released from soils during the warm season (spring, summer and fall) and slightly volatilized during the cold season (winter). Hg deposition was only observed

in several nights of the cold season during the study period."

P35868, Line 1-2:
"Numerous studies showed that the remote forest already considered the forested catchments as filters between atmosphere and hydrosphere." →
"Numerous studies showed that the catchments of remote forest was regarded as filters between atmosphere and hydrosphere."

P35869, Line 15-16:
"The ultimate fate of Hg in the terrestrial ecosystem may depend upon the means of delivery and incorporation of Hg into the forest floor. And the average Hg fluxes were also estimated." →
"The ultimate fate of Hg in the terrestrial ecosystem may depend upon its delivery and incorporation into the forest floor."

P35869, Line 22-23:
"An amount of the atmospherically deposited THg was released through Hg0 emission at a rate of 18.6 μgm-2 yr-1."→
"A majority of atmospherically deposited THg was released through Hg^0 at a rate of 18.6 μg m^{-2} y^{-1}."

A4: For contradicting statements:
P35865, Line 2-10:
"The deposition fluxes of THg through throughfallin Mt. Simian were lower than those investigated in the southwestern cities ofChina, . . . approximately 2–10 times higher than those reported in remote areas of North America and Europe. . . It was obviously that the THg fluxes at Mt. Simian werehigher than other sites at home and abroad."
Yes, it is contradicted. We are sorry for the clerical error! "It was obviously that the THg fluxes at Mt. Simian were higher than other sites at home and abroad." will be changed to "Obviously, the THg fluxes at Mt. Simian were higher than other sites abroad." in the coming version.

A5: For incorrect statements
P35866, Line 23-26:
"Unlike some other studies, in which averagefluxes of Hg in spring (12.25.1 ngm-2 h-1) were slightly lower than that in summer(14.24.7 ngm-2 h-1)"; the seasonal fluxes reported here seem to be yours.
Yes, it is an incorrect use of clause. It will be changed to "The average fluxes of Hg in spring (12.25.1 ngm-2 h-1) were slightly lower than that in summer (14.24.7 ngm-2 h-1), which was different from other studies (Larssen et al., 2008; Fu et al., 2010)."

A6: The word "and" may not be used to start a sentence.
We made the following changes:
P35866, Line 8: "And it is also…" → "It is also…"
P35870, Line 11: "And higher wet deposition…" → "Higher wet deposition…"
P35860, Line 14, "And it is also……"→ "Moreover, it is also…."

A7: Pg 35861, L3, "through" had been replaced by "throughfall". Thanks a lot!

A8: Pg 35866, L4, “were shown in Table 1”. → “are shown in Table 1”.

A9: Pg 35868, L19, “export mass of THg through stream water was 7.23 μgm-2 yr-1”. → “export flux of THg through stream water was 7.23 μgm-2 yr-1”

A10: Pg 35870, L19, “Compared the ratios of output flux with other places, the higher output flux may be greatly…” → “Compared the ratios of output to input flux with other places, the higher ratios may be greatly...”

A11: The significant figures seem to be a bit excessive at times, e.g. “982.2 times”,“337.6 times”, suggest using integers in those two incidents.
P35870, Line 3-4: “982.2 times” → “982 times”; “337.6 times” → “338 times”

A12: The readability of sections 3.3 and 3.4 could be improved by avoiding long paragraphsand eliminating redundancy with sections 3.1 and 3.2, e.g. comparison of individualconcentration/flux with other studies.
Thanks a lot for this suggestion. We had separate 3.3 to two paragraphs, and 3.4 to three paragraphs based on the logical relationship.

Thanks a lot for the thorough check to our manuscript, which help us a lot!
Ma Ming