Dear Editor,

We thank you very much for your comment on our manuscript.

When trying to establishing the sediment and organic carbon (OC) budgets in the Yellow River basin, we first determined each quantifiable budget term and calculated its uncertainty range based on available data. With these estimates, we estimated the hillslope redistribution term for the sediment budget and the decomposition term for the OC budget by taking into account propagation of error. In particular, for the uncertainties of the OC budget terms, we estimated the OC budget terms from two aspects. One is the uncertainties related to the sediment budget terms. The other is the uncertainty in the sediment OC content (%); the results are shown in Table 1 for reference.

Table 1. A summary of organic carbon content of different budgetary terms.

| Soils/sediment | Used OC (%) | OC (%) in literature | Source | Note |
|---|---|---|---|---|
| Soils ($\theta_E$) | 0.84±0.12 | 0.21-39 | Environmental and Ecological Science Data Center for West China | Estimated from the soil organic carbon map. An enrichment ratio of 1.1 for the topsoils and 0.8 for the subsoils was used. |
| Sediment deposited behind all dams ($\theta_T$) | 0.65±0.19 | | | By taking into account the OC content difference for sediments trapped by silt check dams and by reservoirs. |
| Slope soil control ($\theta_P$) | 0.84±0.12 | | | Assuming it has an OC content similar to the parent soils. |
| Sediment diverted with water ($\theta_W$) | 0.51±0.28 | | Liu and Zhang, 2010 | Similar to the seaward sediment |
| Hillslope redistribution ($\theta_R$) | 0.75±0.16 | | | Average of $\theta_E$ and $\theta_T$. |
| Sediment deposited in channels ($\theta_H$) | 0.49±0.29 | 0.44-0.85 | Liu and Zhang, 2010 | For the mainstem channel downstream of Lanzhou. |
| | | 0.4-0.8 | Wang et al., 2007b | Mainly the middle-lower reaches. |
| | | 0.11-0.89 | Ran et al., 2013c | Based on a weekly sampling frequency from Toudaoguai to Lijin. |
| Seaward suspended sediment ($\theta_O$) | 0.51±0.28 | 0.4-0.6 | Zhang et al., 2009 | Measurements for the fine sediments (<16 μm in size) at Lijin station. |
| | | 0.37-0.79 | Wang et al., 2012 | Based on a monthly sampling frequency at Lijin station. |
| | | 0.42-0.5 | Cauwet and Mackenzie, 1993 | 0.42 in May (dry season) and 0.5 in August (wet season) near the estuary. |
| | | 0.15-0.75 | Cai, 1994 | Calculated from 115 sediment samples collected from the estuary. |

According to the reviewers' comments, we have further discussed the uncertainties related to the sediment and OC budgets in the Discussion Section. For example, the channel sedimentation may have been underestimated because not the full depositional length of the mainstem channel and the tributaries was considered. A large number of tributary floodplains are important sinks of sediment and the associated OC. Dams also play an important role in trapping sediment and burying OC, and the estimated dam trapping is with low confidence due to the difficulty in estimating sedimentation behind each dam. In addition, because the soil erosion rate has changed with time during the period 1950-2010, the used soil erosion rate (1.7-2.5 Gt/yr) may have also resulted in uncertainty to the estimate of OC redistribution on the landscape. Finally, based on available literature data and our own field measurements, we indicated the confidence level for each budget term as shown in Table 2.

Table 2. Redistribution of the eroded soils and organic carbon in the Yellow River basin during 1950-2010. Also shown are the uncertainty and confidence level.

| Term | Sediment (Gt) | OC (Gt) | Note |
|---|---|---|---|
| Soil erosion | 134.2 ±24.7 | 1.07 ±0.15 | Based on a mean soil erosion rate of 2.2 Gt/yr; high confidence for SOC. |
| Dam trapping | 40.3 ±1.2 | 0.262 ±0.077 | Sediment sum of reservoir trapping and silt check dam interception; low confidence for OC. |
| Channel deposition | 17.8 ±3.5 | 0.087 ±0.054 | Sum of sediment deposits in three sediment sink zones; medium-to-high confidence for OC. |
| Sediment diversion | 10.5 ±0.4 | 0.054 ±0.03 | Based on mainstream water diversion; high confidence for OC. |
| Seaward transport | 49.3 ±2.1 | 0.251 ±0.138 | Based on measurements at Lijin station; high confidence for OC. |
| Slope soil control | 6.0 ±1.1 | 0.05 ±0.012 | Sum of vegetation restoration and terrace formation; low confidence for OC. |
| Hillslope redistribution | 10.3 ±24.9 | 0.077 ±0.187 | Determined as a residual, and includes the propagation of uncertainty. |
| Decomposition | / | 0.289 ±0.294 | Determined as a residual, and includes the propagation of uncertainty. |

Specifically, with the estimated uncertainties related to the sediment and OC budget terms, we analyzed the propagation of uncertainty. In the sediment budget, the hillslope redistribution is determined as a residual, and thus includes potential errors arising from other sedimentation processes not considered in the budget and also the propagation of uncertainty from the calculation. Because there are uncertainties with each sediment budget term (see Table 2), we account for the propagation of error for the hillslope redistribution term by treating the errors on the individual terms as being statistically independent (although not entirely true). This allows us to evaluate its propagation of error by adding the uncertainties of individual budget terms in quadrature (John R. Taylor, 1997. *An Introduction to Error Analysis: The Study of Uncertainties in Physical Measurements*, Chapter 3). When studying the budgets of sediment and OC in the conterminous United States, Smith et al. (2001. Global Biogeochemical Cycles, 15, 697-707) have used similar methods to evaluate the propagation of uncertainty related to the sediment redistribution and OC decomposition terms.

For example, if $x$, $y$, and $z$ have independent errors $\delta x$, $\delta y$, and $\delta z$, respectively, and $Q$ is some combination of sums and differences of these quantities, i.e., $Q=x+y-z$. Then the propagation of error in $Q$ is

$$\delta Q = \sqrt{(\delta x)^2 + (\delta y)^2 + (\delta z)^2}$$

Here, the fractional uncertainties add in quadrature to get the uncertainty in $Q$.

The propagation of uncertainty for the hillslope redistribution term is shown in Table 2. Likewise, the decomposed OC is determined through the budget calculation and there are also uncertainties with each OC budget term (see Table 2). We evaluated its propagation of uncertainty using the same method as the hillslope redistribution term in the sediment budget. The result is also shown in Table 2 (the last row).

In our original manuscript, we carelessly forgot to explain how the propagation of uncertainty was estimated. We have more clearly clarified the propagation of uncertainty analysis in the revised version. The extended discussion on uncertainty of the other budget terms has also been added into the revised manuscript.