

## ***Interactive comment on “Rapid channel incision of the lower Pearl River (China) since the 1990s” by X. X. Lu et al.***

**X. X. Lu et al.**

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Author<sup>2</sup>17;s Responses to Referee 1 (N. Surian)

Referee: 1 - Language: English should be improved. Example: I do not think the expression S797 8220;fluvial river<sup>2</sup>21; is correct (pag. 2206 - row 19).

Author: Effects have been made to improve language. 8220;fluvial river<sup>2</sup>21; in the paper should be 8220;alluvial river<sup>2</sup>21;

Referee: 2 - 8220;2 Study area<sup>2</sup>21;: this chapter could be integrated with information about the river, specifically regarding channel morphology (e.g. channel width, slope, pattern) and bed and bank composition.

Author: Information about channel geomorphology has been added in the part of study

area and shown as follows.

The channel from Wuzhou to Makou has a length of 212 m with the average channel slope of 0.098240; while the channel from Makou to Modaomen waterway (the river mouth) has a length of 139 m with the average slope of 0.0488240;. The channel width of the Xijiang at Gaoyao is about 1000 m and the channel depth is about 30 m. The channel width of the Beijiang at Sanshui is about 1100m and the channel depth is about 25 m. The channel pattern is clearly shown in Figure 1B. Generally the channels in both the lower Xijiang and Beijiang are more like straight with alternate sand islands. The sinuosity is about 1.07 for the reach from the Lingyangxia Gorge to the estuary of the Xijiang, and 1.19 for the lower reach of the Beijiang (Xu, 1996). The channel bed composition in the lower Xijiang and Beijiang is mainly sand except in the 8 km-long bedrock section of the Lingyangxia Gorge in the low Xijiang.

Referee: 3 - Rapid channel incision: what about channel variations before 1990 ? It would be relevant to have some data about channel morphology before 1990 to understand if channel incision occurred only after 1990 or some changes occurred before that date. Such pre-1990 data will be useful to understand relation between channel changes and cause (e.g. sand mining).

Author: Pre-1990 data are not available in this study. However, based on the information from Chinese documents, the channel generally remained balance between deposition and erosion before 1990s. The following related references have been cited in the introduction part.

Huang, B., Lian, W., Du, J., and Zhang, G.: The study on dyke renovation in the Datang-Suijiangkou section of Beijiang dyke, Guangdong Water Resources and Hydropower, 2, 19-22, 2003 (in Chinese).

Li, T.: The impact analysis of hydrological characteristics in the Pearl River Delta, Guangdong Hydrology and Water Environment 2, 2003 (in Chinese) (<http://www.gdsw.gov.cn/web/law/>).

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Interactive Discussion

Discussion Paper

Qian, Y.: The impacts and management measures of in-channel sand mining in the Pearl River Delta, Pearl River, 2, 44-46, 2004 (in Chinese).

Referee: 4 - 8220;Pag. 2210 - row 48221;: is the Arno the river that should be cited here instead of Po ?

Author: Po River is right cited here, but the reference should be Rinaldi et al. (2005) rather than Rinaldi and Simon (1998).

Referee: 5 - 8220;4 Results - pag. 2212 row 4-68221;: the slope of the river is very low and I am wondering if the slope increase that occurred (from 0.000063 to 0.000070) is so relevant in terms of channel hydraulics (e.g. shear stress, stream power) and subsequent effects.

Author: Although the slope of the flood water surface is quite low, it has increased of more than 10

$(0.00007-0.000063)/0.000063*100=11.1$  which is a significant variation and could make difference in channel hydraulics.

Referee: 6 - 8220;5.1 Discussions8221;: more explanations about sediment fluxes and sediment extracted would be useful; 59.8-68.9 Mt is the total load or the suspended load ? Is coarse fraction extracted from the channel bed equivalent to the bed-load ? Is it possible to make an estimate of proportion of the different components of sediment load (suspended load, bed load) ? In other words, if the sediment extracted (sand) correspond to bedload, it is important to stress that the extracted volumes could be much higher than average bed-load transport rates.

Author: 59.8-68.9 Mt is the amount of suspended load. The coarse fraction extracted from the channel bed is dominantly from the bed-load although there are minor coming from suspended sediment. So we can say the sediment extracted approximately correspond to bed-load. Generally, the bed-load only accounts for 5 10

Referee: 7 - 8220;5.2 Discussions8221;: The average annual sediment loads have

decreased of about 20

Author: the annual sediment load here refer to the annual suspended sediment load. Although about 20

Referee: 8 - 8220;6 Conclusion8221;: this chapter should be improved, there are parts that could be removed and the main results/conclusions of the paper should be reported more clearly. S798 For instance, I suggest to move a part of this chapter (row 16-25 pag. 2214) to chapter 5 (8220;Discussion8221;). In the chapter 8220;Discus- sion8221; it could be worth to have a section dealing with environmental effects of channel incision (e.g. salty water intrusion).

Author: A new section about the effects of channel incision has been added in the Discussion part (Section 5.1) for more elaborations.

Referee: 9 - Figure 2: it is not clear; I have a couple of suggests: a) put only some of the cross-sections instead of all the available 14 cross-sections; b) replace the figure with temporal trends of bed elevation (e.g. thalweg elevation or average level of the bed).

Referee: 10 - Figure 3: it is not clear; like for figure 2, I am wondering if it would be better to report only some of the data which will give the possibility to see better temporal variations.

Referee: 11 - Figure 5: same comment as for Figures 2 and 3.

Author: Figures have been re-plotted according to the suggestions of two referers.

## TECHNICAL CORRECTIONS

Referee: 1 - MT: I suggest to use 8220;Mt8221; since 8220;T8221; is commonly the symbol for tesla (magnetic flux density).

Referee: 2 - Pag. 2208 - row 5: it would be useful to mention the drainage area of the Pearl River at the end of the previous chapter, where other rivers are reported.

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Referee: 3 - Pag. 2210 - row 3: Fig. 2 instead of Fig. 2a.

Referee: 4 - Figure 4a: is the 8220;Altitude8221; above sea level (a.s.l.)?

Referee: 5 - Figure 6: is water level above sea level?

Author: Corrections have been made corresponding to the reviewer8217;s comments.

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