**Dimensions and shapes of tidal-fluvial meanders – are the final meanders of a river disproportionally large?**

Jasper R.F.W. Leuven, Bente R. Lexmond, Bram V. van der Hoek, Matthijs J. Spruijt, Barend van Maanen and Maarten G. Kleinhans

j.r.f.w.leuven@uu.nl, www.jasperleuven.nl

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### Introduction

Many river mouths reputedly have one or a few excessively large meanders in the tidal-fluvial transition (e.g. Thames, Salomon, see Fig. 1). Relations for meander size are either derived from rivers or small tidal creeks. Here we present data of 72 fluvial-tidal transitions to test whether meanders at the transition are indeed much larger than the upstream fluvial meanders.

### Methods

- Digitized the outline of 800 meanders in 72 rivers that transition from land into the sea;
- Extracted the channel centerlines and calculated inflection points;
- Derived meander dimensions: wavelength, amplitude, sinuosity;
- In multi-channel estuaries, the main meandering channel was used.

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### Meander dimensions

- Wavelength and amplitude increase in seaward direction (Fig. 3 & 4);
- Estuarine meanders are on average 4 times larger than their landward counterpart (Fig. 3);
- Landward meanders set the minimum meander dimensions and correspond to Leopold and Wolman (1960) and Struikema et al. (1985).

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### Proportionality to channel dimensions

- Meander dimensions scale with local channel width (Fig. 5);
- Meander dimensions are not disproportionally large when compared to the local channel dimensions (Fig. 5);
- Increase in meander dimensions scales with the channel width convergence length (Fig. 6).

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### Sinuosity peaks above 2.5?

Literature suggests that channel sinuosity systematically peaks above 2.5 in the fluvial-tidal transition zone (Dalrymple et al., 2012).

- Only 11 of the 72 systems peak above 2.5;
- Highest values mostly meander numbers between 6-10;
- Degree of sinuosity lacks correlation with the size of the tidal system.

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### Conclusions

- Meander dimensions increase in seaward direction;
- Increase in dimensions is proportional to the channel width;
- The landward river width sets the minimum dimensions and the downstream dimensions scale with the upstream river;
- The main meanders in the multi-channel estuary are typically 4 times larger;
- Sinuosity peaks above 2.5 are rather an exception than a rule for tidal-fluvial meanders;
- Meanders in the transition zone are not excessively large beyond the usual spread and seaward change.

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### References


