Interactive comment on "Reconstructing lateral migration rates in meandering systems; a novel Bayesian approach combining OSL dating and historical maps" *by* Cindy Quik and Jakob Wallinga

J. Hooke (Referee)

janet.hooke@liverpool.ac.uk

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This is an interesting paper and potentially valuable. It is a commendable approach to try to combine historical map evidence with OSL dating of scroll bars to extend migration rates back in time over the historical period, rather than just much longer periods (as more common with most fluvial OSL applications). The overall approach is sound but some details and assumptions need to be clarified or considered in more detail. My comments concern the historical maps and the meander development, not the OSL. It would be useful to have a summary Figure at the end plotting migration rates them-

selves over time (with error bars) since much of the discussion is about these, though it can be inferred from Fig. 7. Specific comments: 40 not entirely true that historical maps only cover "cultivated" areas. 53 and elsewhere on p 2 - other literature should be acknowledged, e.g. Rowland et al. (2005). Need to be very careful in naming only one exception that literature search is absolutely comprehensive. 87 give width of channel so we understand its size - very important for subsequent evidence and analyisis. Fig.1 and 120 - cannot refer to a paper that is only submitted and not available. Section 3.2 Need a fuller review of use of historical maps. Hooke and Kain (1982) wrote a book on use of historical evidence, including guidelines on checks to be made. Other subsequent papers give more detail on accuracy in relation to meander changes. Not all older maps necessarily less accurate. Certainly those pre 1840 in Britain were less accurate and not usable for river planform position but late 19thC / early 20thC OS maps at large scale were of high accuracy. 3.2.1 Discuss scale of maps. 140 - "normalization" is a term to be avoided since straightening is far from normal and is completely artificial (although it is common translation). Use channelization. 150 Finding GCPs is a frequent problem in analysing rivers because of lack of fixed features in floodplains. Is not simply due to nature of maps nut nature of floodplain landscapes. 3.3.1 Explain position of samples in relation to scroll bars and ridges and swales. Precision of 3m seems unnecessarily low, Discuss effects on errors. 3.4 Indicate the width of scroll bars. It is possible to plot the trajectory of maximum meander movement if the scroll bars are highly visible on air photo or satellite images. This would be an added check and corroboration. Also indicates direction of meander movement in relation to the assumed profiles taken. 299 Explain in more detail why or what is meant by assumption of randomness in deposition. 312 but position only accurate to $\pm$3m 318 Channel width is very likely to have varied significantly over the period of the last few centuries. Numerous papers document such changes on European rivers. Thus assumptions about width introduce another uncertainty, which is assessed but the variations could be real. Again, could supplement with measurements of meander scroll widths if visible on images. 323 Danger of circular argument. Need to be very careful about assumptions

on migration rates since it has been shown that rates tend to accelerate with curvature and during bend development (Hickin, Hickin and Nanson, Hooke, numerous papers). 4.1 I found that maps earlier than 1840 tend to be much less accurate, including the 1st Ordnance Survey maps In England. May help to show presence and absence of features but not exact position. Agree with strategy to exclude the older maps (L439). 417 & 464 state that river moves outside valley but river must be in the valley . Do you mean outside floodplain and moving into terraces and/ or valley wall? If extends into such materials they tend to be more resistant than alluvium so tend to impede channel movement, whereas development shown on Fig. 5 is relatively rapid. Need to explain what the channels move into and what was restricting them prior to that.

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