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Coupled eustatic, fluvial and nutrient controls on the initiation and location of human civilization during the Holocene

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The initiation of human civilization, as expressed in long-lived settlement, and organized agriculture and irrigation, occurred at the same time as a major decrease in the rate of Holocene eustatic sea-level rise. This is not coincidental, since sea-level exerts an important control on the alluvial river systems where many known early settlements are located. Bulk changes in fluvial and alluvial styles over the Holocene may have shared a global pattern. This pattern is perhaps best known from previous work on the Rhine-Meuse delta in NW Europe [Berendsen and Stouthamer, 2001], where a transition from crevassing and anastomosing channel networks to meandering channels occurred at 6-4 ka. Concomitant with this change, the coastline closed up and started prograding, the extent of the estuarine system decreased, and river floodplains expanded. We demonstrate that similar changes have occurred in the Nile, Tigris-Euphrates, and Huang He river and delta systems, with only slight differences in timing. These three areas have archeological evidence of systematic human settlement starting at the decrease of Holocene sea level rise. In Mesopotamia, where this evidence is most complete, an apparent shift occurred from smaller settlements and cities with estuarine locations associated with small scale farming and fish-based protein provision to larger settled agglomeration in upstream locations with extensive farming, irrigation and animal husbandry, tracking changes in the fluvio-deltaic environment. Important elements of this pattern have also been found in the Nile and Huang He systems, suggesting that further exploration might benefit from prioritization of locations and time horizons that have hitherto received little attention. According to a quantification of nutrient resources, using characteristic values for principal nutrients and nutrient sources in a range of physiographic environments, it is possible that shifts in scale, location and style of civilization of these, and other river systems are tied with the scale and connectivity of channels and channel networks and overbank areas, and the nature and rate of bioproductivity (especially protein) in various fluvial, deltaic and estuarine environments.

Reference:
Berendsen, H.J.A. & Stouthamer, E., 2001. Palaeogeographic development of the Rhine-Meuse delta, The Netherlands. Van Gorcum, Assen, 268 pp.