

New constraints on the age and geometry of alluvial fills in the valley bottoms of the Seine River catchment (France).

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Valley bottom fill deposits and alluvial terraces contain sedimentary archives for paleoenvironmental reconstructions in relation with changes in climate (e.g., base level and/or water discharge), bedrock lithology, and tectonics deformation. In the Paris basin, the geometry of the valley bottom is inherited from the Quaternary period. Thus, understanding how alluvium infill valley bottoms is fundamental to better understand the transient storage of sediments associated with landscape evolution. Within the Seine watershed, valley bottom is also a key compartment for hydrological exchanges between the bedrock, the alluvial aquifers, and the Seine River, and is also a place where many archaeological artifacts may be preserved.

The aim of this study is (i) to reconstruct the large-scale geometry of the interface between the bedrock and the alluvium of the Seine watershed (ii) to quantify the alluvium volume stored at the bottom of major valleys of the Seine watershed. For this purpose, a database consisting of thousands of boreholes that intersect the alluvium at the bottom of valleys was created from the Banque du Sous-Sols (BSS) dataset while a harmonization of valley bottom infill mapping was realized.

A first restitution of valley bottom geometry using a new directional kriging has been applied in the Oise valley. There, alluvium thickness increases downstream, i.e., from 3-8 m upstream to 12 and 14 m downstream, where the valley is narrower. We also identified areas where the plain is much wider in the middle and upstream part of the valley in association with a pattern that may suggest a development of a braided system while downstream the geometry is more consistent with that of a meander system.

To reconstruct the evolution of the Seine River and the timing of sediment deposition, we analyse the geochronological ages on fluvial deposits by OSL and ESR.

Current available ages on fluvial sediments suggest that the alluvial infill in valley bottoms is no older than MIS 2, for instance in the Bassée alluvial plain, in the Upper Seine upstream of Montereau (ca. 15 to 17 ka). In the Lower Seine River, we were able to access sedimentary outcrops in quarries to study the most recent strath terraces. In the Anneville-Ambourville area, we identified different incision steps on chalk bedrock. Fluvial and tidal deposits were observed, the associated OSL ages being comprised between 197 ± 10 ka and $172 \pm 8,5$ ka. Finally, several generations of cryoturbation structures were observed, the latest being younger than MIS 2 ($24 \pm 1,3$ ka). Results on MIS 7 may suggest a possible correlation with the neighbouring Tourville-la-Rivière site. These results will be completed by ESR dating, using the most sensitive centers of quartz.

Keywords: Paris basin, valley fills, Quaternary, kriging method, Manoir Brésil, OSL, ESR.