
Contribution of cave infill datings in Normandy (France) to the landscape evolution of the Seine Valley during the Quaternary

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Résumé

The Normandy area of northern France comprises an extensive karstic Chalk plateau incised by deeply entrenched river systems including the River Seine. Previous estimates of valley incision and landscape evolution have been hampered by the lack of well-preserved datable fluvial terraces, particularly at high levels. A stack of abandoned phreatic cave passages preserved in the sides of the Seine valley are morphostratigraphic markers that can be used to reconstruct the landscape evolution of the region. These indicate that former base-levels were situated up to ~ 100 m above the modern valley floors. Combining geomorphological observations, paleomagnetic and U/Th dating of speleothem and cave sediments in eight caves along the Lower Seine valley, we have constructed an age model for cave development and valley incision. Six main cave levels have been identified that were formed during the last ~ 1 Ma, coeval with the incision of the River Seine. Passage morphologies indicate that the cave were formed in a shallow phreatic or epiphreatic setting, and have been modified by influxes of sediment. New chronological data from cave deposits combined with a review of dated terrace and tufa deposits provides new evidence for the landscape evolution of the Seine valley. The maximum age of the Seine valley is constrained by the occurrence of late Pliocene marine sands and clays. Paleomagnetic dating of sediment infills indicates that the highest-level caves (ca. 90 m asl) were being infilled prior to the Jaramillo normal subchron at 1.1 Ma. The evidence from the studied caves complemented by fluvial terrace sequences indicate rapid river incision occurred during Marine Isotope Stage (MIS) 28 to 20 (0.8-1 Ma), with rates reaching a maximum of ~ 0.30 m·ka⁻¹, dropping to ~ 0.08 m·ka⁻¹ between MIS 20-11 (0.8-0.4 Ma), and 0.05 m·ka⁻¹ from MIS 5 to the present-time (Upper Pleistocene).

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