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Late Quaternary river incision rate from L'Aquila-Scoppito Basin (central Apennines, Italy)

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L'Aquila-Scoppito Basin (ASB) is part of the wider L'Aquila Basin, one of the most tectonically active intermontane basins of central Apennines (Italy). ASB is a semi-enclosed intermontane sedimentary basin of morphotectonic origin, W-E trending and approximately 20 km2 wide, with mean elevations ranging between 850 and 650 m a.s.l. and it is crossed by two main water courses: the Aterno River and the Raio Creek.
Structurally, the ASB may be considered as an half-graben, bordered northerly by the south-dipping Scoppito-Preturo normal Fault and easterly by the southwest dipping Pettino Fault.
In the L'Aquila-Scoppito Basin a series of erosional and depositional post Middle Pleistocene events generated three order of fluvial terraces, generally not completely preserved.
The first order of fluvial terrace, the Vetoio Synthem (T1), is a fill terrace carved into both the L'Aquila Breccia Synthem (Middle Pleistocene) and the Madonna della Strada Synthem (Lower Pleistocene), whose top is preserved near the L'Aquila airport and the S. Salvatore hospital, approximately at 20-25 m above the present thalweg of the Aterno River.
The second order of terrace, the Pile Synthem (T2), is a strath terrace embedded into T1 and carved into both the Lower Pleistocene deposits and the pre-Quaternary bedrock. The top of T2 is located at 10-13 m above the present thalweg of the Raio Creek.
Charcoaled plant remains founded within the sandy layers of T2 give a 14C 2σ age of 41854-40464 BP (MIS 3). This age is in agreement with traces of lithic industry of Mousterian age (late Middle Paleolithic) inside the gravels.
The youngest order of terrace, Ponte Peschio Synthem (T3), lies 5-7 m above both the Raio and the Aterno thalwegs. T3 is embedded into T1 and carved in the L'Aquila Breccia Synthem, near the S. Salvatore hospital, while at Ponte Peschio it is embedded into T2 and is carved directly into the pre-Quaternary bedrock. Then, also T3 may be interpreted as a strath terrace.
River incision rate for L'Aquila-Scoppito Basin was determined starting from the second order of terraces by using 14C age. In addition, assuming a constant river incision rate for the the L'Aquila Basin, during late Quaternary, the obtained incision rate was used to evaluate a possible age for the Vetoio and Ponte Peschio synthemes.
On the basis of the collected data we calculated a river incision rate for T2 ranging between 0,24 and 0,32 mm/yr. These rates are similar to estimates of sediment yield (0.12–0.44 mm/yr), river incision (0.35 mm/yr), and uplift (0.01–1.0 mm/yr) rates inferred from other methods, for the northern and central Apennines since the Early Pleistocene (Cyr and Granger, 2008). Assuming for the L'Aquila Basin a constant incision rate from Late Pleistocene to Present, we estimated an age of 71-89 ka (MIS 5a) and 18-25 ka (MIS 2) for T1 and T3, respectively.