



Environmental evolutions of the Alzette valley (Grand Duchy of Luxembourg) since Late Pleistocene

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The Alzette River rises within France, approximately 4 km south of the French-Luxembourg border, and has a total length of 73 kilometres before joining the Sauer which is a left-bank tributary of the Moselle River. During the construction of the "Nordstrooss" motorway (going north from Luxembourg city towards Ettelbruck) a viaduct was built that crosses the wide alluvial plain (about 1 km) of the Alzette River valley near Lorentzweiler. A lot of drillings were also made for geotechnical purposes by the Geological survey of Luxembourg (SGL). The drillings were able to provide informations about the sediments preserved in the Alzette River valley floor. This information has allowed the construction of a cross-profile through the valley showing the stratigraphy of the quaternary deposits, and illustrating that it was the result of a rather complex evolution (aggradation and incision periods leading to terraces formation, input of slope deposits at the valley margins, possible eolian input, ...). A multidisciplinary research project thus started, aiming to reconstruct the paleoenvironment of the Alzette region during the late Pleistocene and Holocene periods.

The drilling results make it possible to reconstruct the geometry of the quaternary sedimentary units of the Alzette valley. Three stepped alluvial units are recognized along the cross profile: the lower one (Az0) corresponds with the maximal incision of the Alzette. It is preserved in the western part of the floodplain, with base being located at about 212 m a.s.l.. In the eastern part of the valley the contact between the fluvial deposits and the substratum is located at about 215 m a.s.l.: these deposits may also be allocated to a lower terrace Az1 (relative height : +3 m). A third alluvial unit Az2 was recognized in two drillings, with bedrock located at about 224 m a.s.l. (+12 m). The channel migration in the valley and the assumed meandering dynamics (suggested by the weakness of the longitudinal slope) led to meander downcuttings and to the formation of oxbow lakes. These former oxbow-lakes are subjected either to a mineral or organic filling, the predominance of this latter leading to the formation of peat bogs. Radiocarbon datings were obtained on peaty levels from two drillings, FR-200-364 (Beta-249559:3400±40 BP, Beta-249560:4660±40 BP, Beta-249561:9390±60 BP) and FR-200-365 (Beta-240994:7250±40 BP, Beta-249562:12100±70 BP, Beta-249563:11910±70 BP). Taking account of this dating, sequences of peats found in recent drillings, downstream the viaduct, could belong to the first part of the Holocene. In one of this new drillings (FR-207-353), it is also important to note presence of an organic level within the coarse sediments. It is located at approx. 211 m a.s.l., and contains numerous rests of mollusc shells. Further radiocarbon dating and palynological study are consequently be realised for this level and the new sequence of peats.

Two studies in the area are also to considerate:

- in the drilling FR-201-055 (located at the western part of the valley), the dating of moss remains (bryophyts) preserved in a clayey level gave an age estimate of about 25280±220 BP (Beta-182249). This result is in good agreement with palynological data, suggesting a dry and cold environment. This age has however to be confirmed due, first to a possible reservoir effect (more study of the bryophyts remains is needed), and secondly to the

incoherence and heterogeneity of the drilling samples (mix of alluvial and slope deposits);

- in a western tributary called "Seisselbaach stream" a molluscan analysis from a tufaceous holocene deposit has been done and a radiocarbon age of 9820 ± 120 BP (Beta-181807) was obtained on charcoal fragments too small for identification.

The upstream course of this small river valley offers very convenient conditions to study the end of the glacial period and the beginning of the warmer period in a continental setting. Further results should then lead to improve the global environmental evolution in the Luxembourg area since the last cold period.