



Morphogenetic evolution of the Têt river valley (eastern Pyrenees) using 10Be/21Ne cosmogenic burial dating

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The rates and chronologies of valley incision are closely modulated by the tectonic uplift of active mountain ranges and were controlled by repeated climate changes during the Quaternary. The continental collision between the Iberian and Eurasian plates induced a double vergence orogen, the Pyrenees, which has been considered as a mature mountain range in spite of significant seismicity (e.g. Chevrot et al., 2011) and evidence of neotectonics (e.g. Goula et al., 1999). Nevertheless, recent studies indicate that the range may have never reached a steady state (Ford et al., in press). One option for resolving this controversy is to quantify the incision rates since the Miocene by reconstructing the vertical movement of geometric markers such as fluvial terraces. However, the few available ages from the Pyrenean terrace systems do not exceed the middle Pleistocene. Thus, to enlarge the time span of this dataset, we studied alluvium-filled horizontal epiphreatic passages in limestone karstic networks. Such landforms are used as substitutes of fluvial terraces because they represent former valley floors (e.g. Palmer, 2007; Audra et al., 2013). They record the transient position of former local base levels during the process of valley deepening.

The Têt river valley (southern Pyrenees) was studied near the Villefranche-de-Conflent limestone gorge where 8 cave levels have been recognized over a vertical height of 600 meters. Given that $^{26}\text{Al}/^{10}\text{Be}$ cosmogenic burial dating in this setting was limited to the last ~ 5 Ma (Calvet et al., 2015), here we used the cosmogenic $^{10}\text{Be}/^{21}\text{Ne}$ method in order to restore a more complete chronology of valley incision (e.g. Balco & Shuster, 2009; McPhillips et al., 2016). Burial age results for alluvial deposits from 12 caves document incision rates since the Langhian (~ 14 Ma). Preliminary results indicate a history of valley deepening in successive stages. The data show a regular incision rate of 70–80 mm/a from the Langhian to the Messinian, then a decrease to a mean incision rate of ~ 15 mm/a. Together with these burial ages, pre-burial catchment denudation rates were estimated and do not exceed 21 mm/a. Moreover, no acceleration during the Quaternary is recorded. This method also allows to infer that the Pla des Horts plateau is of Burdigalian age.