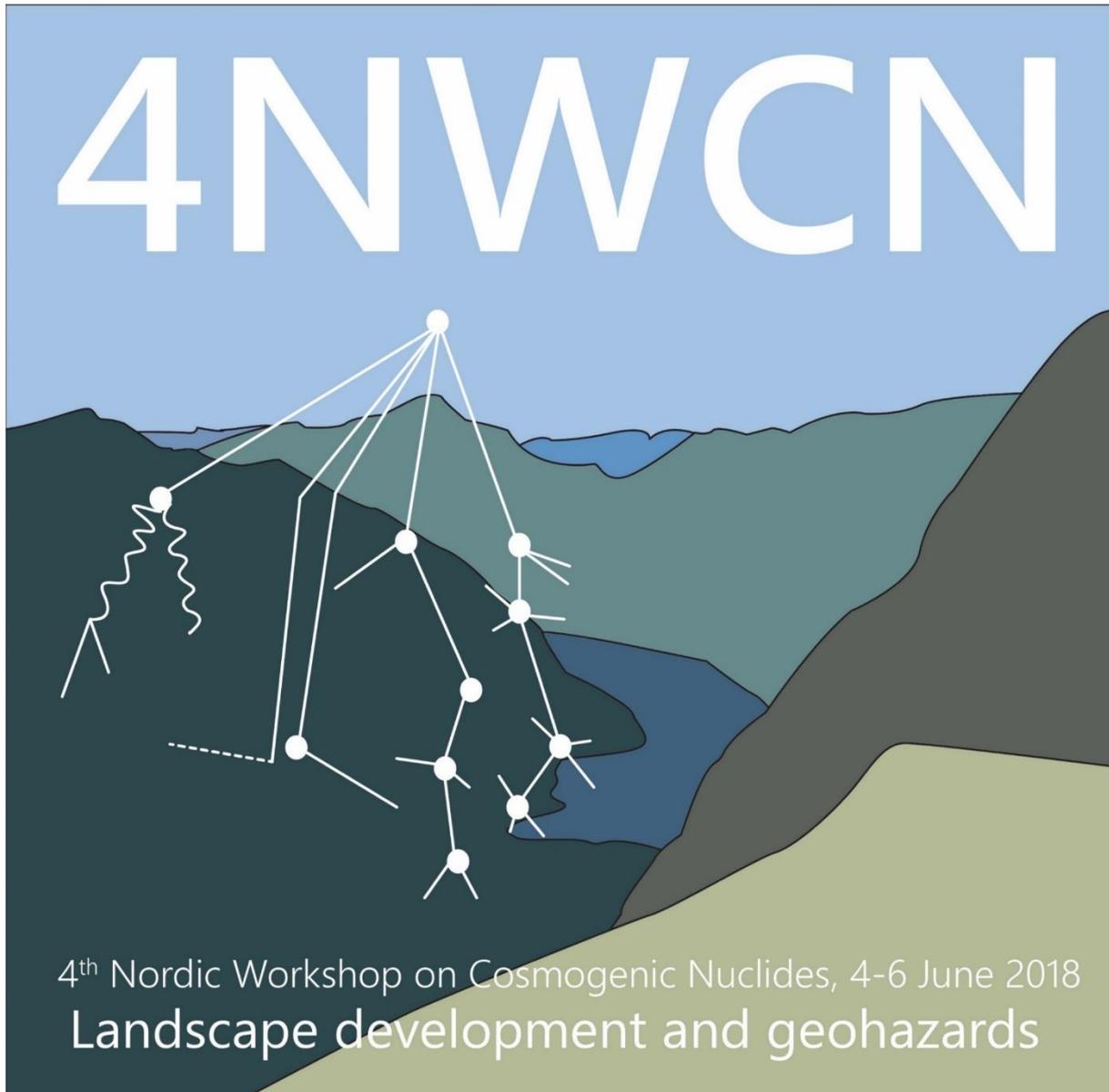


4th Nordic Workshop on Cosmogenic Nuclides

Landscape development and geohazards

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4th Nordic Workshop on Cosmogenic Nuclides (4NWCN)

Landscape development and geohazards

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WHEN TCN MEET HIGH SCHOOL STUDENTS: DECIPHERING WESTERN CÉVENNES LANDSCAPE EVOLUTION (LOZÈRE, FRANCE) USING TCN ON KARSTIC NETWORKS

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The rates and chronologies of valley incision are closely modulated by both the tectonic uplift of active mountain ranges and repeated climate changes during the Quaternary. The Neogene evolution of the Cévennes, the southernmost part of the French Massif Central, is poorly constrained. According to Séranne *et al.* (2002), most of its incision is due to a topographic uplift between the Langhian (16 Ma) and the Messinian (5.32 Ma) due to Mediterranean geodynamics as well as eustatic variations. Studies performed at the Montagne Noire and east of the Massif Central (*e.g.*, Olivetti *et al.*, 2016) suggest in addition a marked Pliocene incision. Finally, the Mediterranean facade (Ardèche) records a marked incision during the Messinian and the Pliocene controlled by eustatic fluctuations (Tassy *et al.*, 2013).

With the aim of quantifying the incision rates in the western Cévennes area since the Miocene, alluvium-filled horizontal epiphreatic passages in limestone karstic networks were studied. Such landforms are used as substitutes of fluvial terraces because they record the transient positions of former local base levels during the process of valley deepening. In the study area, the Jonte, Tarn and Lot valleys contain stepped cavities particularly well-suited for such purpose.

As part of the Erasmus+ “Live on the karst” project, 4 high school students and the research team firstly performed morphological and petrographic observations. Then, the burial durations of alluvial sediments from 13 caves located in the Jonte and Tarn valleys were determined using cosmogenic ²⁶Al/¹⁰Be and ¹⁰Be/²¹Ne ratios. The results obtained allow us to document the incision processes since the Tortonian (~ 11-8 Ma) in the Tarn gorges, and the Zanclean (~4 Ma) in the Jonte gorges. In both valleys, the estimated incision rates range from 40 to 120 m/Ma, also giving an estimate of the uplift rates. The digging would then be posterior to the Messinian envisioned by Séranne *et al.* (2002) for the Jonte gorges and could result from changes in drainage systems or even closure of the valley. Concerning the Tarn valley, the incision of the Causse de Sauveterre and the Causse Méjean would have started at least 8.39 ± 1.04 Ma ago, in agreement with the scenario envisaged by Séranne *et al.* (2002). This work still in progress provides new and original constrains on incision, paleo-denudation and related uplift rates in the study area. This may help to better understand the late evolution of this area, particularly its relations with the French Massif Central volcanism and the synchronous post-orogenic evolution of the French Alps and the Pyrenees.

Furthermore, the “Live on the karst” project allows high school students, as part of an advanced examination of the French A levels, to study the biodiversity and geodiversity of the Grands Causses karsts (southern Cévennes), and to compare them to other European karsts in interactions with Italian and Slovenian high school students. In this project, most of the cosmogenic nuclide concentrations were acquired by high school students supervised by members of the CEREGE team.

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Poster presentations

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