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The Schistes à Blocs Fm: the ultimate member of the Annot Sandstones in the Southern Alps (France); slope gullies or canyon system?

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Described since a long time, the Schistes à Blocs Fm is the ultimate member of the famous tertiary Grès d'Annot Sandstones in southern alpine foredeep basin in SE France. It mainly consists of shales, silty shales, debris flows, olistoliths and a subordinate amount of sandstones. Since their introduction, and because of their location down to major thrust sheet, they have been considered as a tectono-sedimentary unit linked to the nappe's emplacement and refer as an olistostrome, (Kerckove 1964-1969).
However they are separated from the underlying Annot Sandstones by a major erosional surface which deeply cuts, up to 500m, into the sandy turbidites; this surface definitively predates the infill and the nappe emplacement. This is supported by the fact that imbricates affect the upper part of the Schistes and also because of the age; the Schistes à Blocs being Upper Eocene to Lower Oligocene whilst the nappe is latest Oligocene to Lower Miocene. A detailed analysis of the erosional surface in la Bonette area reveals a complex geometry which shows obvious similarities with these observed either on submarine canyons or in slope dissected by gullies as shown by numerous seabeams or 3D seismic images.
The infill is quite complex, no basal lag have been observed, however bioturbations suggest occurrence of by pass. Most commonly the lower part of the infill is made of muddy or silty sediments. In some areas, decametric to pluri hectometric olistoliths are interbedded within these deposits. Debris flows are also common with a muddy matrix and finally isolated turbidite channels including the same material than in the Annot Sandstones occur. The reworked material into the debris flows and in the olistoliths suggests that it doesn't only derived from canyon flanks (sandstones) but includes elements belonging to older tethyan series such as Triassic and Liassic carbonates which must be exposed on the sea floor on local highs in the more internal part of the Alps but much earlier than the nappe emplacement.
In the forthcoming weeks, thanks to an already done drone acquisition of the cliffs, a 3D gridded model will be realize and will allow to discriminate if we are dealing with a major canyon with lateral irregularities or if, all incisions must be interpreted as numerous gullies entrenching the slope, it will also help to restore the offset of small normal faults affecting the surface.
Such type of features are of primary importance in the deep sea sediment routine system; very few examples of mud filled prone canyon are published and because of the outcrop quality, this example can become a world class analog; particularly to highlight potential hydrocarbon trapping mechanism in turbidite systems. Many other outcrops, of a coeval Fm occur all along the Alps from Italy to Switzerland and can provide opportunities to analyze variation of geometrical elements and describe additional facies participating to the infill.