

Multiproxy approach to deep-water Annot sandstones cyclicity

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Context

The Annot sandstones are a world famous formation of deep-water sedimentary rocks deposited in confined basins in the foreland basin of the western Alpine belt. During their deposition in the Eocene-Oligocene, these rocks recorded the growth of the orogen and contemporaneous climate variations. Cyclic patterns of deposition are marked by the presence of well-defined repetitive occurrences of sediment gravity flow deposits in alternation with intervals of hemipelagic deposition. Although this repetitive pattern has been extensively described, its origin remains unknown. Climate, sea-level and tectonics can all possible be held responsible for this specific (yet ubiquitous in other basins of the world) pattern of deposition. To test this, the proposed study will sample hemipelagics in between and within the sandstone members in order to establish a multi-proxy record of background environmental factors. In particular the evolution of stable isotopes and detrital proxies will allow testing climatic/sea-level controls versus tectonics.

Objectives and Methods

Aims:

Establish a continuous high-resolution multiproxy record of environmental factors within the Chalufy outcrop of Annot sandstones

Test hypotheses of tectonics versus climate versus sea-level control on deposition

Methods

Field work (sedimentology, sampling) / A good physical condition is required for these mountain outcrops

Proxies that will be used: sedimentology, geochemistry (organic matter, carbonate isotopes geochemistry, major and trace-elements) and mineralogy (clays and bulk mineralogy)

Statistical and signal processing techniques (computer, Matlab, Analyseries, R, Excel)

Literature

Du Fornel, E., P. Joseph, et al., "The southern Grès d'Annot outcrops (French Alps): an attempt at regional correlation." *Geological Society, London, Special Publications* 221, no. 1 (2004): 137-160.

Joseph, Philippe, and Simon A. Lomas. "Deep-water sedimentation in the Alpine Foreland Basin of SE France: New perspectives on the Grès d'Annot and related systems—an introduction." *Geological Society, London, Special Publications* 221, no. 1 (2004): 1-16.

Smith, Ru, and Philippe Joseph. "Onlap stratal architectures in the Gres d'Annot: Geometric models and controlling factors." *Geological Society, London, Special Publications* 221, no. 1 (2004): 389-399.



WEB sites

Sébastien Castelltort, earth surface dynamics Geneva

http://cms.unige.ch/sciences/terre/research/Groups/surface_dynamics/surface_dynamics.php

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<https://applicationspub.unil.ch/interpub/noauth/php/Un/UnPers.php?PerNum=1072250&LanCode=37>

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http://fondationtuck.fr/jcms/rep_6712/fr/philippe-joseph?idx=6

Choice of orientation :

1) Sedimentary, Environmental and Reservoir Geology / 2) Geochemistry, Alpine tectonics, Ore Deposits