



## Quantifying retro-foreland evolution in the Eastern Pyrenees.

Arjan R. Grool (1,2), Mary Ford (1), and Ritske S. Huismans (2)

(1) CRPG, Université de Lorraine, Nancy, France, (2) Department of Earth Sciences, University of Bergen, Norway

The northern Pyrenees form the retro-foreland of the Pyrenean orogen. Modelling studies show that retro-forelands have several contrasting characteristics compared to pro-forelands: They tend to show a constant tectonic subsidence during the growth phase of an orogen, and no tectonic subsidence during the steady-state phase. Retro-forelands are also not displaced into the core of the orogen once the steady state phase is achieved. This means they tend to preserve the subsidence history from the growth phase of the orogen, but little or no history from the steady state phase. The northeastern Pyrenees (Carcassonne high) are a good location to test these characteristics against real-world data, because syn-orogenic sediments are preserved and the lack of postrift thermal subsidence and Triassic salt reduce complicating factors.

In order to test the model, quantification of the following parameters is needed: Timing, amount and distribution of deformation, subsidence and sedimentation. We use subsurface, field, map and literature data to construct 2 balanced and restored cross sections through the eastern north Pyrenean foreland, stretching from the Montagne Noire in the north, to the Axial Zone in the south. We will link this to published thermochronology data to further constrain the evolution of the retro-foreland and investigate the link with the Axial Zone towards the south. We will quantify subsidence, deformation and sedimentation and link them to exhumation phases in the North Pyrenean Zone (NPZ) and the Axial Zone.

The north Pyrenean retro-foreland is divided into two parts: the external foreland basin (Aquitaine basin) to the north and the North Pyrenean Zone to the south, separated by the North Pyrenean Frontal Thrust (NPFT). South of the NPZ lies the Axial Zone, separated from the retro-foreland by the North Pyrenean Fault which is believed to be the suture between Iberia and Europe. The NPFT was the breakaway fault on the European continent during the Apto-Albian rifting phase and was strongly inverted during the Pyrenean orogeny. South of the NPFT we find Lower Cretaceous and older sediments, including Triassic salt. These sediments are completely absent north of the NPFT (on Carcassonne high), indicating its significance during the extensional phase. The retro-foreland is deformed by fault-propagation folds above basement-involving thrusts. A slow northward propagation of deformation and sedimentation is clearly visible. The preserved thickness of Upper Cretaceous sediments corresponds with the retro-foreland model's prediction that early subsidence records are preserved. Two distinct deformation phases are recognized, but not the latest Oligocene phase that is found in the pro-foreland (southern Pyrenees). This could indicate a steady state during the late Oligocene. We quantify and constrain the evolution of the eastern Pyrenean retro-foreland basin, investigate the link with the axial zone and investigate the pre-orogenic configuration of the region that currently constitutes the eastern Pyrenean retro-foreland.