Brisson, Sofia[1,2]; Wellmann, Florian[2,3]; von Hagke, Christoph[1]

Using low-temperature thermochronometers for model selection: an approach for choose the best geometry for the Eastern Alps

[1]*Department of Environment and Biodiversity, Salzburg University, Austria;*
[2]*Computational Geoscience, Geothermics and Reservoir Geophysics, RWTH Aachen University, Germany;*
[3]*Fraunhofer Research Institution for Energy Infrastructures and Geothermal Systems (IEG), Germany;*
brisson@cgre.rwth-aachen.de

In the Eastern Alps, there is a long-standing discussion about a possible subduction polarity reversal. Deciphering the time-temperature evolution of the orogen and its foreland is key to link deep-seated processes like this to Alpine deformation and surface processes. Thermokinematic models have been used in the past for this purpose. However, thermokinematic models in past studies consider one or at most a handful of model geometries and sequences of deformation. This results in a common problem: solutions are usually non unique - more than one model geometry can explain a certain thermochronological signal. It is necessary to explore a range of possible models, and also of possible model configurations, to accurately address this conundrum.
In this work, we present two 3-D kinematic model hypotheses each for the Subalpine Molasse and for the Eastern Alps' TRANSALP section. One model geometry supports the subduction polarity reversal theory and the other does not. We use available low-temperature thermochronology to quantitatively evaluate how well each model iteration fits the observed data. Using the calculated maximum likelihood estimate (MLE) from each model hypothesis, we use the Bayes factor to determine which geometry is more likely, considering parameter and data uncertainties. For the Subalpine Molasse models, results favor an out-of-sequence triangle zone formation. For the TRANSALP section, the resulting Bayes factor implies very strong evidence against the subduction polarity reversal model, as the alternative model better explains the deep exhumation in the Tauern Window.

Session: *Pangeo workshop: Earth Surface Dynamics*
Keywords: *3D Modeling; Uncertainty; Eastern Alps; Thermochronology*