



Provenance analyses: a tool to constrain tectonic changes. Parallelism between the ancient Yukon-Koyukuk Basin (Alaska) and modern Southeast Asia

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Time & place: May 14, 2025 at 15h00. William-Olsson lecture hall, Geohuset

In this seminar, I will present the results of my PhD research on the sedimentary units of the Yukon-Koyukuk Basin (YKB) in Alaska, which allowed to better understand its evolution within a tectonic framework. Two different models have been suggested for its formation: the first one interprets the YKB to be formed during the collision between an intraoceanic volcanic arc and the arctic Alaska continental margin in the Late Jurassic, while the second addresses YKB formation to an extensional event occurred in the Late Cretaceous. To test these two models, we collected and analysed samples from the whole stratigraphic column, from the lowermost, non-marine to deep marine, Kv unit, to the uppermost, deltaic, Ks unit.

We use QEMSCAN® (Quantitative Evaluation of Minerals by Scanning Electron Microscopy) for heavy mineral (HM) analysis, which, along with point counting, petrographic description, paleocurrent data and sedimentary features characterization, helps to constrain sediment provenance and the paleogeography of the basin. U-Pb SIMS dating of tuffs and detrital zircons provides, for the first time, an absolute chronology for basin evolution.

The combined data indicate the YKB formed in a forearc/backarc setting prior to 138 Ma (deposition of the basal, volcanic-rich, Kv unit). With the progressive denudation of the Brooks Range, sedimentation shifted towards greater metamorphic input, leading to the deposition of the turbiditic Kvg unit at 110 Ma. The Late Cretaceous uplift of the Ruby Terrane caused a change in the main depocenter, recorded by deposition of the slurry beds, and a shift in the HM assemblages towards a more mafic input in the Ks unit. Ultimately, two basins in Southeast Asia serve as modern analogues for comparison. The Savu Sea and the Taiwan margin show similarities in metamorphic grade, stratigraphic sequence and tectonic setting, suggesting these are effective modern analogues that can enhance our understanding of both ancient and modern arc-continent collisional systems.

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