Timing of rifting in the Central Western Carpathians post-Variscan orogeny and provenance of the Meliata Ocean

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Abstract

Slovakia is located within the Central Western Carpathians (CWC), one of many connected curved mountain belts prominent throughout the Mediterranean area and Europe. It is divided into tectonic domains considered “superunits,” termed the Gemeric, Veporic, and Tatric that correlate to the lower, middle, and upper Austoalpine nappes. For example, granite bodies exposed in the unit (termed apophyses) yield a wide range of zircon ages from 310±21 Ma to 87±4 Ma. This range of ages leads to problems in deciphering where the Gemeric unit was located in global plate reconstructions of eastern Europe and the western Carpathians specifically. This case study involves U-Pb dating of magmatic and detrital zircons from the Gemeric tectonic unit. This area records the Variscan orogeny that formed the CWC, rifting, and opening of the Meliata Ocean. We aim to constrain the timing of rifting and identify the provenance of Meliata Ocean radiolarian sediments collected from an obducted Meliata ophiolite suite (Dobsina, Slovakia). The relative age of the Variscan orogeny extends from the late Devonian to early Permian and was followed by rifting throughout the Mesozoic within the CWC. Eventually, the Meliata Ocean closed during the Cretaceous. Zircons from several S-type granites were collected throughout the Gemeric tectonic unit; they were dated using Laser Ablation Inductively Coupled Plasma Mass Spectrometry and imaged using cathodoluminescence. Rim crystallization ages from the granites are 295.8±3.4 Ma (2σ, 238U-206Pb) to 213.1±4.4 Ma. Ages from the detrital zircons are 346.4±4.5 Ma to 263.9±2.7 Ma, indicating that sediments overlying the Meliata Ocean ophiolite contain remnants of both the Variscan orogeny and Gemeric granites.
The Central Western Carpathians is composed of three tectonic units that create nappes thrusted over the Tatric unit (Fig. 2).

The Variscan orogeny is recorded by numerous granitoid plutons throughout the region. These range in age from 450-550°C and 1-1.5 kbar (Poller et al. 2002).

INTRODUCTION

The Dobsina locality is located in Dobsina, Slovakia, a small mining town that used the locality for its asbestos. This locality represents the Cretaceous. A highly altered blueschist incorporates the base of the locality, while package are metamorphosed radiolarians that record sedimentation within the Meliata Formation.

Granite bodies exposed in the unit (termed apophyses) provide important clues into the tectonic history of this important unit in the western Carpathians. However, these rocks range of ages leads to problems in deciphering where the Gemeric unit was located in the time period between 540-500 Ma.

The goal of this study is to obtain zircon (ZrSiO₄) ages from igneous and sedimentary rocks exposed in the unit (termed apophyses) in order to provide a more complete tectonic history of this unit.

METHODS

Field observations are coupled with apatite, monazite, tourmaline, and garnet. The Dobsina locality is located in Dobsina, Slovakia, a small mining town that used the locality for its asbestos. This locality represents the Cretaceous. A highly altered blueschist incorporates the base of the locality, while package are metamorphosed radiolarians that record sedimentation within the Meliata Formation.

CONCLUSION

In summary, the intent of the document is to highlight the importance of the Meliata Ocean in the central and western Carpathians. This study provides new insights into the tectonic evolution of the region through the analysis of zircon ages.

ACKNOWLEDGMENTS & REFERENCES

Graduate students, Gabriel Villasenor and Thomas Quintero. Figure C: Dobsina Locality. Outcrops. Cores of Gemeric granite from a mine near a field site within the Gemeric Superunit.
TIMING OF RIFTING IN THE CENTRAL WESTERN CARPATHIANS POST-VARISCAN OROGENY AND AGES OF SEDIMENTS OVERLYING MELIATA OCEAN OPHIOLITES (SLOVAKIA)

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INTRODUCTION

In conclusion, the closure of the Meliata Ocean happened soon after. In addition, ages from the detrital zircons are 346.4±4.5 Ma to 263.9±2.7 Ma, indicating that the sediments underlying the Meliata Ocean overlapped on top of remnants of the Gemeric granite and Gemeric gneisses.

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