

# SHRIMP-U/Pb Dating and Provenance Studies of Glaciomarine Tillites and Related Sediments in Late Neoproterozoic Rock Units of Germany (Saxo-Thuringian Zone, Bohemian Massif)

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\_\_\_\_\_The Precambrian basement of Central Europe consists mainly of Late Neoproterozoic volcaniclastic psammites deposited in marginal basins in a magmatic arc setting ("Avalonian-Cadomian Island Arc") at the Gondwana margin (Linnemann and Romer, 2002). The sedimentary units with arc-derived psammitic turbidites were intruded by postkinematic igneous rock units around 540 Ma. In Central Europe, Neoproterozoic to Early Paleozoic marginal basins, island arc remnants, and postkinematic plutons are referred to as the Cadomian basement or the Avalonian-Cadomian Orogen (Linnemann, et al., 2000). Remnants of this orogen are involved in the peri-Gondwanan terranes Avalonia and Cadomia. Saxo-Thuringia is a crustal fragment of Cadomia. We use U/Pb - SHRIMP data on detrital zircons from volcaniclastic psammites intercalated within different Saxo-Thuringian Neoproterozoic sandstones and glaciomarine tillites to characterize the provenance of the detrital material and the maximum ages of deposition.

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\_\_\_\_\_ Currently, there is much debate about the paleogeography of the Avalonian-Cadomian Orogen, potential source areas being Amazonia, West Africa, and Baltica (Robardet, 2003). Parts of these cratons became recycled during the Cadomian orogeny at the Gondwana margin. These three cratons differ in their mean age and the presence or absence of rocks from the Grenvillian orogeny (around 1.0 Ga). Rocks formed during the Grenville orogeny are prominent on Amazonia and Baltica, but are so far unknown from the West African Craton. The zircon age pattern strongly suggests a provenance of Saxo-Thuringia from West Africa (Linnemann et al. in print). [The zircon ages ranging from 3.4 to 0.57 Ga. Grenvillian zircons are not present. The maximum ages of deposition for Precambrian glaciomarine sediments and arc-derived turbidites in the Saxo-Thuringian Zone of the Bohemian Massif \(Germany\) are given by the youngest zircon population with ages of around 570 Ma. Thus, the glaciomarine tillites are about 30 Ma younger than the "Snowball" Earth. The data suggest a glaciation of the Avalonian-Cadomian arc in a time interval between 570 and 540 Ma.](#)

**References**

[Linnemann, U.; Gehmlich, M.; Tichomirowa, M.; Buschmann, B.; Nasdala, L.; Jonas, P.; Lützner, H.; Bombach, K., 2000. From Cadomian Subduction to Early Palaeozoic Rifting: The Evolution of Saxo-Thuringia at the margin of Gondwana in the light of single zircon geochronology and basin development \(Central European Variscides, Germany\). In: Franke, W.; Haak, V.; Oncken, O.; Tanner, D. \(eds.\). \*Orogenic Processes - Quantification and Modelling in the Variscan Belt of Central Europe, Special Publication of the Geological Society of London\*, 179: 131-153.](#)

[Linnemann, U.; Romer, R. L., 2002: The Cadomian Orogeny in Saxo-Thuringia, Germany: geochemical and Nd-Sr-Pb isotopic characterisation of marginal basins with constraints to geotectonic setting and provenance. \*Tectonophysics\*, 352: 33-64.](#)

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[Linnemann, U.; McNaughton, N. J.; Romer, R. L.; Gehmlich, M.; Drost, K.; Tonk, C. \(in press\).](#)

[West African provenance for Saxo-Thuringia \(Bohemian Massif\): Did Armorica ever leave pre-Pangean Gondwana ? U/Pb-SHRIMP zircon evidence and the Nd-isotopic record.](#)

[International Journal of Earth Sciences \(Geol Rundsch\), Berlin.](#)

[Robardet, M., 2003. The Armorica 'microplate': fact or fiction? Critical review of the concept and contradictory paleobiogeographical data. Paleogeography, Paleoclimatology, Paleoecology, 195: 125-148.](#)

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**Figure Captions**

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**Figure 1.** Schematic map of the Variscan Orogenic Belt in Western and Central Europe

(after Robardt 2003). 1-prominent Cadomian-Variscan basement units, 2-crustal units of the Saxo-Thuringian Zone in the Bohemian Massif and its correlation to other basement complexes in the Variscides, 3 - glaciomarine tillites of Weesenstein and Clanzschwitz.

SX-Saxo-Thuringian zone, RH-Rheno-Herzynian zone, TB-Tepla-Barrandian unit, M-

Moldanubian zone, MNAD-Central and Northern Armorican Domain, LD-Ligerian Domain,

CZ-Cantabrian Domain, AL-Western-Asturian-Leonesian zone, GM-Galizian-Trás os Montes-

zone, CIZ-Central-Iberian zone, Ossa-Morena zone, South Portugese zone.

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**Figure 2.** Tectonostratigraphic columns for Neoproterozoic to Cambro-Ordovician rocks of

the Schwarzburg Anticline, Doberlug Syncline, and the Leipzig Complex of the North Saxon

Anticline (from Linnemann and Romer, 2002).

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**Figure 3.** Tectonostratigraphic columns for Neoproterozoic to Cambro-Ordovician rocks of

the Lausitz Anticline, the Clanzschwitz Complex of the North Saxon Anticline, and the

Weesenstein Complex of the Elbe Zone (from Linnemann and Romer, 2002).

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## – Early Paleozoic Geotectonic History of Central Europe:

### Did Cadomia ever leave Gondwana in pre-Variscan times ?

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