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RHENO-HERCYNIAN BELT OF CENTRAL EUROPE: REVIEW OF RECENT FINDINGS AND COMPARISONS WITH SOUTH-WEST ENGLAND

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This paper summarizes results acquired in the German segment of the Rheno-Hercynian Belt during the past 20 years, comparisons with England, and important open questions. Newly discovered allochthonous units underlying the ocean-derived Giessen Nappe can be attributed to the strongly extended, passive northern margin of the Rheno-Hercynian Ocean. These allochthons include Ordovician through to early Devonian rocks with Armorican affinities. This suggests that the Rheno-Hercynian Ocean opened to the South of the Rheic suture between Avalonia and Armorica, and left a narrow belt of Armorican rocks stranded on its northern shore. The geodynamic causes for the opening of the Rheno-Hercynian ocean in a generally convergent setting remain controversial.

A conservative estimate yields ≥ 710 km of orthogonal shortening of continent-derived rocks involved in the Rheno-Hercynian Belt (the Mid-German Crystalline High included), and ≥ 2100 km for the entire mid-European Variscides. Hence, palinspastic restoration places all units formed south of the Rheno-Hercynian ocean far to the South-East, probably off the southern coast of Baltica. This explains the problem of important along-strike displacements in the Variscan belt which abut, today, against the south-western margin of Baltica, but may have operated freely in their original positions in the open sea.

Although the German and the English segments of the Rheno-Hercynian Belt match each other in great detail, the absence, in England, of a broad marine shelf between North Devon and the areas south of the Culm Synclinorium requires an explanation.

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INTRODUCTION

The Rheno-Hercynian Belt represents the northernmost orogenic belt in the terrane collage of the European Variscides (see the latest review in Franke, 2000). It is continued, westwards, via south-west England and southern Ireland as far as south Portugal, and, towards the East, around the Bohemian Massif into the Moravo-Silesian Belt of the Czech Republic (Figure 1). Recognition of the Rheno-Hercynian Belt goes back to the benchmark paper of Kossmat (1927), who defined a 'Rhenoherzynische Zone' named after the Rhenish Massif and the Harz Mountains. The southern, active margin of the Rheno-Hercynian orogen (in its modern definition) is contained in the northern part of Kossmat's Saxothuringische Zone (now termed Mid-German Crystalline High, see Kopp and Bankwitz (2003) for a review of the German segment of their 'Europäische Kristallinzone').

Correlation of the Rheno-Hercynian Variscides between Germany and SW-England has a long-standing tradition (Franke and Engel, 1982; Engel *et al.*, 1983; Franke and Engel, 1986; Floyd *et al.*, 1990, 1991; Holder and Leveridge, 1986; Matthews 1977a, b; Tunbridge *et al.*, 1987; Leveridge and Hartley, 2006). This paper summarizes results acquired in the German segment during the past 20 years, and presents a comparison with England, with a statement of important open questions.

MAIN FEATURES COMMON TO SOUTH-WEST ENGLAND AND GERMANY

It is largely agreed that the English and German segments of the Rheno-Hercynian Variscides share a very similar palaeogeographic and tectonic evolution. Summaries of the English and German terrains are available in Holder and Leveridge (1986), Leveridge and Hartley (2006) and Franke (1995, 2000). The main items include:

(1) Thick Devonian clastic sequences deposited at the southern margin of Laurussia + Avalonia (the 'Old Red Sandstone' Continent), although Avalonian basement remains to be proven in south-west England; (2) establishment of an Early Carboniferous limestone platform on the siliciclastic shelf; (3) Devonian and Early Carboniferous intra-plate volcanic assemblages within the passive margin; (4) formation of oceanic lithosphere in late lower Devonian (Emsian) time; (5) Grossly southward subduction of the Rheno-Hercynian basin floor and thinned passive margin, which brought about: (6) Devonian through to Namurian synorogenic greywacke turbidites derived from the active, southern margin of the Rheno-Hercynian basin (Normannian High in the English Channel, Mid-German Crystalline High on the continent), passing up-section and northwards into coal-bearing, fluvio-lacustrine sequences with coal seams (Namurian – Westphalian); (7) a grossly North-