SHOCK METAMORPHISM AT THE RIES AND IMPLICATIONS FOR LUNAR ROCKS AND MARTIAN METEORITES. F. Langenhorst[1], [1]Bayerisches Geoinstitut, University of Bayreuth, D-95440 Bayreuth, Germany; Falko.Langenhorst@uni-bayreuth.de.

Before 1960 suevite from the Ries was interpreted by most scientists as a volcanic tuff and the Ries structure itself was considered as the product of a volcanic eruption. The impact origin of the Ries structure was established in 1960 by Shoemaker and Chao [1] who discovered coesite in crystalline fragments of suevite from the Otting quarry. Subsequent petrographic and mineralogical investigations of suevite breccias resulted in the discovery of further diagnostic impact effects such as planar microstructures, diaplectic glasses, and stishovite [2,3]. These investigations led also to the definition of the progressive stages of shock metamorphism and the classification of impact rocks [4, 5]. The knowledge obtained during this early time of impact research was provided to the Apollo 14 astronauts during a NASA field training in the Ries, which was regarded as the "best-known lunar terrain on planet Earth".

Studies of shock metamorphism at the Ries experienced a revival in the mid 90ies by the discovery of impact diamonds [6], which were interpreted to have formed by condensation from the vapour plume. Subsequent studies showed however that the diamonds exhibit a tabular shape (Figs. 1 and 2) that can only be explained by a solid-state transformation of precursor graphite in target rocks [7].

Since the discovery of diamond a number of other new high-pressure phases have been found in the Ries including the new high-pressure polymorphs of TiO_2 [8, 9]. These discoveries have been enabled by the use of modern characterization techniques with high lateral resolution such as Raman spectroscopy and transmission electron microscopy (TEM). The latter technique has particularly improved our knowledge of the nature und formation of shock effects in terrestrial, lunar and Martian rocks.

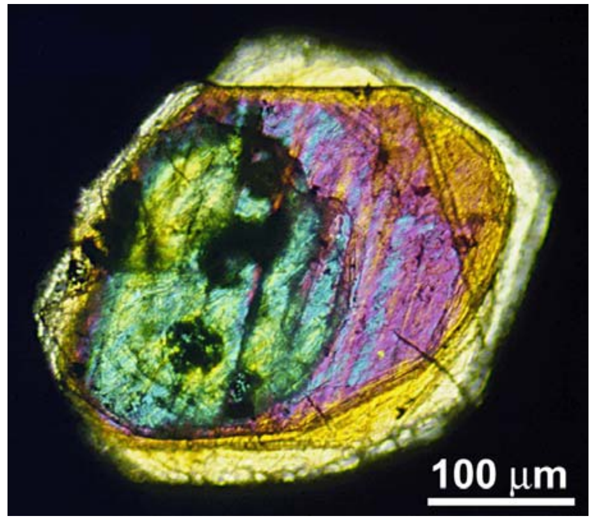

Fig. 1. Optical micrograph of an impact diamond from the Ries, crossed Nicols.

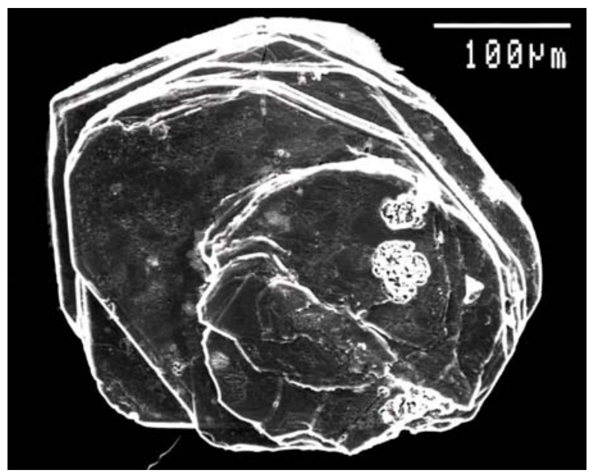

Fig. 2. Secondary electron image of the diamond platelet shown in Fig. 1.

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