and mantles of terrestrial planets. Probably, some large parent meteorite bodies could undergo the similar process.

CORRECTED IMPACT MECHANICAL DATA FOR THE RIES IMPACT

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In 1977 the author presented a provisional shock pressure graph for the Ries, based somewhat dubiously on the estimated total suevite quantity and an estimated shock pressure at the crater rim.

A more reliable date for the graph can be derived from the "Bunte Breccie," the most abundant ejectum. This cannot be estimated where it is lying now. But we can estimate what is totally missing in the crater: 1) The crater was sealed for 2 m.y. Redepositions, *i.e.* the deposition of lake sediments, did not alter the missing quantity. 2) From boundaries between ejecta and old surfaces and between fresh water limestone and underlying strata we know old surfaces. Result: 2 m.y. after the impact mean depth of the crater depression 130 m between flat bottom at 420 m and mean surrounding height at 550 m over to-day sea level, mean diameter 22 km, volume about 50 km^3. Further: Cracks and pores in underground of impact cause gravity deficit equivalent to 75 Gt (Ernstson, 1977). Because free spaces are not empty but filled with water, density deficit only about 1.5 g/cm^3 or Gt/km^3. Free space about 50 km^3, total missing volume about 100 km^3.

Other estimate: All mesozoic sediments are thrown out till outer rim of crystalline circular wall. Diameter 13 km, thickness 630 m (Gall and Müller, 1977), volume 82 km^3. There are to add (R. Hüttner, oral communication) 5 to 10% crystalline ejecta = 4 to 8 km^3 and about 10 km^3 lost (evaporated and sprayed) ejecta from center. Total 96 to 100 km^3, corroborating the estimate above.

Ejection from radius 6.5 km over the rim at 13 km needs throwing and sliding 6.5 km far, about 600 m up. According to experiences with large rock slides the starting velocity must be at least 150 m/s. For initiating this, particle flow velocity of the shock in strong basement rock must have been at least of this order. That means minimum shock pressure:

$$p = \zeta \cdot v_{particle} \cdot V_{shock} = 2600\ km/m^3 \cdot 150\ m/s \cdot 5000\ m/s = 2 \cdot 10^9 Pa = 20\ kbar$$

Analogous for the rim: Displacements there (R. Hüttner, oral communication) up to 200 m far, 20 m up, need at least v = 30 m/s, in crystalline basement p = 4 kbar. Because transmission of shock pressure and velocity through softer triassic and lower jurassic layers will be linked with considerable attenuation we have to expect still higher true shock pressures. Therefore the graph in Figure 1, according to F. Hörz (1969) as in the authors 1977 paper, is drawn as band of uncertainty. The deep position of

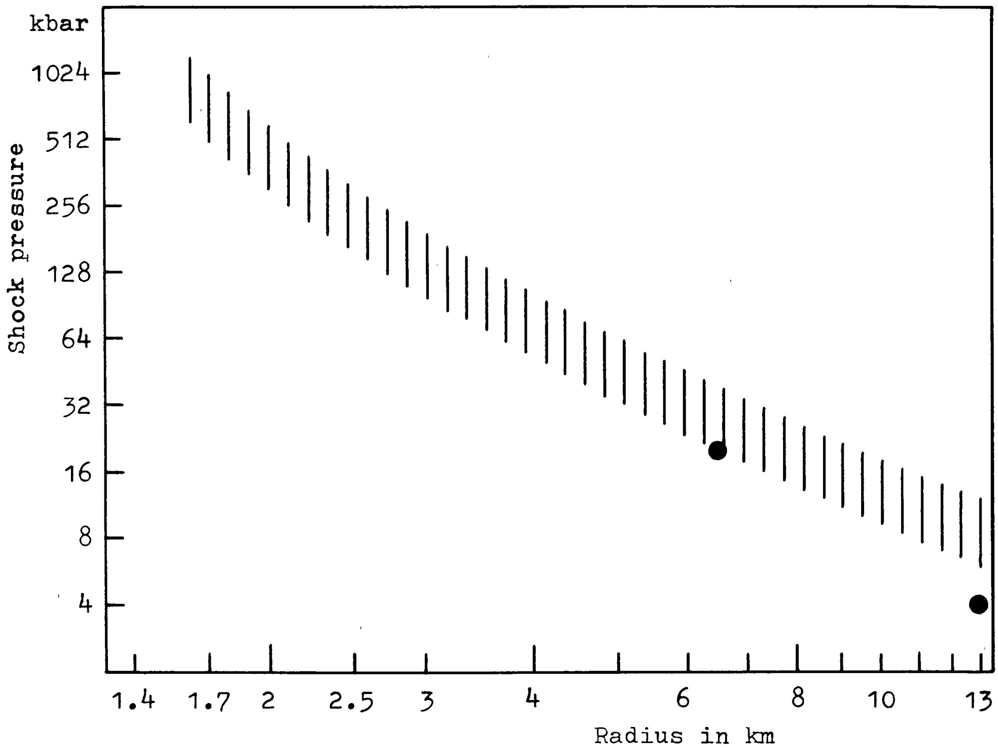

Fig. 1 **Shack pressure in crystalline basement of the Ries.**

the point at the rim is reasonable because here the distance between crystalline basement and displaced malm limestone is largest.

The mineralogically found low shock pressures in "low temperature suevite" and in rock of lower part of the 1973 borehole (at radius 3.8 km) seem to contradict. This rocky matter can impossibly have been transported to there from a radius larger than 6.5 km. The explanation is: Shocks of moderate intensity split up into a stepwise pressure rise, caused by the transition elastic to plastic compression and by phase transitions as quartz to stishovite. Mineralogy will measure at best the highest step, even more probably only the first step, but surely not the total pressure which is relevant for the throwout velocities. Splitting up further severely reduces the heat effects of a shock. For these reasons the new findings are not at variance to the observations at the suevites.

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