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REPORT ON AN INTERNATIONAL WORKSHOP ON "CRYPTOEXPLOSIONS AND CATASTROPHES IN THE GEOLOGICAL RECORD - WITH A SPECIAL FOCUS ON THE VREDEFORT STRUCTURE" (Parys, RSA, 6-10 July 1987); W.U. REIMOLD, Schonland Research Centre for Nuclear Sciences, University of the Witwatersrand, WITS 2050, Johannesburg, SOUTH AFRICA.

Eighty-five geoscientists - including twenty-five North American and European workers - representing the fields of applied and general geology, mineralogy, geochemistry, geophysics and paleontology - gathered in the heart of the Vredefort cryptoexplosion structure to discuss and evaluate the current knowledge about mass extinctions, impact and volcanic cratering and to obtain first-hand information on the Vredefort structure and its hotly debated origin. Apart from daily field trips to prominent outcrops of Vredefort geology, 41 oral and 26 poster contributions were on the agenda within 8 topical sessions: (i) the regional setting of the Vredefort structure, (ii) the Vredefort structure itself, (iii) deformations and microdeformations, (iv) large cryptoexplosion structures, (v) the Ries Crater, (vi) tektites, (vii) the K/T-boundary, and (viii) tectonophysics of cratering. The programme was rounded up by working group and plenum discussions culminating in a Workshop report emphasizing problem areas, gaps in the data base and recommendations for future research. Pre- and post-Workshop field trips led to the Roter Kamm and Gros Brukkaros craters in SWA/Namibia and into the Bushveld Igneous Complex.

Session (i) focussed on presentations summarizing the geological, geophysical and chronostratigraphical record of the western portion of the Kaapvaal Craton in order to set the scene for the discussion of the Vredefort structure (session (ii)). Here the participants were treated to reports on the gravity and magnetic fields of the structure, the geochemical results and recent structural and metamorphic studies in and around the Dome. A tectonic and an impact-melt model for the formation of Vredefort's bronzite-granophyre were presented, and new chronological, seismic, structural and fluid inclusion results reported. Session (iii) dealt with microdeformations, pseudotachylite and shatter cones as possible shock indicators - at Vredefort and - in the case of microdeformations in quartz and feldspar - with respect to natural catastrophes in general. Pseudotachylite from Vredefort, from the Witwatersrand Basin and from drilling "burn-in" were discussed, and pseudotachylite and shatter cones were examined on photos and in the field. The question "Is there evidence for shock metamorphism in the Vredefort structure?" was posed. Session (iv) widened the scope of issues-at-hand through contributions on the Sudbury, Manicouagan, Bushveld, Charlevoix, Rattlesnake Creek (Cal.), Saltpetre Kop (SA), Araguainha and Azuara structures (geochemistry, geophysics, mineralogy, structural geology and shock metamorphism). The Ries session (v) contained reviews on the state of the geophysical and structural as well as of shock metamorphism and

breccia studies. The origin of this crater by impact was questioned in one paper on the basis of some structural and geophysical evidence. The origin of tektites (session (vi)) was discussed and presentations contained a general summary of facts, a report on the geochemical knowledge, and contributions on microtektites from the late Eocene and on irghizites. A mechanism to form tektites by violent gas explosion was proposed by one contributor. Highlights of the Cretaceous-Tertiary Boundary session were keynote lectures expertly given on "the biotic record of events at the end of the Cretaceous: marine macroinvertebrates and terrestrial plants", on "Microfossils", "Vertebrates", "Microdeformations in quartz and other mineralogical aspects", and "A volcanic aerosol model - results from the Lattengebirge K/T section". An ad-hoc podium debate ensued. Session (viii) presented two very interesting lectures - "Tectonophysics of cratering, especially with respect to the formation of giant crater structures", and - typical for this conference, not shying away from any controversial issues - a talk on "Explosive volcanism: a source of shocked minerals at the K/T Boundary".

The working group reports cannot be summarised in detail here. However, it should be pointed out that all groups - discussing the Vredefort structure, microdeformations, large cryptoexplosion structures, the Ries Crater and tektites, and K/T-boundary extinctions - recognised shortcomings in the current data base and made very detailed recommendations on which areas need further study. At present some 30 contributions are being edited to form the Proceedings of this Workshop - to appear as a Special Issue to Tectonophysics.

This Workshop could certainly not solve the major problems (e.g. the origin of the Vredefort structure) on its agenda. However, it is hoped that through this event a wider community obtained the possibility to collect first-hand information. It became clear that a large forum such as this could only serve as an exchange medium for information, whereas the detailed work required now should be pursued by smaller groups. Hopefully this workshop fulfilled its second objective - to fertilize the field of crater - especially cryptoexplosion crater - studies. Much still remains to be learnt from the study of large, old, and deeply eroded structures such as Vredefort, be it information on the geology and composition of the deeper crust, the formation of enigmatic deformation phenomena, or the geological signatures of internally or externally produced crater structures in general.