

**Impacts in Precambrian Shields, edited by J. Plado & L.J. Pesonen, 2002. Springer, Tiergartenstrasse 17, 69121 Heidelberg, Germany; 336 pages, hardbound; USD 99.00; EUR 89.95; GBP 63.00; SFR 149.50; ISBN 3-540-43517-4.**

The book reflects the activities within the 'Response of the Earth System to Impact Processes' (IMPACT) programme of the European Science Foundation. Most of it is based on the 4th IMPACT workshop (Meteorite Impacts in Precambrian Shields), which was held in Lappajärvi (Finland) in 2000, which workshop focused on impacts in Precambrian rocks with little or no sediment cover. This implies, unfortunately for the readers of the *Journal of Sedimentary Research*, that little attention is paid to sedimentary consequences of the impacts (almost all this information is concentrated on two pages: 318-319). This is the more unfortunate because it becomes increasingly clear that impacts in the early history of crust development have played an important role in the formation of the first sedimentary basins.

Only a small part of the 43 lectures, 31 posters and various video presentations of the 2000 workshop are included in the book. It is to be regretted that the editors do not inform the reader on the basis of which criteria the 14 presentations in the book have been selected, nor whether they give a representative impression of the progress of the IMPACT programme as far as impacts in Precambrian shields are concerned. The only clear account is that "most of the contributions result from the workshop".

In spite of this, the book contains a lot of information. There are more general and more detailed chapters, and some provide good overviews. Highly interesting are the chapter by Abels et al. (who provide an overview of the impact cratering record of Fennoscandia) and the chapter by Dence, who deals with the impact craters on the Canadian shield. These two interesting overviews make that one really misses comparable overviews of the impacts on other shields (the Australian shield contains a relatively large number of impact craters). And one misses also a global overview with information why the North American, the Northern European and the Australian shields have apparently been hit so frequently, and why this was much less so for the African, Siberian and Southern American shields (that no impacts at all are known from Greenland can be explained by the thick ice cover that prevents field investigations).

The 'lacking' chapters are, obviously, not representative for the book. Those interested in impacts (and less in the sedimentary consequences) will find a lot of data. The editors did well in selecting one impact structure (Popigai, in Russia) that is described in fairly much detail (in four chapters), so that a wide variety of aspects is dealt with. These four chapters increase the insight of the reader considerably, and they will certainly be of help in recognizing the impact character when new structures will be discovered (and it is for sure that many such structures will be found in the future, thanks to new techniques and more attention for the geology of remote areas).

The reader who is not very familiar with impacts will certainly become aware of geological conditions and processes that are difficult to imagine. An example is the chapter by Artemieva, who describes the tektite origin in oblique impacts. This chapter includes a reconstruction of the impact by a bolide with a diameter of 400 m and a velocity of 40 km per second that resulted in the 10.5-km-diameter Bosumtwi Crater complex (Ghana); the deformation of the Earth's crust is modelled for stages after 0.04, 0.10, 0.22 s for the case of an impact under a 45° angle (another figure does so for impact angles of 15°, 30° and 45°): a 'hole' in the crust is formed up to some 800 m deep, whereas crustal material rises up to almost 2 km high!

Such presentations are important for geologists who are confronted with impact structures, also if these structures are not their primary research topic. The editors were apparently aware that the readers of the book are not exclusively impact experts. This is also expressed by the,

generally, good readability of the text, and the clear figures (a few of which in colour). Springer took care of high-quality printing and binding. The book is worth its price.

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