Geophysical Research Abstracts, Vol. 8, 07132, 2006
SRef-ID: 1607-7962/gra/EGU06-A-07132

Quantification of the significance of post-impact crater deformation through the study of Mjølnir and Chesapeake Bay craters: differential compaction, changes in geophysical signature response, and reconstruction of the original crater relief

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Marine impact craters have greater chances to be preserved than subaerial ones because they are, most likely, covered by post-impact sediments. However, post-impact sediments can, in some cases, reach considerable thicknesses and sediment loading above the primary impact relief may result in substantial post-impact deformation and structural modification. The impact-induced lateral change in porosity within an impact structure in a sedimentary target is a key property to understand impact processes, post-impact compaction, and crater burial history. Although several impact craters have experienced considerable post-impact deformation (e.g. Mjølnir, Cheseapeake Bay, Chicxulub, Montagnais craters; Bedout and Silverpit structures) quantification of this process is almost entirely absent, and therefore a great need exists for such studies. We now use high-resolution geophysical data along the well-studied Mjølnir and Chesapeake Bay craters to quantitatively study differential compaction and changes in geophysical signature response due to post-impact sediment loading, and to reconstruct the original crater relief. The study of both Mjølnir and Chesapeake Bay craters clearly shows the great importance of long-term deformation processes operating after impact. It appears that the establishment of a "post-impact modification correction factor" is prerequisite for several structures. The factor will be an estimate of the post-impact induced morphological changes (e.g. subdued impact-induced distur-

bance, amplification of structural and morphological features), geophysical signature changes (e.g. reduction in gravity and seismic velocity response, demagnetization), and subdued transient cavity dimensions and structural uplift estimates. Application of the "post-impact modification correction factor" will lead to the proper estimation of the impact-released energy and therefore of related impact-induced consequences at various scales.