

Mega-Tsunami of the world ocean as the evidence of recent oceanic impacts, chevron dune formation and rapid climate change

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The paper deals with physical and environmental effects resulting from impacts into the ocean by sizable comets, and the rates and risk associated with such cosmic impacts. Specifically, we investigate two sets of probable oceanic impact events that occurred within the last 5000 years, one in the Indian Ocean about 2800 BC, and the other in the Gulf of Carpentaria (Australia) about 536 AD. If validated, they would be the most energetic natural catastrophes occurring during the late Holocene with large-scale environmental and historic human effects and consequences. The physical evidence for the reality of these two impacts consists of several sets of data: (1) remarkable depositional traces of large water flooding (chevron dunes) found in southern Madagascar and along the coast of the Gulf of Carpentaria, (2) presence of crater candidates (29-km Burckle crater about 1500 km southeast of Madagascar which dates to within the last 6000 years and 18-km Kanmare and 12-km Tabban craters with an estimated age of 572 ± 86 A.D. in the southeast corner of the Gulf of Carpentaria), (3) presence of high magnetic susceptibility, quench textured magnetite spherules and nearly pure carbon spherules, teardrop-shaped tektites with trail of ablation, other impact-indicators (quartz with 3 to 5 directions of straight, parallel fractures, conchoidally fractured feldspar) and metallic drops with $Fe > Cr > Ni$ and $> 1\% Ni$ found by cutting-edge laboratory analytical techniques in the upper-most layer of core samples close to the crater candidates.

The allied problem to these climate affecting impacts is the problem of origin of chevron dunes that are V-shaped dunes widely developed in many parts of Indian Ocean coastline and in the Gulf of Carpentaria. Although some propose a wind-blown origin we have evidence in favor of their mega-tsunami formation. In southern Madagascar we have documented evidence for oceanic water run-up reaching 205 m with in-land penetration up to 45 km that is far beyond the run-ups of any historical tsunami. In the field study of these chevrons we found a number of features that are inconsistent with their wind-blown genesis, but well explained by flooding resulted from

mega-tsunami waves coming from the areas with proposed crater candidates.

The results of our study show that substantive oceanic comet impacts not only have occurred more recently than modeled by astrophysicists, but that they profoundly affected Earth's natural systems, climate, and human societies. If validated, they could potentially lead to a major paradigm shift in environmental science by recognizing the role of oceanic impacts in major climate downturns during the late Holocene that are well documented by different techniques (tree-ring anomalies, ice-shield and lake-bottom drilling and peat bog cores).