

Sand Lobes on Stewart Island as Probable Impact-Tsunami Deposits

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Introduction: About 500 years ago, a cosmogenic tsunami produced a minimum run-up of 130 meters in Jervis Bay near Sydney Australia [1]. The probable source crater for this event is Mahuika crater at 48.3 S, 166.4 E on the western edge of the New Zealand shelf [2]. Mahuika impact crater is 20 ± 2 km in diameter and is less than 1000 years old. It has a tektite field that is found in surface sediments located to the southeast of the crater [3]. Tektites are *prima facie* evidence of impact origin. Although Jervis Bay is over 1500 km from Mahuika crater, Stewart Island is only about 200 km northeast of Mahuika crater. Consequently, the tsunami run-ups from the Mahuika impact should be higher on Stewart Island than in Jervis Bay. We are conducting a field survey in February 2004 to determine if the maximum elevations of the sand lobes represent tsunami run-up or windblown deposition. We will have our results at the meeting.

Aerial Photo Data: In preparation for our field program, we have obtained orthographic aerial photo coverage of the field area. The aerial photos show many sand lobes that run roughly west to east but meander along strike (Figures 1, 2). At some locations, the sand lobes show an appearance that resembles a braided stream (Figure 3). Overall, very little of the sand lobe surfaces resemble wind blown dunes.

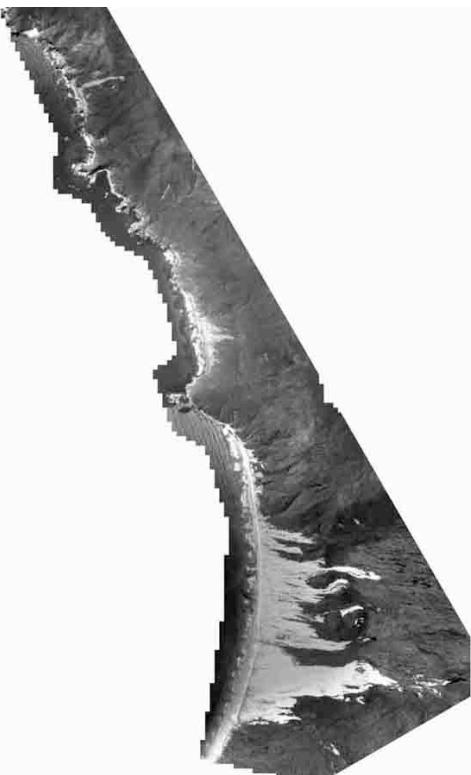


Figure 1. Aerial photo of the area within 4-8 km of the west coast of Stewart Island between Mason Bay and Hellfire Beach. White areas are beaches (left) and sand lobes (right). Photo is oriented so that the up direction is due north.



Figure 2. Detail of southernmost sand lobe in Figure 1. The sand lobe is widest on its western (left) edge and narrows as it moves towards the east. The sand lobe bifurcates around the top of Big Sand Hill (right center). The top of Big Sand Hill is 156 meters above sea level. The sand lobe climbs to ~150 meters above sea level. The sand lobe continues to the east down into the marshland behind Big Sand Hill. At its eastern most extent, the sand lobe is over 4.2 km from the ocean. Note that the sand lobe has few obvious north-south oriented highs, as would be expected in the case of sand blown by the prevailing westerly winds.



Figure 3. Detail of sand lobes in the center of Figure 1. These sand lobes show the clearest resemblance to braided streams. The sand lobes extend to at least 60 meters above sea level and 1 km away from the coast.

References: [1] Bryant, E., Tsunami, The Underrated Hazard, 2001, Cambridge, UK, Cambridge University Press, 320 pp. [2] Abbott, D. H., A. Matzen, E. A. Bryant, and S. F. Pekar, 2003. Did a Bolide Impact Cause Catastrophic Tsunamis in Australia and New Zealand?, Geol. Soc. Am.. Abstr with Programs. [3] Matzen, A.K., D. H. Abbott, and S. Pekar, 2003. The Spatial Distribution and Chemical Differences of Tektites from a Crater in the Tasman Sea, Geol. Soc. Am.. Abstr with Programs.