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Repeat swath bathymetry surveys and the rates of growth and collapse of active submarine volcanoes

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Technological advances in shipboard navigation and swath bathymetry systems have made it possible to measure the depth of the seafloor to accuracies of better than 1-2 m, even in water depths > 2 km. Since 1992, there have been >500 swath bathymetry research cruises that have insonified ∼6% of the ocean floor. The swath data have provided new information on seafloor processes, especially submarine volcanism, mass wasting and sediment transport from ocean margins to the deep-sea. Yet, there have been comparatively few repeat swath surveys. Recently, we compared swath data acquired in 1998, 2004, 2007 and 2011 on the Monowai submarine volcano and found dramatic differences in the depth of the seafloor between the 4 surveys. Within the 2011 survey alone, positive differences of +70 m and negative differences of up -18 m were found that indicate growth and collapse of the volcano on time-scales as short as a few days. The data are a reminder of how rapidly seafloor processes can occur. The seafloor is littered with seamounts, most of which are volcanic in origin, so comparative studies are needed in order to determine how many of them are collapsing and growing. Such studies would provide further insights into the dynamics of the seafloor and its implications for geohazards, including tsunami and sea-level change.