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What GEBCO can do for us: A comparison of shoreline-crossing DEMs of volcanic islands

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Inhalt

We have higher resolution information of other planets and the moon than on the surface of the Earth beneath the ocean. Acquisition of high-resolution bathymetry requires hydroacoustical surveys by research vessels or autonomous vehicles, which is time consuming and expensive. The consequence is sparse data coverage, especially along the coasts, where a “Coastal white ribbon” remains widely unmapped. While world-wide datasets based on satellite altimetry combined with other available data, as provided by GEBCO (GEneral Bathymetric Chart of the Ocean) for example, are improving, they do not have the resolution required for most scientific questions.

The research on volcanic islands, sources for both volcanic, as well as marine hazards such as tsunamis, is greatly limited by the lack of high-resolution bathymetry. Considering that more than 90 percent of most edifices' volume is lying below the sea surface, bathymetry data is often presenting the only available source of information. So, how can we increase the knowledge with the available data?

Here, we compare results of geomorphometric parameter extraction from the low-resolution GEBCO grid with those derived from high-resolution bathymetry of 30 volcanic islands. The goal is to evaluate how reliable information obtained from GEBCO is, in order to assess its usefulness for our future work in areas, where high-resolution data is not available. In a first analysis, we find that most parameters show an average deviation from the high-resolution bathymetry of less than 5%. Outliers of concerning extent exist, but they can be explained by an incomplete coverage of the volcanic edifice in the high-resolution bathymetry, rather than lower precision of the GEBCO data. There is an expected trend of increasing reliability with increasing dimensions (i.e. height higher error than volume).

Though a thorough analysis has not yet been completed, these first results are encouraging. With this benchmark, we will be able to increase our geomorphometric investigations to volcanic islands where little or no high-resolution bathymetry data is available.

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