Geoform classification in the Cook Islands - from sunlit seamounts to hadal troughs

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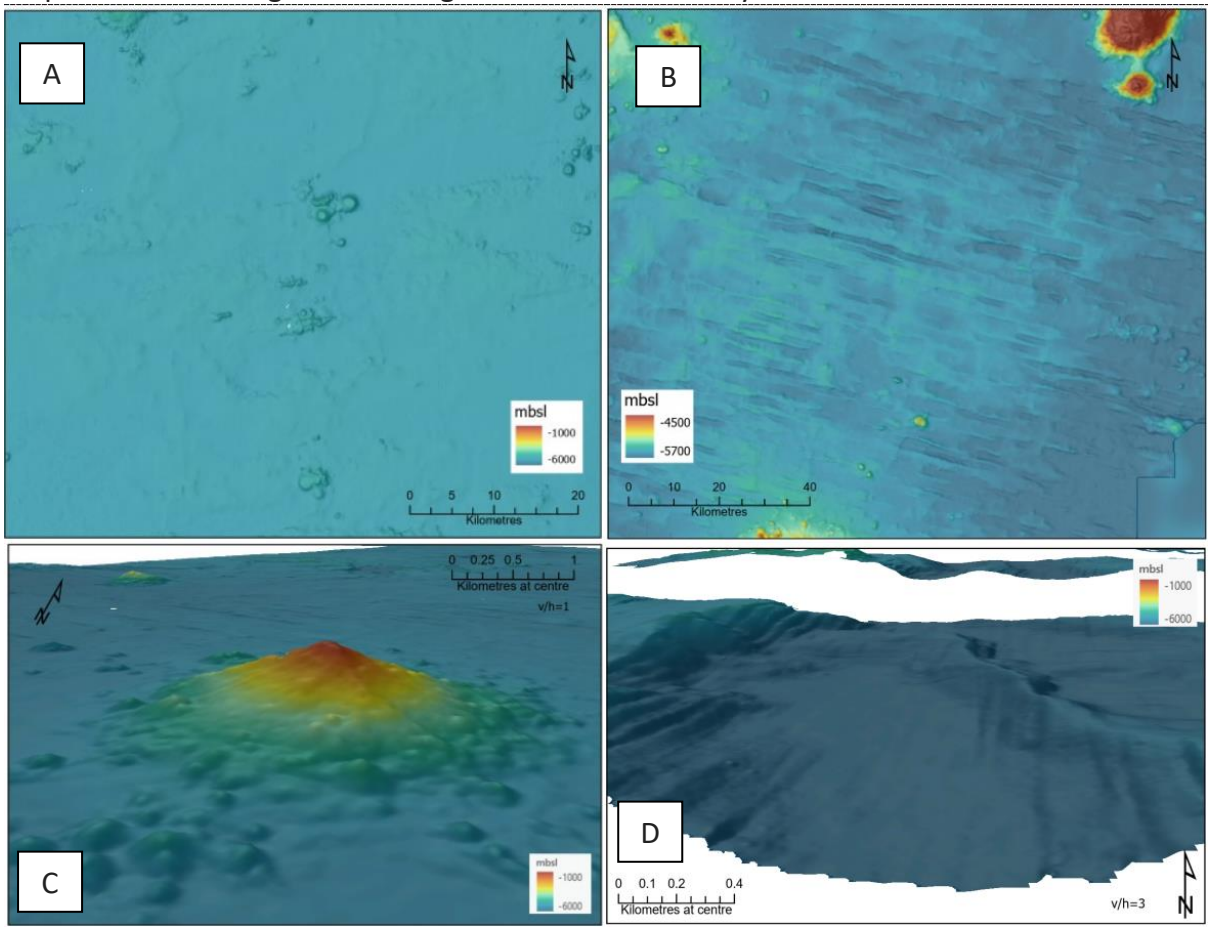
Ecosystem based management for the Cook Islands seabed relies in part on a scalable definition of habitat-types that involve seabed geoforms and substrates. Along with other related and independent surrogates, geoforms support a marine spatial framework that characterize the seabed and assist, for example, in assessing potential seabed minerals extraction impacts. While focus to date has been on abyssal plains that host polymetallic nodules, more recent research has expanded to knolls and seamounts, and in the future hopefully a major plateau, and troughs that extend to hadal depths in places.

At a regional to subregional scales, habitat management zones (interpreted groups of habitats) are derived from surrogates of broad brush geoforms/geomorphology and modeled net export. These suffice for regional scale assessments such as a recently completed Strategic Environmental Assessment for the Cook Islands seabed.

At project to local scales, multibeam bathymetry helps define geoforms, and in combination with backscatter and other data, potentially substrate. Geoform and substrate classifications derived from CMECS[1] have been synthesized and partially tested using limited long duration ROV[1] traverses. A key gap is that the hadal troughs in the Cook Islands have not yet been visited and have only partial transit-type MBES[1] coverage. Hadal troughs are important to understand from a regional Cook Islands perspective as mapping and characterizing them will help bracket the range of seabed geoforms in the country.



Example bathymetry of some geoforms A) flatter seabed, B) narrow abyssal hills, C) seamount, D) hadal trough

[1] CMECS is Coastal and Marine Ecological Classification Standard; ROV is Remotely Operated Vehicle