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The size-frequency and spatial distributions of submarine volcanic features

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The ocean floor is characterized by numerous banks, ridges, and seamounts, many of which are volcanic in origin. Indeed, submerged oceanic volcanoes may be the most abundant volcanoes on Earth. Globally ($\pm 60^{\circ}$latitude), we have used 39.5×10^6 km of ship tracks to quantify the number, size, and distribution of these features. Our along-track search algorithm, **MiMIC**, isolated 201,055 featues of all heights (100 m $< h <$ 6700 m) above the surrounding seafloor depth.

This size-range exceeds that of any previous study, and it transpires that no single empirical curve (exponential or power-law) describes the global size-frequency distribution of seamounts. Nevertheless, it has been possible to quantify the number of seamounts expected over a wide range of heights, including $h < 2$ km which are difficult to detect using existing satellite altimetry data. We predict $\sim$40,000 features of $h > 1$ km, $\sim 3.5 \times 10^6$ features $h > 100$ m, and estimate that $\sim$30,000 features currently undetected by altimetry could be found by planned missions such as ABYSS.

Greater than half (8,393 of 14,581) of tall seamounts ($h > 1$ km) occur in the Pacific Ocean. The greatest concentrations in the northern Pacific, are on old ($>$80 Ma) and very young ($<$20 Ma) oceanic crust. The significance of the global size-frequency distribution and the implications of our data for ocean dynamics are explored.