Aegis of the Atlas of Italian Submarine Volcanic Structures
The IAVCEI Commission on Submarine Volcanism

Scientific exploration and discovery in the marine realm is undoubtedly exciting. The relatively new field of submarine volcanology with its studies of submerged volcanoes, eruptions and hydrothermal activity is a captivating and emerging field of inquiry. Scientific understanding of submarine volcanology has been much slower to progress than in subaerial settings, principally because as geologists, we learn the most by observing natural phenomena and their deposits. Naturally in the past observations of submarine volcanism has been extremely limited since one is not able to simply walk to outcrops and edifices for investigation, compare detailed mapping and samples around volcanic structures, and observe variations in the spatial distribution of eruptive products. Until the first observations of seafloor eruptions on the seafloor at NW Rota in 2004, advances in submarine volcanology had been hard won, and driven by highly detailed field and laboratory research on ancient volcanic terrains that make up some islands and the continents. Such settings provide a 3D framework to further understand eruption processes, however the absence of knowledge of vent depths, mass eruption rates and linking deposits to vents has largely inhibited the use of numerical and experimental approaches to explore the roles of eruption into water under hydrostatic pressure. Although further serendipitous discoveries of active submarine eruptions in the last two decades have provided further advances of understanding, these eruptions are very few and limited to certain magma compositions, eruption rates and styles, and vent depths.

The seafloor is a largely unexplored frontier. The surfaces of the Moon and Mars have been mapped at much higher resolution than Earth's sea floor. Take a moment to look at a global bathymetric map; Hmm, what are those features? Are those volcanoes? I wonder what that is? With only ~10% of the seafloor mapped at a resolution to identify seafloor features, the answer to these questions is likely we don't know. Future discoveries that await on the seafloor will be undeniably transformative across multiple scientific disciplines, and that curiosity of the unknown is driving the technological advances to permit this science. Key to the rate of progress is to instil a sense of curiosity of the marine realm in the public, and more specifically the next generations of scientific explorers. This Atlas makes marine geoscience in this region accessible to scientists, and engages a younger audience with the stunning high resolution bathymetric imagery of seafloor volcanoes, some of which have never been visited and host future major discoveries.

We are in the age of technology. Scientists and engineers are working together to achieve multidisciplinary seafloor science with new technologies. Exploration of the seafloor continues to be a challenging setting for undertaking submarine volcanology due to inaccessibility and elevated costs. But, exploration of modern seafloor volcanoes provides observations and data that is a challenge to decipher in uplifted, deformed and often altered ancient terrains, and its importance can't be overstated. For example, constraining volcanic heat and chemical fluxes to the oceans relies on exploration, difficult measurements and collecting data over extended time series. Further, temporal and spatial data of hydrothermal systems and base metal repositories on the modern seafloor permits new developments of ore discovery of analogues in ancient terrestrial terrains. Lastly, a mapping and observational database of submarine volcanic terrains provides a baseline for detecting change and understanding process – which can be challenging to achieve otherwise. This Atlas provides a highly valuable framework for a timeseries of geological and observational database accessible to the global community, for transformative marine geoscience today and in the future.

It's difficult to fear what we can't see. Do submarine volcanoes pose an unquantified risk to society either directly by volcanogenic tsunami, or through disturbances to marine biological ecosystems and the loss of biodiversity? The answers to those questions are complex, however what is clear is that monitoring is critical to quantify change that permits prediction and preparedness, and that highly accessible visualisation of submarine volcano environments can provide a means of communicating 'the unseen' providing a platform to deliver important messages about risk. This Atlas provides such a communication, in an important highly populated geographic area where active submarine volcanoes are numerous and where experts have established that the risk is real.

The International Association of Volcanology and Chemistry of the Earth's Interior's (IAVCEI) Commission on Submarine Volcanology aims to communicate and popularise the efforts and progress in this field to a wide range of audiences that includes the public, the next generation of scientists and explorers, and policy makers. This Atlas is a very welcome contribution which will facilitate this messaging, and we thank the editors and contributors of the volume.

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