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Modular Design Architecture of DONET Sea-Floor Observatory Network

DONET, i.e. the Dense Ocean-floor Network system for Earthquakes and Tsunamis is the first real-time seafloor observatory network monitoring earthquake and tsunami with high-accuracy, high-density, and large-scale in the seismogenic zone. It consists of various geophysical sensors such as seismometers and pressure sensors connected with submarine cable. DONET uses the state-of-the-art technologies in the system in order to achieve sustainable seafloor observatory network, for which three functional components are employed; "high reliable backbone cable system", "maintainable science node", and "expandable observatory". To assemble these components in the system, modular architecture has been designed in contrast to the conventional in-lined linear seafloor network. Hybrid wet-mate connectors are used between each component, which allows us to do easy maintenance of the observatory by ROV. Science node which plays an important role as a hub-to-spoke function can also make it possible to increase/separate observatory flexibly. The first DONET has been deployed in 2010 followed by the second DONET in 2016. 51 observatories are now in operation in DONET, and their data availability rate keeps more than 90 % since the deployment. Success of DONET development can contribute to new generation's seafloor observatory to be deployed in the future in the world's oceans.

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