

New research shines a light on the importance of submarine canyons

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We are only beginning to understand the vital role that submarine canyons play in our global ocean. Acting as 'deep sea gutters', these biodiversity hotspots trap and concentrate organic matter that serves as food for many marine invertebrates, fish, and marine mammals.

While nearly 10,000 [submarine](#) canyons have been mapped to date, only 8.5% of them have been studied by the scientific community. In a new volume of research published recently in *Progress in Oceanography*, 17 scientific articles describe new discoveries on physical, geological, and biological processes of these incredibly diverse and dynamic seabed topographic features, highlighting the key role [submarine canyons](#) play in 'Bridging the gap between the shallow and deep oceans.'

The majority of this research was presented at the 3rd International Network for Submarine Canyon Investigation and Scientific Exchange (INCISE) Symposium, hosted in Victoria, British Columbia in July 2016, co-sponsored by Ocean Networks Canada (ONC).

This special volume includes a review of the history of submarine [canyon](#) research. The earliest submarine canyon study dates to 1929, but it was not until the early 2000's that this field started to achieve a high degree of interdisciplinarity, with research topics becoming more cohesive and interconnected.

Other topics in the volume include research on physical oceanography, geomorphology and natural sedimentary processes; quantifying the

submarine canyon seafloor habitat; the impacts of bottom trawling; and an in-depth investigation of Barkley Canyon in the northeast Pacific off Vancouver Island.

Since its installation in 2009, ONC's offshore cabled observatory has made it possible to study Barkley Canyon's ecosystem in great detail. ONC's extensive network of sensors and cameras provides researchers with access to real-time data of benthic (seafloor) marine life and the main oceanographic processes governing their distribution and biodiversity.

A new and interesting finding by ONC's senior scientist Fabio De Leo and co-authors was the surprising observation of large zooplankton species (copepods from the genus *Neocalanus* spp.) migrating as deep as one kilometer into the canyon to complete their reproductive cycle. The study offers insight into how much carbon these massive zooplankton migration events export into the deep sea each year, due to fact that adult copepods die at depth after reproducing. Determining ocean carbon stocks is essential in the framework of ongoing climate change mitigation actions.

The results from a second study, Food quantity and quality in Barkley Canyon (NE Pacific) and its influence on macroinfaunal community structure. *Progr. Oceanogr.* (in press) by Neus Campanyà-Lovet and co-authors, corroborated these findings. In sediment samples collected at Barkley Canyon, large quantities of lipid biomarkers (an indication of the presence of the same zooplankton species) were found at the very same locations where the video cameras are installed. Scientists are now starting to examine the entire video dataset close to nine years of observations to see how these zooplankton migration events changed in the last decade.

Read a summary of the new findings within this special volume,

authored by Fabio De Leo, ONC senior staff scientist, and Pere Puig, marine geologist and head of the Marine Geosciences Department at the Institute of Marine Sciences in Barcelona.

The upcoming 4th INCISE International Submarine Canyons Symposium will take place in Shenzhen, China in November 2018. Co-sponsored by ONC, the scientific community hopes to consolidate existing research, and develop new, collaborative initiatives on various aspects of submarine canyon studies during this international event.

More information: Fabio C. De Leo et al. Bridging the gap between the shallow and deep oceans: The key role of submarine canyons, *Progress in Oceanography* (2018). [DOI: 10.1016/j.pocean.2018.08.006](https://doi.org/10.1016/j.pocean.2018.08.006)

Barkley Canyon new scientific findings:

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De Leo, F.C., Bruno Ogata, B., Akash, R., Sastri, A.R., Heesemann, M., Mihály, S., Galbraith, M., Morley, M.G. High-frequency observations from a deep-sea cabled observatory reveal seasonal overwintering of *Neocalanus* spp. in Barkley Canyon, NE Pacific: Insights into particulate organic carbon flux. *Progr. Oceanogr.* (in press): www.sciencedirect.com/science/.../ii/S0079661118300132

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