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New insights into the relevance of deep processes in the ocean circulation

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The Ocean Observations have for a long time been excluded abyssal layers from the majority of the ocean world surveys, due to the general idea that the ocean-deep circulation is in quasi-stationary motion, except for areas of dense water formation.
The Ocean is the main heat storage of the Earth. Despite the energy uptake, mostly affect the upper part of the ocean from the sea surface down to $\sim$ 700 m, but a not negligible amount of about 30 % of the total amount absorbed is stored in the deep/abyssal layers. Therefore, studying the deep ocean processes and the deep/abyssal thermohaline dynamics is essential to compute the real amount of energy accumulated on the abyss and to be more aware of the redistribution of the energy towards the upper layers. However, the real awareness about the unsteady state of the abyssal layers has only risen recently thanks to the continuously evolving of technology that enhanced the long-term monitoring of deep layers through fixed observatories, such as NEMO-SN1 installed at the Western Ionian node of EMSO Research Infrastructure.
The analysis of the new amount of data encourages studies on deep mechanisms, trying to understand how the internal instability and mixing mechanism can affect the ocean circulation at a local and global scale.
The purpose of this talk is to show the key role of cabled observatories in the monitoring and study of the deep ocean, and how these data can contribute to filling the knowledge gap of deep processes (such as mixing, turbulence, bottom-up diffusion). This also provides essential outcomes bringing infrastructure technology towards more and more efficient monitoring of the key ocean processes.