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Submarine cables feel the heat from global warming

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Long-term environmental monitoring of the deep ocean environment is crucial for better understanding the feedback processes between the oceans and Earth's climate in the face of global warming. However, obtaining in-situ observations from the deep seafloor is difficult and costly. Use of laser reflectometry in optical fibers using existing submarine telecommunication cables can help bridge this knowledge gap. We performed distributed thermal sensing (using the Brillouin Optical Time Domain Reflectometry technique) on a network of commercially operating telecom cables connecting the islands of the Guadeloupe archipelago in water depths of 10 - 700 m. Monitoring at regular 6 month intervals over the past 2.5 years reveals a temperature change (delta T) of +1.3°C between June 2022 and late-May 2024 on the shallow carbonate platform (10 - 40 m water depth) south of Grande-Terre (Saint François), Guadeloupe. These sea-floor measurements are corroborated by satellite observations of the Sea-Surface-Temperature (SST) during the past three years, which document a similar (+1.3°C) temperature increase at the sea surface, in the same location (offshore Saint François). A smaller temperature increase (0.2 - 1.0°C) is observed in deeper waters (300 - 700 m) between the islands over the same period (June 2022 - late-May 2024). These results can open the path for widespread use of submarine cables for long-term environmental monitoring of the seafloor.