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Vertical ocean heat redistribution sustaining sea-ice trends in the Ross Sea

Olivier Lecomte (1), Hugues Goosse (1), Thierry Fichefet (1), Casimir de Lavergne (2,3,4), Violette Zunz (5), and Antoine Barthélemy (1)

(1) Earth and Life Institute, Université Catholique de Louvain (UCL/ELIC), Center for Earth and Climate Research (TECLIM), Louvain-la-Neuve, Belgium (olivier.lecomte@uclouvain.be), (2) Sorbonne Universités (Université Pierre et Marie Curie Paris 6), Paris, France, (3) CNRS-IRD-MNHN, Paris, France, (4) LOCEAN Laboratory, Paris, France, (5) Vrije Universiteit Brussel (VUB), Earth System Science & Department of Geography, Brussels, Belgium

Several processes have been hypothesized to explain the slight overall expansion of Antarctic sea ice over the satellite observation era, including externally forced changes in local winds or in the Southern Ocean's hydrological cycle, as well as internal climate variability. Here, we show the critical influence of an ocean-sea-ice feedback. Once initiated by an external perturbation, it may be sufficient to sustain the observed sea-ice expansion in the Ross Sea, the region with the largest and most significant expansion. We quantify the heat trapped at the base of the ocean mixed layer and demonstrate that it is of the same order of magnitude as the latent heat storage due to the long-term changes in sea-ice volume. The evidence thus suggests that the recent ice coverage increase in the Ross Sea could have been achieved through a reorganization of energy within the near-surface ice ocean system.