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Adjustments of a global Finite-Element Sea Ice Ocean Model configuration to improve the general ocean circulation in the North Pacific and its marginal seas.

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The sub-Arctic oceans like the Sea of Okhotsk, the Bering Sea, the Labrador Sea or the Greenland-Irminger-Norwegian (GIN) Sea react particularly sensitive to global climate changes and have the potential to reversely regulate climate change by CO_2 uptake in the other areas of the world. So far, the natural processes in the Arctic and Subarctic system, especially over the Pacific realm, remain poorly understood in terms of numerical modeling. As such, in this study we focus on the North Pacific and its adjacent marginal seas (e.g. the Sea of Okhotsk, the Bering Sea and the Sea of Japan), which have nowadays a significant role in the climate system of the Northwest Pacific by influencing the atmospheric and oceanic circulation as well as the hydrology of the Pacific water masses. The Sea of Okhotsk, in particular, is characterized by a highly dynamical sea-ice coverage, where, in autumn and winter, due to massive sea ice formation and brine rejection, the Sea of Okhotsk Intermediate Water (SOIW) is formed which contributes to the mid-depth (500-1000m) water layer of the North Pacific known as newly formed North Pacific Intermediate Water (NPIW).
By employing a Finite-Element Sea-Ice Ocean Model (FESOM), in a global configuration, but with high resolution over the marginal seas of the Northwest Pacific Ocean ($\sim$7 km), we tested different meshes and forcing improvements to correct the general ocean circulation in the North Pacific realm towards a more realistic pattern. By using different forcing data (e.g. CORE2, ERA-40/interim, CCMP-correction), adapting the mesh resolutions in the tropical and subtropical North Pacific and changing the bathymetry over important inflow straits (e.g. Amukta Passage, Kruzenstern Strait), we show that the better results are obtained (when compared with observational data) via a combination of CCMP corrected COREv2 forcing with increased resolution in the pathway of the Kuroshio Extension Current and Northern Equatorial Current.