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Modeling study of tidal effects on the Arctic sea ice

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We investigate the tidal effects on the sea-ice distribution of the Arctic Ocean using an ice-coupled Ocean General Circulation Model (OGCM). The model covers the Arctic Ocean with the adjacent seas including Norwegian Sea, Greenland Sea and Hudson Bay. The horizontal grid size ranges from 23 to 30 km. A total of 50 s-coordinate levels are adopted along the vertical direction with enhanced resolution near the surface. After 10years spinning up model, we conducted a hindcast simulation from January 1, 1980 to the end of 2013 with a 12-hourly atmospheric forcing. Four major tidal forcing (M2, S2, K1, O1) are included along the open boundaries based on TPXO7. Model results show that there are no substantial changes in the sea ice volume of the Arctic Ocean except around Canadian Arctic Archipelago where the sea-ice thickness is significantly decreased in summer. The enhanced currents and mixing by tide seems to increase the sea-ice melting there. The enhanced mixing affects subsurface temperature distributions in the Barents Sea as well.