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Interactions between ocean heat transport and Arctic sea ice

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Arctic sea ice has been retreating at fast pace in the last decades, with potential impacts on the weather and climate at mid and high latitudes, as well as the biosphere and society. Sea-ice loss is driven by anthropogenic global warming, atmospheric circulation changes, climate feedbacks, and ocean heat transport. To date, no clear consensus regarding the detailed impact of ocean heat transport on Arctic sea ice exists. Previous observational and modeling studies show that the poleward Atlantic Ocean heat transport and Arctic sea-ice area and volume are generally anti-correlated, suggesting a decrease in sea-ice area and volume with larger ocean heat transport. In turn, the changing sea ice may also affect ocean heat transport, but this effect has been much less studied. Our study explores the two-way interactions between ocean heat transport and Arctic sea ice. We use the EC-Earth global climate model, coupling the atmosphere and ocean, and perform different sensitivity experiments to gain insights into these interactions. The mechanisms by which ocean heat transport and Arctic sea ice interact are analyzed, and compared to observations. This study provides a way to better constrain model projections of Arctic sea ice, based on the relationships between ocean heat transport and Arctic sea ice.