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Decadal predictability of the Arctic sea ice in Atlantic marginal seas and its link with the Atlantic meridional overturning circulation in the IPSL-CM5A-LR model.

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The Arctic sea-ice cover has been shown to be more predictable in the Atlantic than in the Pacific sector in several climate models (Koenigk et al., 2006; Koenigk and Mikolajewicz, 2009 ; Germe et al., in Rev.). Several mechanisms have been proposed to explain this higher predictability including, for example, sea-ice advection through Fram Strait (Koenigk et al., 2006), or the advection of Atlantic water temperature and salinity anomalies (Schlichtholz, 2011). Koenigk et al. (2012) highlighted a negative correlation between the **Atlantic meridional overturning circulation** (AMOC) and the sea-ice thickness in those areas that could also explain part of this predictability. In this study, we explore the impact of the AMOC on the variability and predictability of the sea ice in the Arctic marginal seas as represented in the IPSL-CM5ALR climate model. This analysis is based on a 1000 year preindustrial control simulation performed in the framework of the fifth phase of the coupled model intercomparison project (CMIP5), as well as on a set of perfect model ensemble experiments of predictability sampling different initial states of the AMOC (Persechino et al., 2013). Focusing on the marginal seas of the Atlantic sector – the Labrador, Greenland-Iceland-Norwegian, and Barents Seas –, the diagnostic and prognostic potential predictability of the sea-ice fraction and thickness is analysed and related to the influence of the AMOC initial state and variations.

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