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Impact of the Mertz Glacier Tongue calving on the emergence of polynyas in the d'Urville Trough, East Antarctica

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Passive microwave remote sensing observations and atmospheric data are used to characterize the impact of the Mertz Glacier Tongue (MGT) calving in February 2010 on the sea ice conditions in the D'Urville Trough, East Antarctic shelf (139°E-141°E). The main objective is to determine if conditions for dense shelf water production in this area were possibly influenced by the calving. In particular, we look for the existence of winter polynyas capable of sustaining significant sea ice production, a prerequisite for the formation of dense, saline waters. We show that polynyas in the D'Urville area are part of a complex icescape made of fast ice and drifting pack ice. The seasonal evolution of this icescape has been profoundly modified with the calving of the MGT and opening of new polynyas. Pre-calving and post-calving sea ice concentrations are analyzed to identify major patterns of variability. Examination of the fast ice distribution and atmospheric forcing helps to develop a scenario for the formation of low sea ice concentration regions and their relation to the sea ice fluxes, supporting the conclusion that the role of the Adelie Bank as a barrier to the drift ice may have strengthened after the calving.