Regional differences in processes controlling Arctic sea ice floe size distribution in Chukchi Sea, East Siberian and Fram Strait during pre-ponding season

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The floe size distribution (FSD) is important to the physical and biological processes in the marginal ice zone (MIZ). The FSD is controlled by ice advection, thermodynamics (lateral melting), and dynamics (winds, tides, currents and ocean swell). These thermodynamic and dynamic conditions are different between the western Arctic (e.g., Chukchi and Beaufort Seas) and the eastern Arctic (e.g., Fram Strait). For example, the MIZ in the western Arctic is strongly influenced by a warm ocean due to enhanced sea-ice albedo feedback, while the MIZ in the eastern Arctic is strongly influenced by ocean swell. We hypothesise that this regional difference can affect the FSD differently between the two regions. To address the hypothesis, we analysed the FSD data derived from MEDEA and synthetic aperture radar (SAR) TerraSAR-X in Chukchi Sea, East Siberian Sea and Fram Strait. Our results show that the FSD in Chukchi Sea the most dynamic as it contains a larger percentage of smaller floes and undergoes a greater interannual variability in the FSD compared to East Siberian Sea and Fram Strait. In particular, the FSD in Chukchi Sea shows a notable change before and after 2012. This change is likely attributed to the severe storm occurred in early August 2012 and the presence of thinner ice in this region.