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Changes in Antarctic sea ice seasonality over the last 4 decades

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Changes in open water season duration in the Southern Ocean have been documented, with decreases in the Weddell and Ross sectors and increases west of the Antarctic Peninsula. Yet, not much is known on the mechanisms of changes. To progress understanding, we revisit Antarctic sea ice seasonality diagnostics (ice-free season duration, advance and retreat) from three satellite products. We diagnose their evolution at short and long time-scales, following the methodology of Lebrun et al (2019). We also put them in the context of oceanographic changes, as diagnosed from in situ observations. Preliminary analysis suggests that over the last decade, there was overall little change in the spatial distribution of the trends and of their magnitude, regardless of the used satellite product. Trends in all three diagnostics have slightly weakened but are still regionally significant. The ice-free season is still lengthening in the Bellingshausen and Amundsen Seas and shortening in the Weddell and Ross Seas. Where trends are significant, trends in ice advance date generally exceed those in ice retreat date. However, inter-annual variations in ice retreat date are larger than those in ice advance date. We will investigate possible reasons of this conundrum. We will also provide more analysis on possible links with water column stratification and surface energy budget. We hope such understanding will help us to better constrain the future evolution of Antarctic sea ice, and its impacts on marine biology and chemistry.