

Change and Variability in East Antarctic Sea Ice, and Its Implications

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Although Antarctic sea ice has undergone a small increase in overall extent over the past 30 years, major regional changes have occurred in sea ice coverage in response to changing patterns of large-scale atmospheric circulation. Most notable are opposite-sign changes in sea ice seasonality (annual coverage duration) in the Bellingshausen-eastern Amundsen Seas (BAS) and Western Ross Sea sectors (negative and positive respectively). In the BAS region, changing sea ice coverage is having major effects on ecosystem structure and function, with mounting evidence that the loss of sea ice has affected multiple levels of the marine food web in a complex fashion. Compared to this sector, much less is known about whether changes are occurring in spatio-temporal characteristics of sea ice coverage across the narrow yet complex East Antarctic sea-ice zone, the nature of these changes and their impacts and implications. In this talk, we present preliminary results from a new study investigating patterns and anomalies in the timing of annual sea-ice advance and retreat and resultant coverage duration (based on satellite image analysis over the period 1979-2006). This analysis forms a contribution to the joint Japanese-Australian (JST-DIISR) project “*Establishing a benchmark to assess climate change impact in the eastern Antarctic marine system*”. The results are discussed in the circumpolar context. We also present new results from the first time-series analysis of landfast sea ice distribution across the entire East Antarctic coast, based on NASA MODIS satellite imagery for the period 2000-2008. Links across the cryospheric boundaries, involving the interaction of sea ice, icebergs and ice sheet coastal margins, and their biological implications are also highlighted, and possible future scenarios are evaluated.