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Transport of multi-year ENSO signatures to the polar regions

S. Jevrejeva (1), J.C. Moore (2), A. Grinsted (2)

(1) Proudman Oceanographic Laboratory, Liverpool, UK, sveta@pol.ac.uk; (2)Arctic Centre, University of Lapland, Rovaniemi, Finland

We present the clear observational evidence with high statistical significance of the dynamic linkages, and putative mechanisms, especially for the low frequency components (13.9- year signal), between the ENSO and the Northern Hemisphere ice conditions over the past 150 years. Using the advance statistical methods we separate statistically significant components from time series and demonstrate that the times of largest variance in ice conditions are in excellent agreement with significant power in the Arctic Oscillation (AO) and Southern Oscillation Index (SOI) at 2.2-3.5, 5.7 and 13.9 year periods. The 2.2-3.5, 5.7 year signals are generated about three months earlier in the tropical Pacific Ocean. In contrast the 13.9 year signal propagates from the western Pacific as eastward propagating equatorial coupled ocean waves, and then fast boundary waves along the western margins of the Americas to reach both polar regions, and has a phase difference of about 1.8-2.1 years by the time it reaches the Arctic.