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Oceanic and atmospheric transport of multi-year ENSO signatures to the polar regions

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Using Monte Carlo-Singular Spectrum Analysis and Wavelet Transform, statistically significant components of Arctic ice conditions, the Arctic Oscillation (AO) and Southern Oscillation time-series, are isolated. They display significant co-variance and consistent phase differences at 2.2-, 3.5-, 5.7- and 13.9-year periods. The first three joint signals detected in the Arctic, lead by three months those in the tropical Pacific. On the contrary, the 13.9- year signal first propagates eastward from the western Pacific as equatorial coupled waves (with average phase speed of ˜ 0.15 m/s), and then along the eastern Pacific coastline as fast boundary waves (phase speeds from 1-to-3 m/s). It takes ˜ 2 years for the latter signal to reach the Arctic. In this paper, evidence of dynamical connections between high latitudes surface conditions, tropical ocean sea surface temperature modulated by equatorial wave propagation, the intensity of the wintertime polar vortex and the AO are provided.