Geophysical Research Abstracts
Vol. 19, EGU2017-17509-1, 2017
EGU General Assembly 2017

Dominant covarying climate signals in the Southern Ocean and Antarctic Sea Ice influence during last three decades

Dario Cerrone (1), Giannetta Fusco (1,4), Ian Simmonds (2), Giuseppe Aulicino (3), Giorgio Budillon (1,4)

(1) Università degli Studi di Napoli Parthenope, Dipartimento di Scienze e Tecnologie, Napoli, Italy (giannetta.fusco@uniparthenope.it), (4) Consorzio Nazionale Interuniversitario per le Scienze del Mare (CoNISMa), (2) School of Earth Sciences, The University of Melbourne, Victoria, Australia, (3) Università Politecnica delle Marche – Dipartimento di Scienze della vita e dell'ambiente, Italy

A composite dataset (comprising geopotential height, sea surface temperature, zonal and meridional surface winds, precipitation, cloud cover, surface air temperature, latent plus sensible heat fluxes , and sea ice concentration) has been investigated with the aim of revealing the dominant timescales of variability from 1982 to 2013. Three covarying climate signals associated with variations in the sea ice distribution around Antarctica have been detected through the application of the Multiple-Taper Method with Singular Value Decomposition (MTM-SVD). Features of the established patterns of variation over the Southern Hemisphere (SH) extratropics have been identified in each of these three climate signals in the form of coupled or individual oscillations. The climate patterns considered here are the Southern Annular Mode (SAM), the Pacific-South America (PSA) teleconnection, the Semi-Annual Oscillation (SAO) and Zonal Wavenumber-3 (ZW3) mode. It is shown that most of the sea ice temporal variance is concentrated at the quasi-triennial scale resulting from the constructive superposition of the PSA and ZW3 patterns. In addition the combination of the SAM and SAO patterns is found to promote the interannual sea ice variations underlying a general change in the Southern Ocean atmospheric and oceanic circulations. These two modes of variability are also found consistent with the occurrence of the SAM+/PSA- or SAM-/PSA+ combinations, which could have favored the cooling of the sub-Antarctic and important changes in the Antarctic sea ice distribution since 2000.