

Extra-Tropical Atmospheric Response to Two Types of El Niño Events

Margaret M. Hurwitz^{1,2}, **Chaim I. Garfinkel**³, **Natalia Calvo**⁴,
Isabel Zubiare⁴, **Amy H. Butler**⁵, **Luke D. Oman**² and **Paul A. Newman**²

- 1 Goddard Earth Sciences Technology and Research (GESTAR), Morgan State University, Baltimore, MD, USA
- 2 NASA Goddard Space Flight Center, Greenbelt, MD, USA
- 3 Johns Hopkins University, Baltimore, MD, USA
- 4 Departamento Física de la Tierra, Astrofísica y Astronomía, Universidad Complutense de Madrid, Madrid, Spain
- 5 Climate Prediction Center, NCEP, NWS, NOAA, College Park, MD, USA

Meteorological reanalyses and chemistry–climate model simulations are used to investigate the extra-tropical atmospheric response to two types of El Niño events: eastern Pacific (i.e., conventional) El Niño and central Pacific (i.e., Modoki or warm pool) El Niño. These events are characterized by positive sea surface temperature (SST) anomalies in the eastern and central equatorial Pacific, respectively, in boreal autumn and winter.

Whereas eastern Pacific (EP) El Niño events do not impact the extra-tropical Southern Hemisphere (SH) stratosphere, central Pacific (CP) El Niño events enhance convective activity in the South Pacific Convergence Zone in austral spring, forcing a tropospheric planetary wave that propagates toward SH high latitudes and upward into the Antarctic stratosphere. This wave enhancement affects Antarctic surface temperatures and sea ice concentrations, and leads to higher polar stratospheric temperatures and to a weaker polar jet during austral summer, as compared with neutral ENSO years. The SH response to CP El Niño events appears to be independent of ENSO index.

CP and EP El Niño events have qualitatively similar Northern Hemisphere (NH) impacts in boreal winter: deepening of the North Pacific low and enhanced planetary wave driving, leading to a weakening of the Arctic vortex. Apparent contradictions in recent CP El Niño analyses may result from the dependence of the NH response on the precise definition of CP El Niño and/or limited by the small number of observed events included in these analyses.

Currently, temperature and dynamical diagnostics are being used to assess the extra-tropical response to different ENSO flavors in the CMIP5 simulations.