Geophysical Research Abstracts
Vol. 18, EGU2016-9242, 2016
EGU General Assembly 2016

Stratospheric Response to Intraseasonal Changes in Incoming Solar Radiation

Chaim Garfinkel (1), vered silverman (2), nili harnik (2), and caryn Erlich (1)

(1) Hebrew University of Jerusalem, Earth Science Institute, Jerusalem, Israel (chaim.garfinkel@mail.huji.ac.il), (2) Tel Aviv University, Tel Aviv, Israel

Superposed epoch analysis of meteorological reanalysis data is used to demonstrate a significant connection between intraseasonal solar variability and temperatures in the stratosphere. Decreasing solar flux leads to a cooling of the tropical upper stratosphere above 7hPa, while increasing solar flux
leads to a warming of the tropical upper stratosphere above 7hPa, after a lag of approximately six to ten days. Late winter (February-March) Arctic stratospheric temperatures also change in response to changing incoming solar flux in a manner consistent with that seen on the 11 year timescale: ten to thirty days after the start of decreasing solar flux, the polar cap warms during the easterly phase of the Quasi-Biennal Oscillation. In contrast, cooling is present after decreasing solar flux during the westerly phase of the Quasi-Biennal Oscillation (though it is less robust than the warming during the easterly phase). The estimated composite mean changes in Northern Hemisphere upper stratospheric ($\sim$ 5hPa) polar temperatures exceed 8K, and are potentially a source of intraseasonal predictability for the surface. These changes in polar temperature are consistent with the changes in wave driving entering the stratosphere.

Garfinkel, C.I., V. Silverman, N. Harnik, C. Erlich, Y. Riz (2015), Stratospheric Response to Intraseasonal Changes in Incoming Solar Radiation, J. Geophys. Res. Atmos., 120, 7648-7660. doi: 10.1002/2015JD023244.