

The impact of solar activity on tropical Pacific decadal variability

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It is no doubt that solar is one of the most important driving forcing for the earth climate. However, the impact of the solar activity for climate on interannual to decadal time scale is still on debate. Based on the detection for the solar signal in some critical components of climate system, we studied the sensitive response of atmospheric and oceanic system to solar activity variation. It is revealed that the tropical Pacific Ocean maybe the key region response to solar activity. As a quasi-period forcing, the features of the ocean heat content (OHC) anomaly and SSTA demonstrate opposite patterns in the tropical Pacific during the different phase of solar cycle. The impact of solar activity(F10.7)on tropical Pacific convection during the boreal summer(June–July–August, JJA) has been examined using reanalysis data, revealing a significant lagged(1–2 years) correlation between outgoing long-wave radiation(OLR) over the tropical western Pacific and the F10.7 index. As related to the influence of solar activity over the tropical western Pacific, a dipole convection anomaly pattern shows an eastward shift of the central position of deep convection. As in fact, this shift results in a feature more like an El Nino Modoki pattern. FGOALS-g2 is employed to simulate the atmospheric and oceanic system response to the constant and period solar forcing. The central Pacific response to solar activity variation is confirmed in these experiments.

Keywords: solar activity, ocean heat content, convection, decadal variability