



Contrasting different techniques for identifying the role of Sun and the El Niño Southern Oscillation on Indian Summer Monsoon Rainfall

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A solar influence on Indian Summer Monsoon (ISM) rainfall, identified in previous studies using the method of solar peak year compositing, may not be robust and can be influenced by other factors such as ENSO and trends. Compositing fails in the Southern Hemisphere where a trend in Sea Level Pressure is clear. Solar peak years suggested -ve NAO features with significant signal around the Azores High, whereas trough years suggest +ve features of NAO with significant influence around the Icelandic Low. Regression analysis, which takes into account variations across the whole solar cycle rather than just the min/max fails to detect any direct solar influence on ISM but the spatial pattern of the Southern Oscillation has changed in recent decades with major changes around Australia. Through the Indian Ocean Dipole, this may have had an impact on ISM rainfall. During the second half of last century, the local north south Hadley circulation, as manifest in the NAO in the northern Hemisphere and the IOD in the southern hemisphere, may have played an important role in modulating the ISM. We discuss these potential indirect connections between the solar cycle and monsoon rainfall, which are different since the 1950s.