



Impact of ENSO on Winter Monsoon Rainfall over south India

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El-Niño-Southern Oscillation (ENSO) is a coupled Ocean-atmosphere phenomenon that has worldwide impact on climate in general and Indian monsoons in particular. El-Niño is used to refer unusually warm water, while La-Niña is the counterpart of El-Niño which is characterised by cooler than normal Sea Surface Temperatures (SSTs) across the equatorial eastern and central Pacific. The physical occurrence of El-Niño is a proven fact with a periodicity of 3-7 years; the strength of ENSO is measured by two principle indices namely Southern Oscillation Index (SOI) and SST index over Nino-3.4 region which refers to the anomalous SSTs within the region bounded by 5⁰N-5⁰S and 170⁰E- 120⁰W. An analysis of mean monthly data of 124 years reveals that the relationship between the SOI in April and May and the winter monsoon rainfall during October through December over south India is variable and non stationery. In the recent four decades, however, SOI (April and May) is negatively and significantly correlated with winter monsoon rainfall. Secondly a similar analysis is also performed using 50years of mean monthly SSTs over Nino-3.4 region in April and May and winter monsoon rainfall to detect a possible relationship and there is a striking positive relationship between them. It is interesting to note that in both of the above cases the April and May signals of ENSO are more significant at 1% level in the recent four decades than for the other months and seasons for probable prediction of winter monsoon rainfall. Further, 20-year sliding correlation tests are performed to examine the consistency of above two relationships and they are very promising. Similar to the relationship between Hurricanes and ENSO episodes, we also noticed that warm ENSO episodes are characterised by increased number and intensity of tropical storms

over the Bay of Bengal and hence enhanced winter monsoon rainfall. Further, Mann-Whitney rank statistical test is applied for the extreme ENSO events in terms of SOI and SSTs over Nino-3.4 regions against winter monsoon rainfall. The statistic value is 2.43, which is significant at 5% level. Thus the ENSO in terms of SOI and SSTs over Nino-3.4 during April and May are the key factors for assessing winter monsoon rainfall over south India