

Variability and predictability of the Asian summer monsoon rainfallBin Wang[†]; Baoqiang Xiang[†] University of Hawaii, USALeading author: wangbin@hawaii.edu

Asian summer monsoon (ASM) rainfall is life blood for over 60% of the world population, yet seasonal prediction of this variability remains a long-standing challenge. By analysis of the 1979-2009 data over the entire Indo-Pacific warm pool, we show that the sources of variability and predictability of the ASM precipitation arises primarily from four principal processes, which account for about 50% of the total summer rainfall variability. The first mode of variability is forced by central Pacific SST anomalies often associated with the developing ENSO. The second mode is coupled with a dipole SST anomaly between the northern Indian Ocean (IO) and WNP, which originates from a positive thermodynamic feedback between convectively coupled Rossby waves and the cooling to the east of the anticyclone center and augmented by Northern Indian Ocean air-sea interaction. The third and fourth modes are forced by Indian Ocean coupled dipole mode (IOD) and global warming, respectively. Evidence also shows that the WNP coupled mode became substantially weakened after the late 1990s, whereas the IOD mode has been steadily intensified over the last two decades. The predictability of these precipitation modes is investigated in terms of multi-coupled AOGCM's hind cast experiments. The most prominent weakness is the models failure capture the second coupled mode.