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South Asian Monsoon Variability and its Relation to Midlatitude Teleconnections

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Effects of large scale circulation anomalies in the upper troposphere on interannual to interdecadal timescales of South Asian Summer Monsoon variability are examined using a 506 years pre-industrial control simulation of the GCM ECHAM5 and the NOAA 20th century reanalysis from 1871-2008. In composite analyses for wet and dry monsoon years both datasets reveal a similar pattern in 250hPa geopotential height, which can be identified as a Rossby wavetrain over Eurasia. This pattern is significantly correlated with a predefined monsoon index (Wang et al., 2001) as indicator for summer (JJAS) precipitation over South Asia.

Positive anomalies in geopotential height over Scandinavia and central west Asia, combined with negative anomalies over the Black Sea region and Siberia are connected with higher summer precipitation amounts over India and vice versa. A European Wavetrain Index (EWTI) can be defined which refers to these anomaly centres. The correlation of the EWTI and the monsoonal precipitation is significant in both datasets over the entire time period but seems to undergo an interannual variation.

While the correlation of the EWTI and the South Asian monsoon is of the same magnitude as it is for ENSO and the monsoon, a dependence of the EWTI on ENSO could not be found in the GCM and the reanalysis.

Wang, B., R.G. Wu and K. Lau, 2001: Interannual variability of the Asian summer monsoon: Contrasts between the Indian and western North Pacific-east Asian monsoons. Journal of Climate, 14 (20), 4073-4090