Analysis of the nonlinearity of Asian summer monsoon intraseasonal variability using spherical PDFs

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The Asian summer monsoon (ASM) is a high-dimensional and highly complex phenomenon affecting more than one fifth of the world population. The intraseasonal component of the ASM undergoes periods of active and break phases associated respectively with enhanced and reduced rainfall over the Indian subcontinent and surroundings. In this paper the nonlinear nature of the intraseasonal monsoon variability is investigated using the leading EOFs of ERA-40 sea level pressure reanalyses field over the ASM region. The probability density function is then computed in spherical coordinates using a Epaneshnikov kernel method. Three significant modes are identified. They represent respectively (i) East - West mode with above normal sea level pressure over East China sea and below normal pressure over Himalayas, (ii) mode with above normal sea level pressure over East China sea (without compensating centre of opposite sign as in (i)) and (iii) mode with below normal sea level pressure over East China sea (same as (ii) but with opposite sign).
Relationship to large scale flow are also investigated and discussed.