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Cloud vertical structures associated with northward advance of the East Asian summer monsoon

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Abstract

Based on the CloudSat dataset, the vertical structures of the cloud water content and cloudiness associated with the northward advance of the East Asian summer monsoon (EASM) are investigated by using composite analysis method with 22 northward-advancing EASM events selected by extended empirical orthogonal function analysis. The positive anomaly of the liquid water content exhibits an apparent vertical tilting structure on the north side of the convective center during the northward advance of the EASM, tilting northward from the upper to the lower atmosphere over 7 degrees of latitude. However, the positive anomaly of the ice water content overlaps with the convective center without obvious vertical tilting structure. The positive anomaly of the cloud fraction also demonstrates an obvious northward tilting structure. This tilting structure is composed of the different spatial positions of various cloud types from the upper to the lower atmosphere. Deep convective clouds are located in the convective center and can be regarded as the reference of the

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