

## Statistical analyses on the morphology and environmental properties of warm-season quasi-stationary convective clusters in Japan

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The morphology and environmental properties of warm-season quasi-stationary convective clusters (QSCCs) in Japan were statistically investigated with the use of operational weather radar and upper-air sounding data from May to October during 2005-2012. The environmental conditions for the development of QSCCs were described through a comparison with those for no-rain cases. With the use of an automated QSCC identification method, 4133 QSCCs were extracted over the Japanese major islands. It was found that QSCCs are typically meso- $\beta$ -scale phenomena. Additionally, most of QSCC have an elongated structure with the southwest—northeast orientation. The environmental analyses indicated that low-level moisture content controls the stability condition for the development of the QSCCs, and that the differences in the magnitude and directional shear of horizontal winds in the lower troposphere characterize the kinematic environments for QSCCs. An increased amount of the middle-level moisture was found for the QSCC environments, suggesting that atmospheric moistening is an important factor for the development of QSCCs. The vertical shear in the lower troposphere also controls the shape of QSCCs: circular mode versus elliptical mode. A parameter combining shear and stability, i.e. bulk Richardson number, clearly distinguishes between the organization modes. It is suggested that the back-building process is one of the key factors in determining the organization mode. The precipitation intensity has a higher correlation with the convective instability, whereas the precipitation area with the shear intensity.