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Implications for the low latitude cloud formations from solar activity and the quasi-biennial oscillation

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We examined the effect of the 11-year solar cycle and quasi-biennial oscillation (QBO) on the 27-day solar rotational period detected in tropical convective cloud activity. We analyzed the data of outgoing longwave radiation (OLR) for AD1979-2004, dividing into four different cases by the combination of high and low solar activities in terms of the 11-year variation, and easterly and westerly stratospheric winds associated with QBO. As a result, 27-day variation has been most significantly detected in high solar activity period around the Indo-Pacific Warm Pool. Based on correlation analysis, we find that solar rotation signal can explain 10-20% of OLR variability around the tropical warm pool region during the high solar activity period. The spatial distribution has been, however, apparently different according to the phases of QBO. It is suggested that the 11-year solar cycle and stratospheric QBO have a possibility to cause large-scale oceanic dipole phenomena.

Keywords: Outgoing Longwave Radiation (OLR), solar activity, solar rotation, Quasi Biennial Oscillation (QBO), Western Pacific Region