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Distinct changes in boreal summer intraseasonal oscillation over the western North Pacific under mega and equatorial La Niña conditions

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Recent studies suggest that La Niña events can be classified into two categories: mega La Niña and equatorial La Niña. The understanding of the variations in boreal summer intraseasonal oscillation (BSISO) behaviors between such two conditions remains uncertain. Results in this work show during equatorial La Niña summers, in conjunction with the more adequate intraseasonal column-integrated moisture anomalies, the weaker intraseasonal outgoing longwave radiation anomalies are observed over the western North Pacific (WNP) at 3 pentads lag of the peak phase for the Maritime Continent (MC) BSISO events than during mega conditions. Such changes are closely linked with the different propagation features, specifically northwestward and northeastward propagations under mega and equatorial conditions respectively. The distinct propagations under these two conditions could be partly explained by the background column-integrated moisture anomalies. Under equatorial conditions, the less sufficient background moisture anomalies over the tropical western Pacific (WP), in comparison to mega conditions, suppress the activities of the BSISO and its northwestward propagation here. Meanwhile, the enhanced moisture anomalies over the northwestern MC and its surrounding area (NWMC) facilitate the northeastward propagation. Under mega conditions, the background moisture anomalies over the tropical WP are not significant. The southward moisture anomaly gradient over the NWMC hinders the meridional northward propagation and makes some BSISO activities move to the tropical WP region, performing the zonal westward propagation as a whole. The moisture budget and multi-scale interaction diagnoses also emphasize the significant role of the propagation change in the moisture tendency difference averaged over the WNP. Moreover, the extratropical circulation anomalies associated with the MC BSISO events are also discussed. These findings provide new insights into BSISO activity and offer potential improvements for subseasonal forecast.