The recent strengthening of Walker Circulation

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This study computed the Walker circulation index and found out that this circulation has recently been reinforcing. Hence, the difference between the average during 1999-2013 period and the average during 1984-1998 period was analyzed to examine the reason for the recent strengthening of Walker circulation. In an analysis of the difference between the two periods in case of 850 hPa stream flows, anomalous easterlies was clearly observed in equatorial Pacific due to the strengthening of anomalous anticyclonic circulations in subtropical Pacific in two hemisphere. To check whether upward flows has been recently reinforced in tropical western Pacific while downward flows has recently gained strength in tropical central and eastern Pacific, the difference of the average of 5°S-5°N zonal atmospheric circulations between the two periods was investigated. Walker circulation where current that ascended in equatorial western Pacific descends in equatorial eastern and central Pacific turned out to have recently gained more power. Meanwhile, according to the time-series analysis of TC genesis frequency covering the period between July-September, average TC genesis frequency during 1999-2013 period was lower than that during 1984-1998 period. The reason for this could be confirmed in the analysis results regarding the 850 hPa stream flows of the two periods. The monsoon trough during 1984-1998 period was strong in eastern side compared to monsoon trough during 1999-2013 period. TCs during 1999-2013 period showed a tendency of frequent development in western region and moving in the west, compared to tropical cyclones (TCs) during 1984-1998 period. Hence, TC intensity during 1999-2013 period that moves along the East Asian shore was weaker. As was previously analyzed, this can be attributed to the strengthening of anomalous anticyclone in subtropical western Pacific due to the recent strengthening of Walker circulation.

Key words: Walker circulation, equatorial western Pacific, tropical cyclones