Investigation of the Impact of convectively coupled equatorial waves (CCEW) and total electron content (TEC) on the diurnal cycle in Indonesia as early warning system of equatorial climate change

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SUMMARY

Climate change has become a global issue that impacts the world community's perspective on preventing potential natural disasters in the future. One of the essential factors in the investigation of climate change dynamics is the Convectively Coupled Equatorial Wave (CCEW). Recent studies on the CCEW found very active climate dynamics in the Indo-Pacific warm sea region. This condition causes the Indo-Pacific region to have the potential for extreme conditions in the future. On the other hand, several previous studies have shown an unusual correlation between TEC (Total Electron Content) activity in the lonosphere layer to climate dynamics in the lower atmosphere. TEC induces the propagation of gravity and Kelvin waves, which affects the formation speed of the weather phases. Although recent research has revealed a correlation between the two components with such a wide area coverage, the impact on Indonesia's territory is still not fully understood. This is important considering that the Indonesian archipelago has various large islands with different meteorological conditions. So, a more specific review regarding the impact of CCEW and TEC in the Indonesian archipelago needs to be carried out. The impact of these two components is focused on the diurnal cycle, considering that the Indonesian archipelago has high precipitation levels. CCEW data processing uses TMPA (TRMM Multisatellite Precipitation Analyses) and IR-WS (Infrared Weather State). Furthermore, the two types of data models are processed to identify the CCEW phase and finally perform a statistical analysis of the resulting diurnal cycle. TEC's behaviour was observed using Geostationary Satellite Radio Beacon Techniques for further statistical analysis of the intensity of its influence on the diurnal cycle. This research is intended as an early mitigation effort to the changing conditions of the equatorial tropical climate in Indonesia, which is expected to continue to increase in the next few decades.

Keywords: Climate change, Convectively Coupled Equatorial Waves (CCEW), Total Electron Content (TEC), diurnal cycle, Indonesia.