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The role of tropical waves in the genesis of tropical cyclone Seroja

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In this study, we have examined meteorological drivers that led to the genesis of tropical cyclone Seroja. Developing over the Maritime Continent and in April 2021, it brought historic flooding and landslides to southern Indonesia, East Timor and Western Australia's Mid West region. Seroja was the first tropical cyclone to have a significant impact on Indonesian land.

We have shown that the genesis of tropical cyclone Seroja in the region of Timor and Suvu Seas was associated with enhanced Equatorial Convection on March 27, 2021 which was preceded by warm sea surface anomalies (SSTs) in that region. The Equatorial Convection was related to Madden-Julian Oscillation (MJO) mode: it developed on the leading edge of MJO where SSTs were high. We have also investigated the role of tropical waves in the development of tropical cyclone Seroja. The interaction between convectively coupled equatorial Rossby wave and three convectively coupled Kelvin waves embedded within the larger-scale envelope of the MJO, provided a supportive environment for this extreme event. The Equatorial Convection that eventually became tropical cyclone Seroja moved southwest, boosted by environmental cyclonic vorticity associated with Rossby Wave. Each of the three Kelvin Waves that arrived over the Maritime Continent had a unique contribution in this event; structuring the convection, winds and precipitation patterns.