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Impact of the Madden-Julian Oscillation on the eastern tropical Pacific Ocean

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The Madden-Julian Oscillation (MJO) is the primary mode of intra-seasonal variability in the tropical atmosphere, with a typical period of approximately 30 to 60 days.The behaviour of the MJO is characterized by the eastward propagation of a concentrated convection region from the tropical western Indian Ocean, where the MJO is initiated, to the tropical western Pacific. Although convection, together with related cloudiness and precipitation, tend to dissipate east of the 180º meridian, the MJO wind signal continues to progress eastward across the eastern Pacific and South America into the tropical Atlantic. However, there are few studies on the impact of the MJO on the eastern tropical Pacific Ocean and, especially, the Panama Basin, a focus of this ocean modelling work.
We use a global, coarse resolution version of the Nucleus for European Modelling of the Ocean (NEMO) framework version 3.6, referred to as ORCA1-LIM3, forced with daily atmospheric forcing from the Coordinated Ocean-ice Reference Experiments (CORE) dataset version 2, to investigate the MJO effects on the area of study for the period 1990 to 2000. Preliminary results from this simulation demonstrate that the MJO has clear and significant signatures in sea surface fluxes, sea surface height ($\pm$ 0.02m), eddy kinetic energy ($\pm$ 100 cm2/s2) and upper ocean temperatures ($\pm$ 0.6°C) and salinities ($\pm$ 0.25 psu) in the eastern tropical Pacific, and as far east as the Panama Basin. These results have ramifications as regards our ability to make reliable mid-range ocean weather and ocean climate forecasts in the region.