

Numerical study of the response of the ocean to a northerly wind-jet in the equatorial eastern Pacific

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The response of the ocean circulation to an anomalous northerly wind jet in the Gulf of Panama in March, 2002, that crossed the equatorial line from 6°N to 6°S [Mosquera, 2004], and the subsequent effects on the west coast of America were studied using a linear numerical ocean model. Two experiments were made: one, without boundaries and the other with an eastern boundary at 81°W, representing the American continent. The spatial and temporal structure of the imposed wind anomaly, represented using idealized mathematical functions, was quite similar to that of the real jet. The duration of the wind jet was six days and the maximum intensity occurred at day three.

The results of these two experiments, after the duration of the wind jet, were the following:

- 1) The first simulation shows 3 types of disturbances: one moves towards the west, slowly, like a packet of Rossby waves [McCreary, 1989], other whose displacement is towards the east and has the mixed Rossby - gravity (MRG) waveform, and the last is an eastward perturbation faster than the second that has an eastward inertia-gravity waveform.
- 2) The second simulation shows that when the eastward inertia-gravity wave initially reaches the eastern boundary, they excite downwelling and upwelling coastal Kelvin waves that propagate southwards and northwards, respectively. Four days later, other group of Kelvin waves of the opposite sign, and stronger than the previous ones, are excited when the MRG reaches the boundary. At the end, five days later, another group of Kelvin waves, with the same sign and intensity of the first group, were excited.

References

McCreary, J., Hyong S. Lee and David Enfield. The response of coastal ocean to strong offshore winds: With Application to circulations in the Gulfs of Tehuantepec and Papagayo. *Journal of Marine Research*, 47, 81-109, 1989.

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