The life-cycle analysis of wave energy in the global atmosphere and ocean for understanding the mechanism of tropical climate variations

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For mid-latitude Rossby waves in the atmosphere, the expression for the energy flux for use in a model diagnosis, and without relying on a Fourier analysis or a ray theory, has previously been derived using quasi-geostrophic equations and is singular at the equator. Aiki et al. (2017, PEPS) have derived an exact universal expression for the energy flux which is able to indicate the direction of the group velocity of both equatorial and mid-latitude waves. This is achieved by introducing a streamfunction as given by the inversion equation of Ertel' s potential vorticity, a novel aspect for considering the energy flux. The connection of the equatorial and coastal waveguides has been successfully illustrated by the energy flux of Aiki et al. (2017). This allows for tropical-extratropical interactions in oceanic and atmospheric model outputs to be diagnosed in terms of an energy cycle as shown in the present study.

http://co2.hyarc.nagoya-u.ac.jp/labhp/member/aiki/

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