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Zonal mean flow excitation due to inertial waves propagating in the meridional plane

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The large-scale oscillation of the atmosphere and oceans is organized by many processes. Waves are a main part. They transport momentum and transfer this locally to the environment. Slowly variating mean flows come into existence, that influence the variability of weather and climate. The quasi-biennial oscillation (QBO) and equatorial deep jets (EDJ) are prominent examples for wave-driven mean flows. The rotation of the earth and associated propagating inertial waves are of main importance for such wave-mean flow interactions. Because of that, we want tho clarify theoretically and later experimentally, wether and how a mean flow will be excitated through inertial waves.
We discuss a simple model for the inertial-wave-driven mean flow obtained from the primitive equations. Plumb [1] described the generation of a 'mean zonal motion' due to momentum transport of vertically propagating gravity waves. Based on the mathematical analogy we show that in the meridional plane, propagating inertial waves can transfer their momentum in the same manner to a sheared mean flow. Even an oscillating mean flow can be driven by the inertial waves in close analogy to gravity-wave-driven mean flow variations.

[1] Plumb, R. A.: Momentum transport by the thermal tide in the stratosphere of Venus. Quart. J. Roy. Meteor. Soc. **101**, 763–776 (1975)