

EGU22-13505

<https://doi.org/10.5194/egusphere-egu22-13505>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Gravity wave generation by shear instability of balanced flow

Manita Chouksey, Carsten Eden, and Dirk Olbers

- The generation of internal gravity waves from an initially geostrophically balanced flow is diagnosed in non-hydrostatic numerical simulations of shear instabilities for varied dynamical regimes. A non-linear decomposition method up to third order in the Rossby number Ro is used as the diagnostic tool for a consistent separation of the balanced and unbalanced motions in the presence of their non-linear coupling. Wave emission is investigated in an Eady-like and a jet-like flow. For the jet-like case, geostrophic and ageostrophic unstable modes are used to initialize the flow in different simulations. Gravity wave emission is in general very weak over a range of values for Ro . At sufficiently high Ro , however, when the condition for symmetric instability is satisfied with negative values of local potential vorticity, significant wave emission is detected even at the lowest order. This is related to the occurrence of fast ageostrophic instability modes, generating a wide spectrum of waves. Thus, gravity waves are excited from the instability of the balanced mode to lowest order only if the condition of symmetric instability is satisfied and ageostrophic unstable modes obtain finite growth rates.