Geophysical Research Abstracts,
Vol. 10, EGU2008-A-05454, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-05454
EGU General Assembly 2008

Parametric subharmonic instability (PSI) and the beta effect

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Prior studies in near inertial oscillations (NIO) have shown that PSI occurs with a time scale of approximately 5 days. During this time period, there is significant north-south wave propagation, and thus neglecting the beta effect cannot be justified. The current study aims at incorporating beta effect into the PSI theory. We introduce a critical latitude, which northward bound NIOs with half the M2 tidal frequency cannot propagate past; a stability theory for over-reflection of the NIO is then posed to aid our understanding of energy transfer between large scale internal waves to smaller scale near-inertial waves via PSI.