Geophysical Research Abstracts
Vol. 15, EGU2013-1700, 2013
EGU General Assembly 2013

Potential vorticity and helicity in a moist atmosphere

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The helicity balance equation and Ertel's theorem on potential vorticity are applied for an analysis of helical flows of moist unsaturated air and for clarifying the conditions of spontaneous amplification (generation) of helicity due to the atmospheric baroclinicity. Critical comparison is made with the case of dry atmosphere. Spontaneous amplification of helicity owing to the latent heating is also addressed and possible generalization of the proposed methodology onto the case of precipitating atmosphere is highlighted, aiming inter alia at the problem of origination of tornadoes and waterspouts.