

Aspects of potential vorticity: impermeability, coordinates, fluxes

Potential vorticity (PV) plays a dominating role in the interpretation of atmospheric phenomena. It is, therefore, of interest to discuss a few topics involving PV where further clarification and data evaluation might be helpful. For example, the impermeability theorem proves that a specific flux of mass weighted PV (MPV) does not cross isentropic surfaces.

It is shown that there exists quite a variety of equivalent fluxes which cross isentropic surfaces. It is suggested after invoking the 'electric analogy' and considering further examples to abandon the concept of a MPV-flux. It is only advective fluxes which can be defined uniquely. In particular, a climatology of MPV-fluxes cannot be established.

However, volume integrals of MPV can be evaluated as well as their tendencies. Data based examples are presented. PV-coordinates are introduced and the related advective flux climatology is presented.