

1. Introduction

2. Theoretical background

2.1 Diabatic processes and PV; 2.2 Slantwise moist convection, moist PV and SCAPE

3. Historic overview until 1980

3.1 The thermal theory of extratropical cyclones in the 19th century



3.2 Moist airstreams



3.3 Diabatic effects on PV in cyclones



3.4 Diabatic processes are required to explain rapid cyclone development



3.5 Two major U.S. storms as catalysts for research on diabatic processes

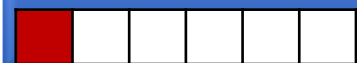


4. Diabatic effects on extratropical cyclones (1980 to 2000)

4.1 Diagnostic studies based on observations, analysis fields and model simulations



4.2 Real case numerical sensitivity experiments



4.3 Idealised numerical simulations of cyclones



5. Recent accomplishments (the last 20 years)

5.1 Reanalyses and weather system climatologies



5.2 Consideration of radiative and surface flux related diabatic processes



5.3 Diabatic processes in (special categories of) extratropical cyclones



5.4 Novel diagnostics of diabatic processes



5.5 Diabatic outflows and Rossby waveguide dynamics



5.6 Field experiments and the investigation of mesoscale substructures



5.7 Linkage to climate change research



1980

Time

2000

6. Synthesis, implications and outlook
6.1 Synthesis; 6.2 Implications and outlook

Moist airstreams

Extratropical transitioning tropical cyclones

Frontal waves

Diabatic outflows and blocking

Moist baroclinic instability

Mesoscale phenomena