# Microphysical heating rates in COSMO

COSMO – User Workshop
1.11.2012

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- Calculation of microphysical heating rates in COSMO version 4.18
- Microphysics scheme hydci_pp

  (itype_gscp=3 with irunge_kutta=2)

  → prognostic variables for qc, qi, qr, qs

  → one moment scheme (only mass of hydrometeors)

- **Considered heating rates**

-Sc : condensation and evaporation of cloud water

-Sev : evaporation of rain

-Snuc: heterogeneous nucleation of cloud ice

-Srim: collection of cloud water by snow (riming)

-Scfrz: homogeneous freezing of cloud water

-Sicri: collection of cloud ice by rain to form snow

-Sidep: depositional growth and sublimation of cloud ice

-Simelt: melting of cloud ice

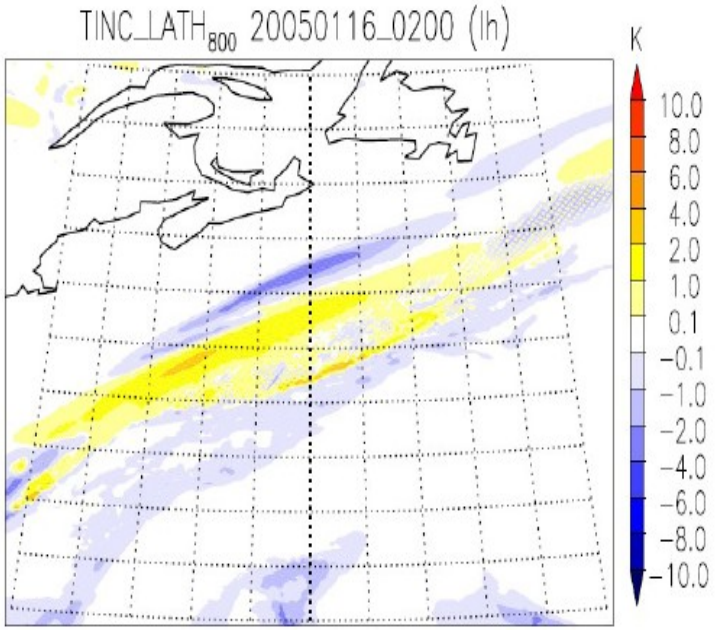
-Srcri: freezing of rain due to collection of cloud ice

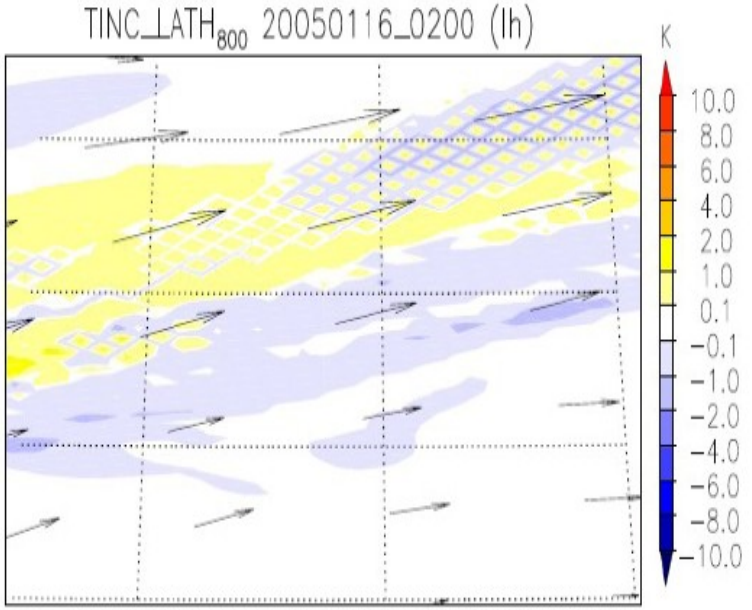
-Srfrz: freezing of rain due to heterogeneous nucleation

-Ssdep: depositional growth and sublimation of snow

-Ssmelt: melting of snow to

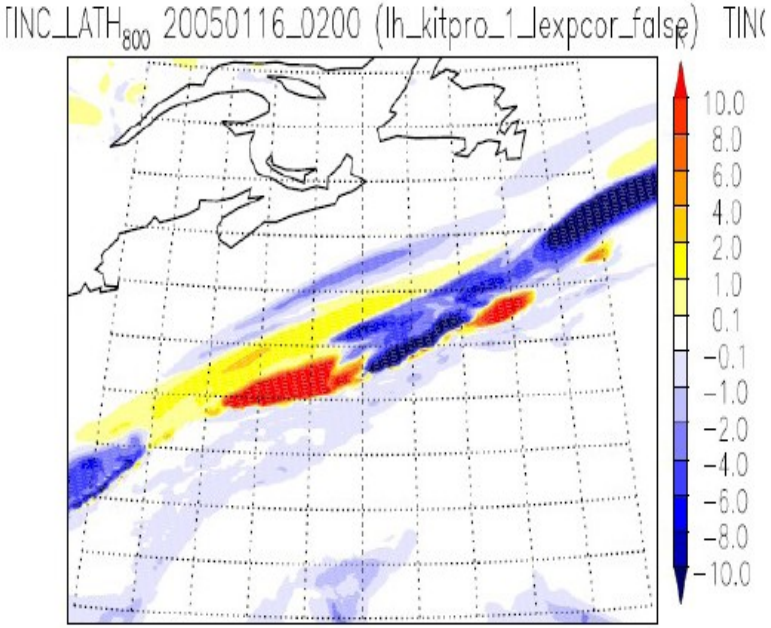
# itype_turb, lexpcor and icldm_turb

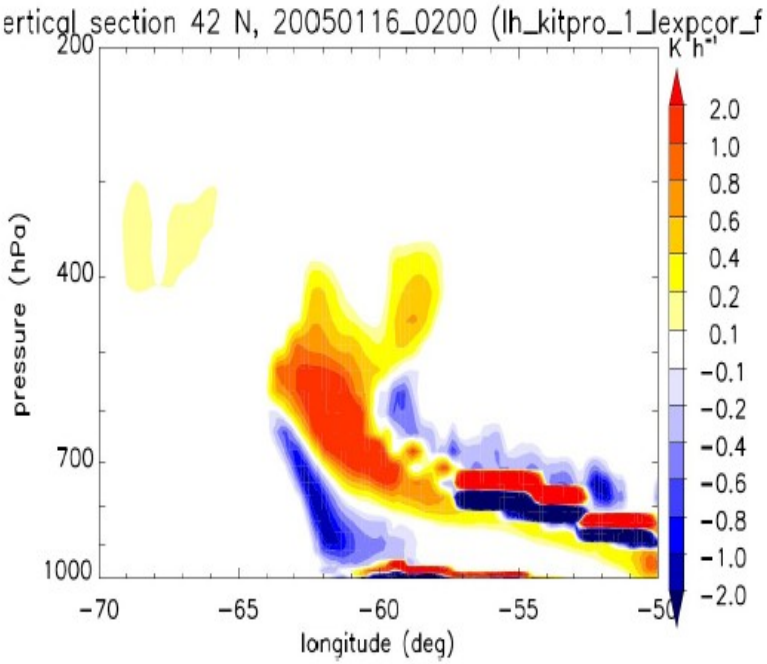



itype_turb=3
lexpcor=true

Turb. fluxes on moist conserved variables (θl,qt) and a correction for subgrid scale cloudiness

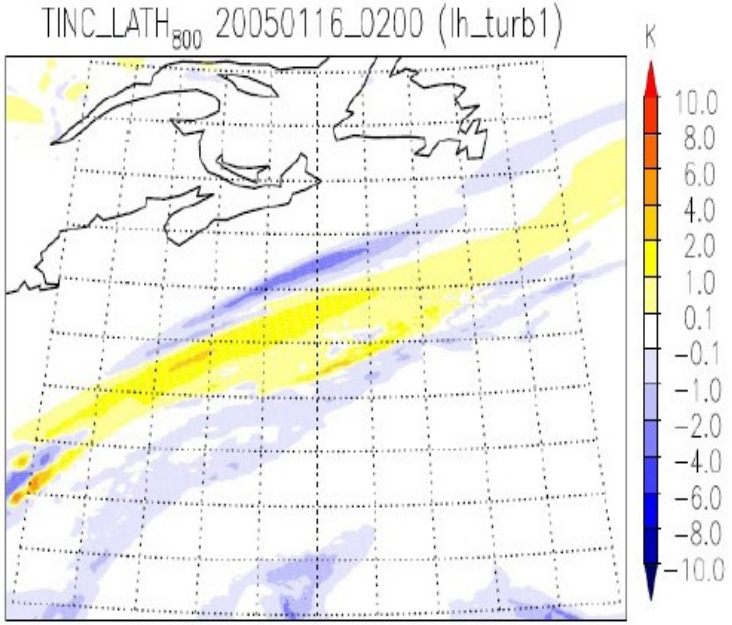


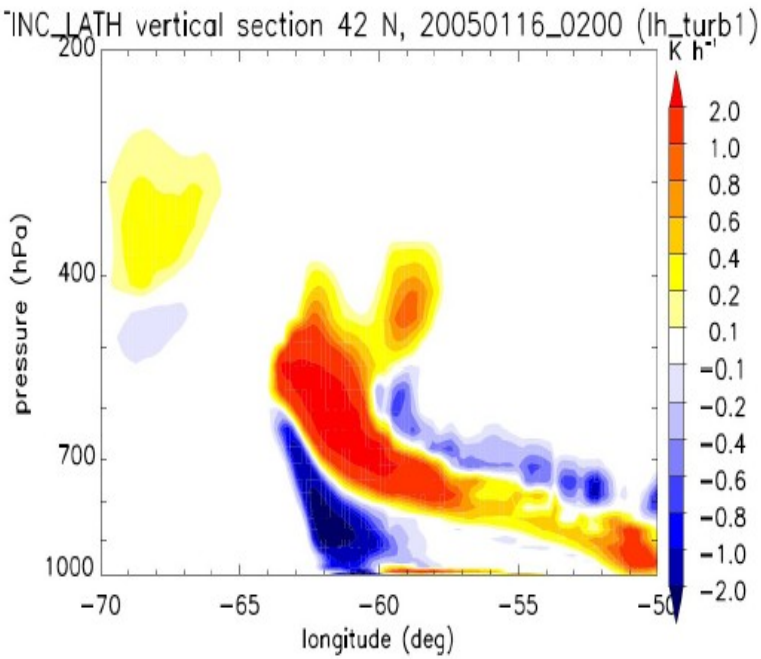




itype_turb=3
lexpcor=false

Turb. fluxes on moist conserved variables+
No correction for subgrid scale cloudiness

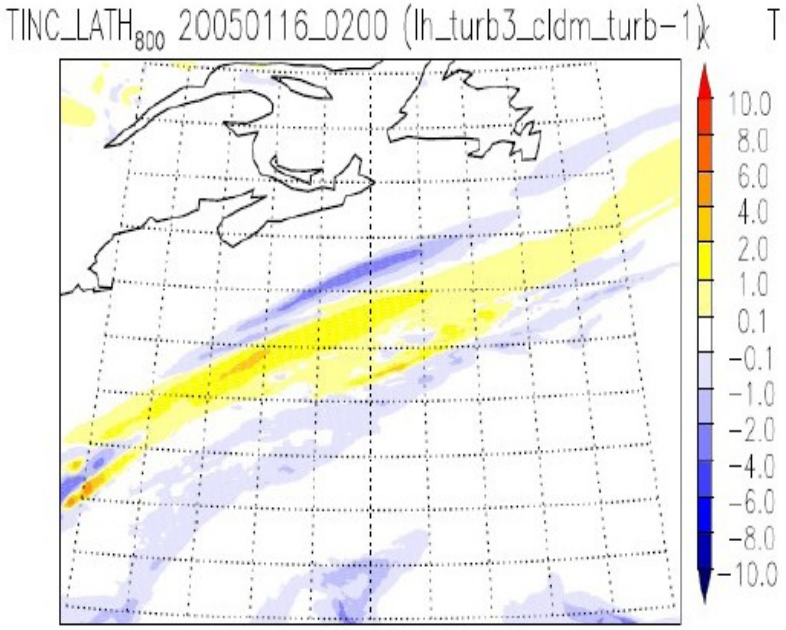
# itype_turb, lexpcor and icldm_turb

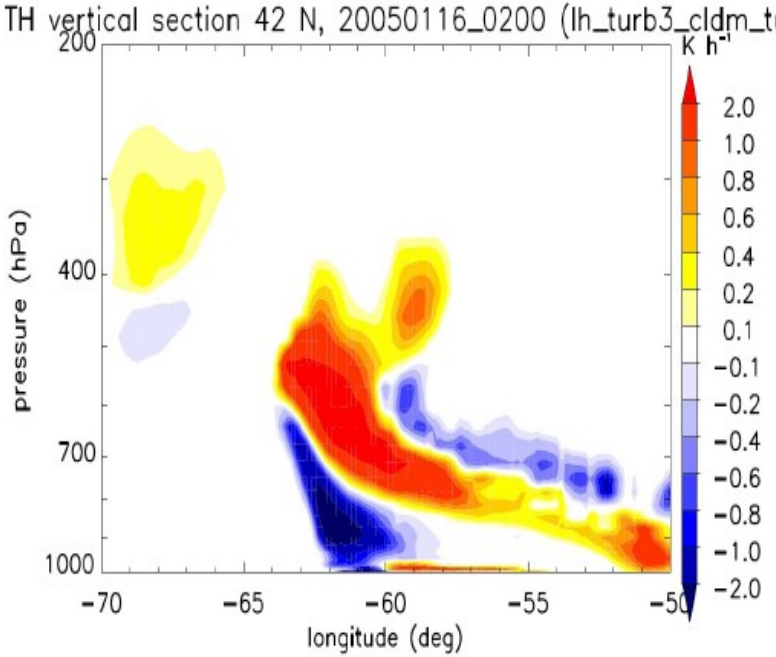



itype_turb=1

Old turbulence scheme (not used anymore)



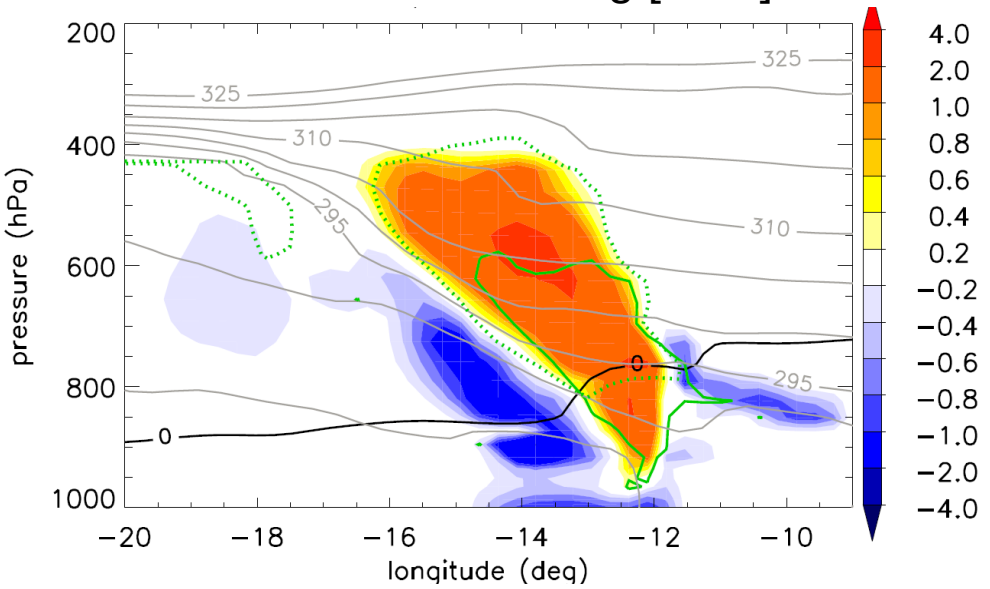




itype_turb=3
cldm_turb=-1
lexpcor=false

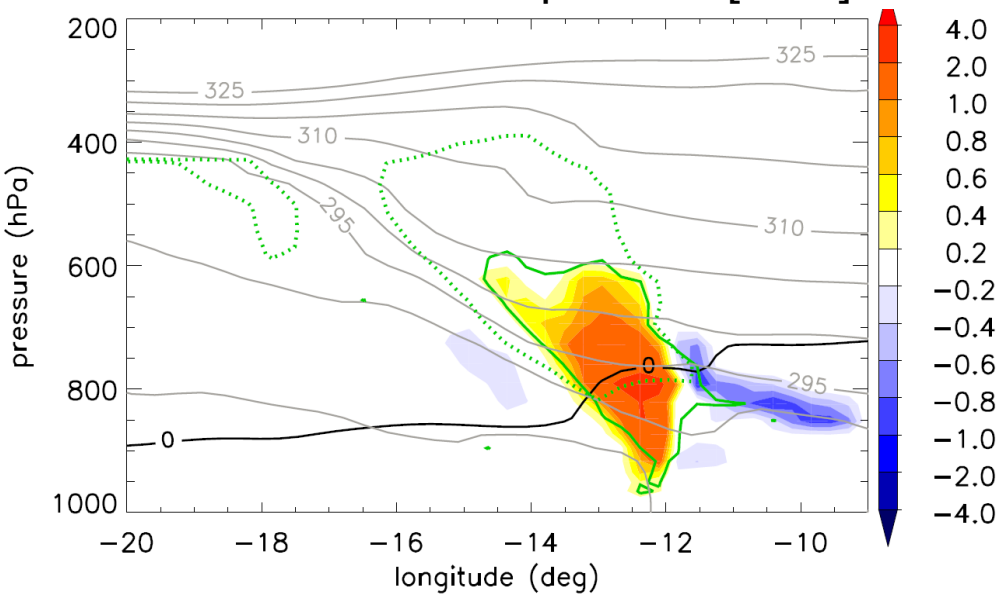
Turb. Fluxes are calculated for dry variables (θ,qv)

# Examples

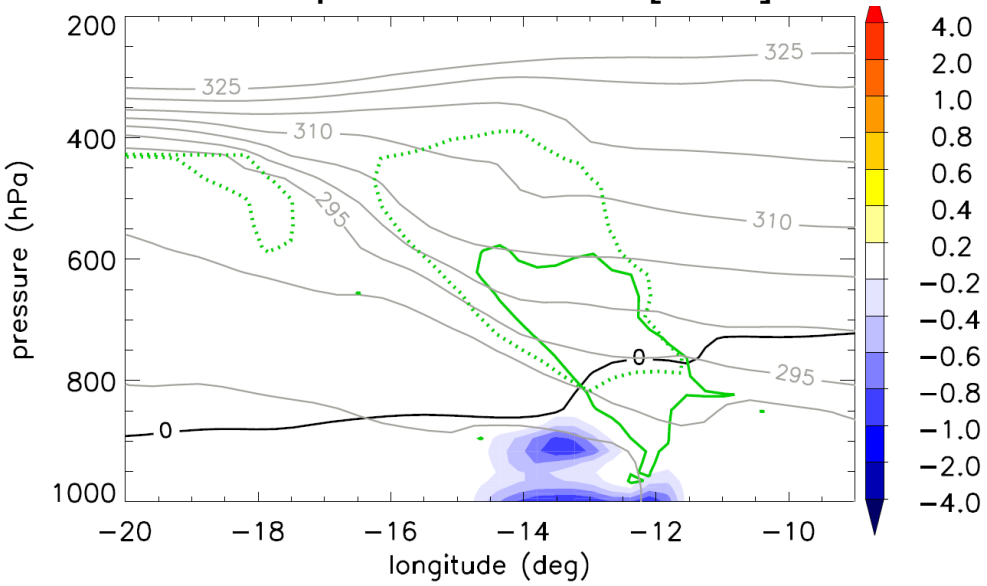
## total latent heating [K / h]




## condensation/evaporation [K / h]




## evaporation of rain [K / h]




## depositional growth of snow [K / h]