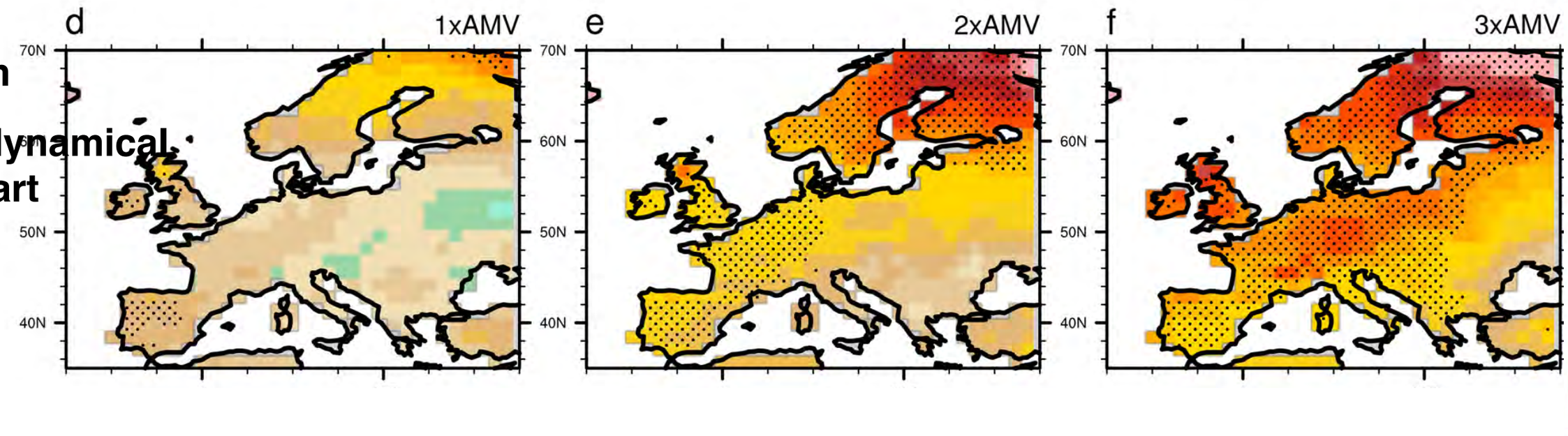
What drives the **thermodynamical** response?

AMV+ minus AMV -

DJF

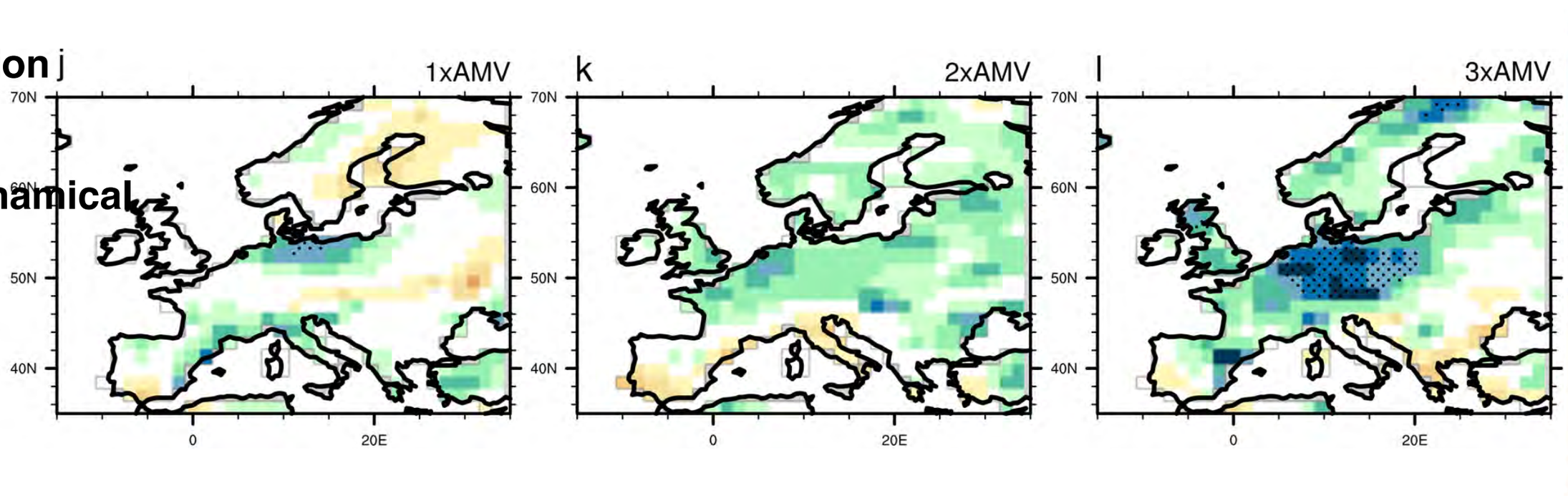
T2m

Thermodynamical part



Precipitation

Thermodynamical part



What drives the **thermodynamical** response?

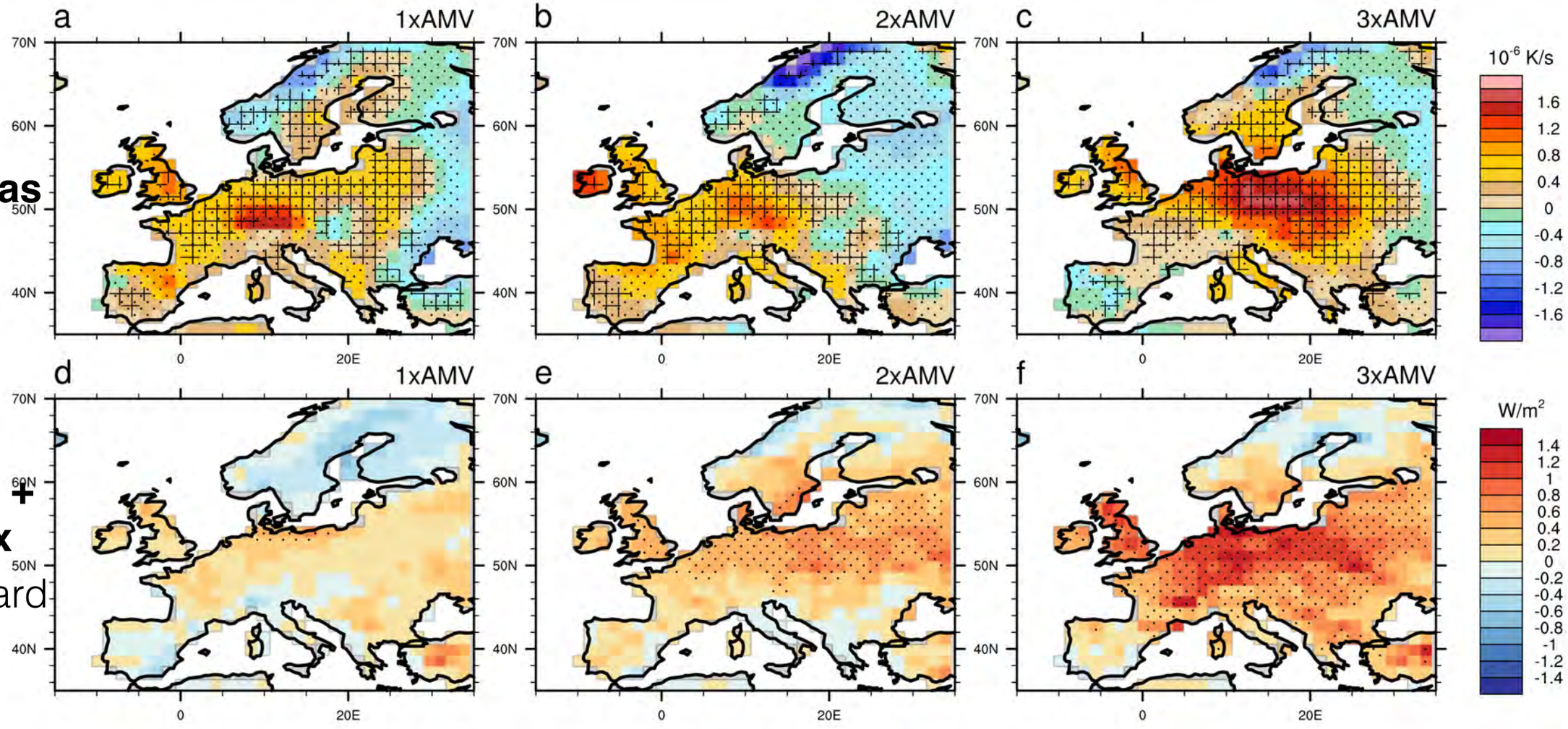
DJF

AMV+ minus AMV -

850hPa

$$\left(\bar{u}T_x' + \bar{v}T_y'\right)$$

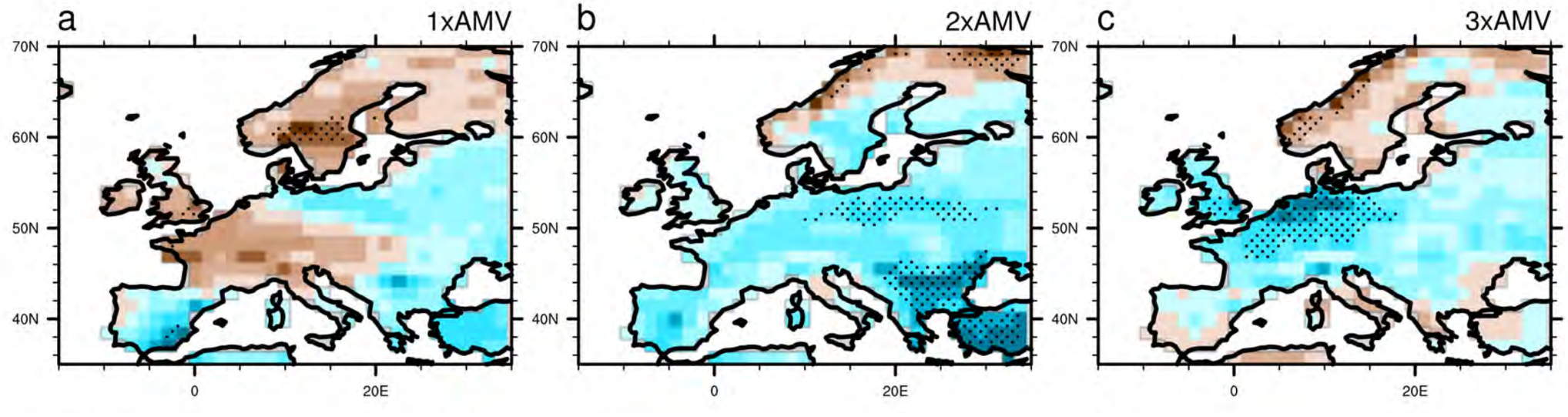
+ if same sign as climatology



Net shortwave + longwave flux

positive downward

Total cloud cover



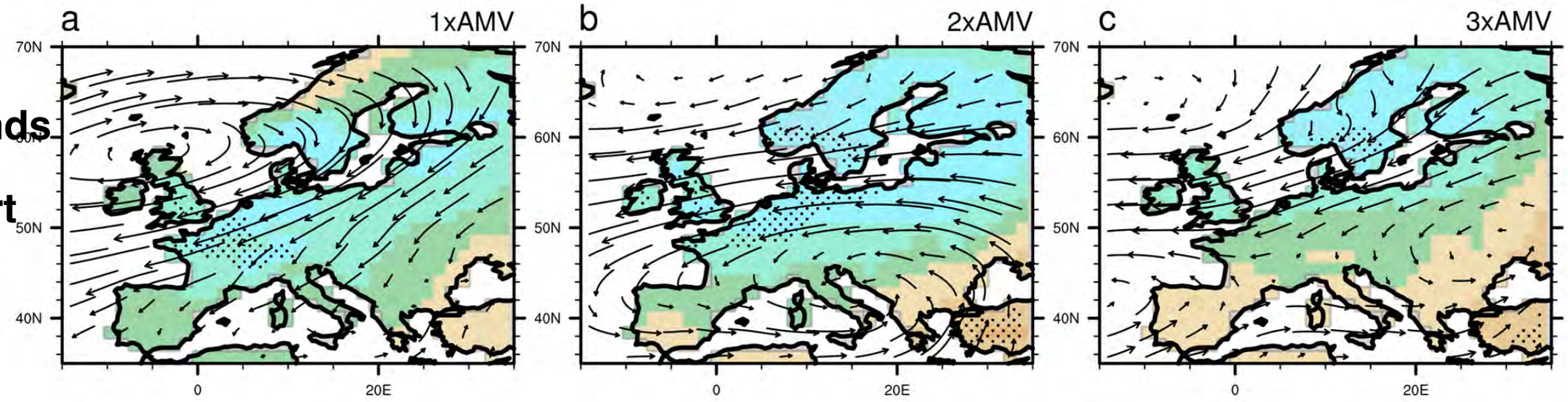
What drives the **dynamical** response?

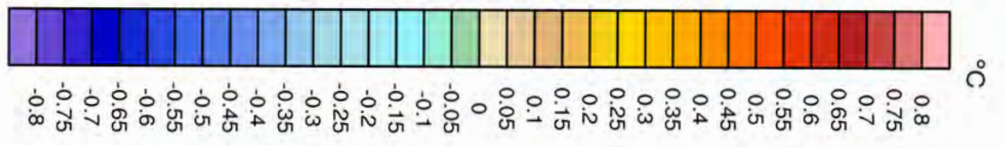
AMV+ minus AMV -

DJF

T2m and surface winds

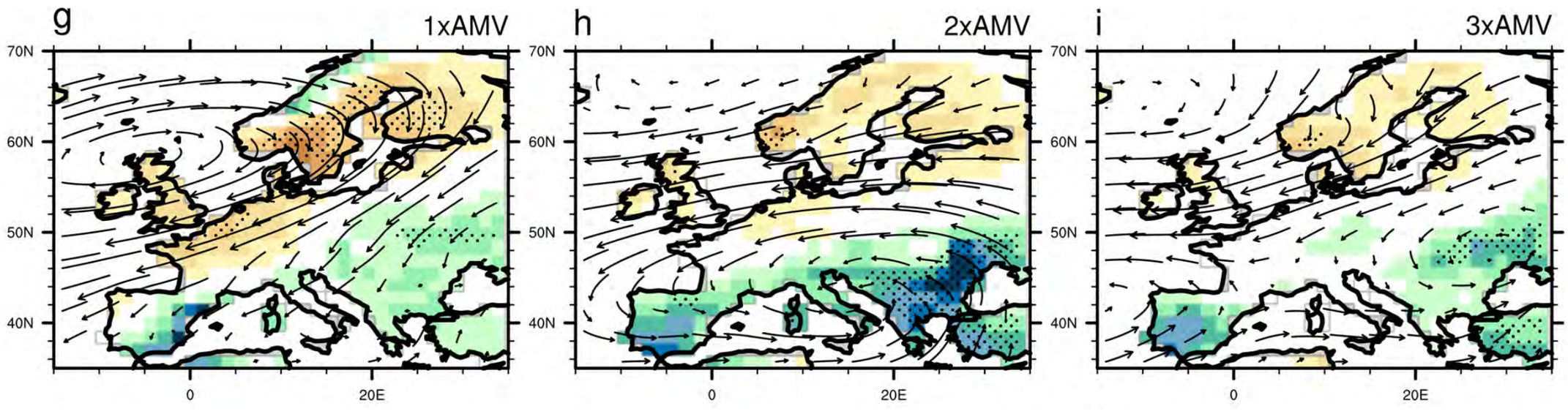
dynamical part

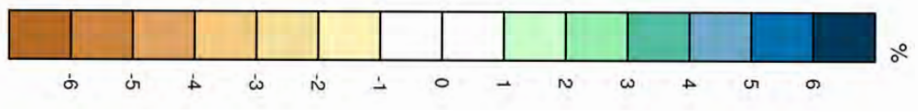




Precipitation

dynamical part



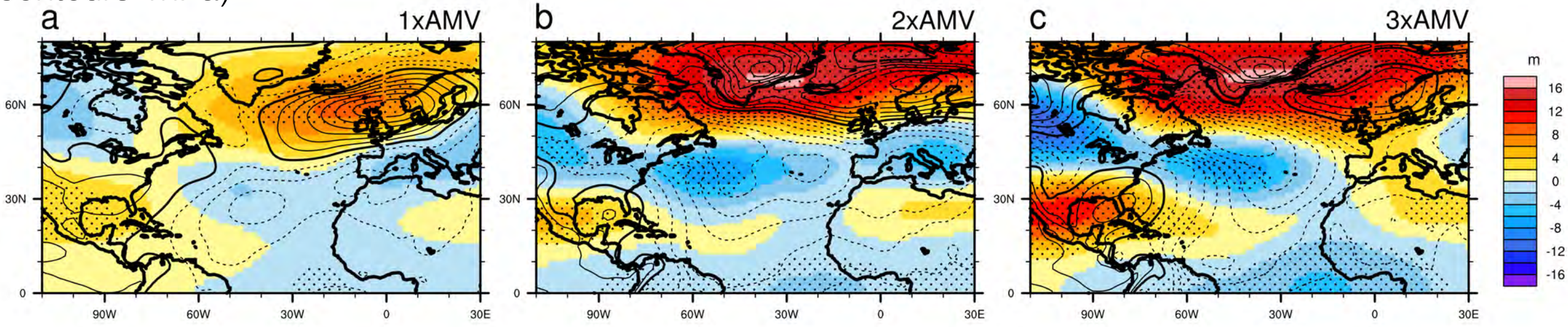


What drives the **dynamical** response?

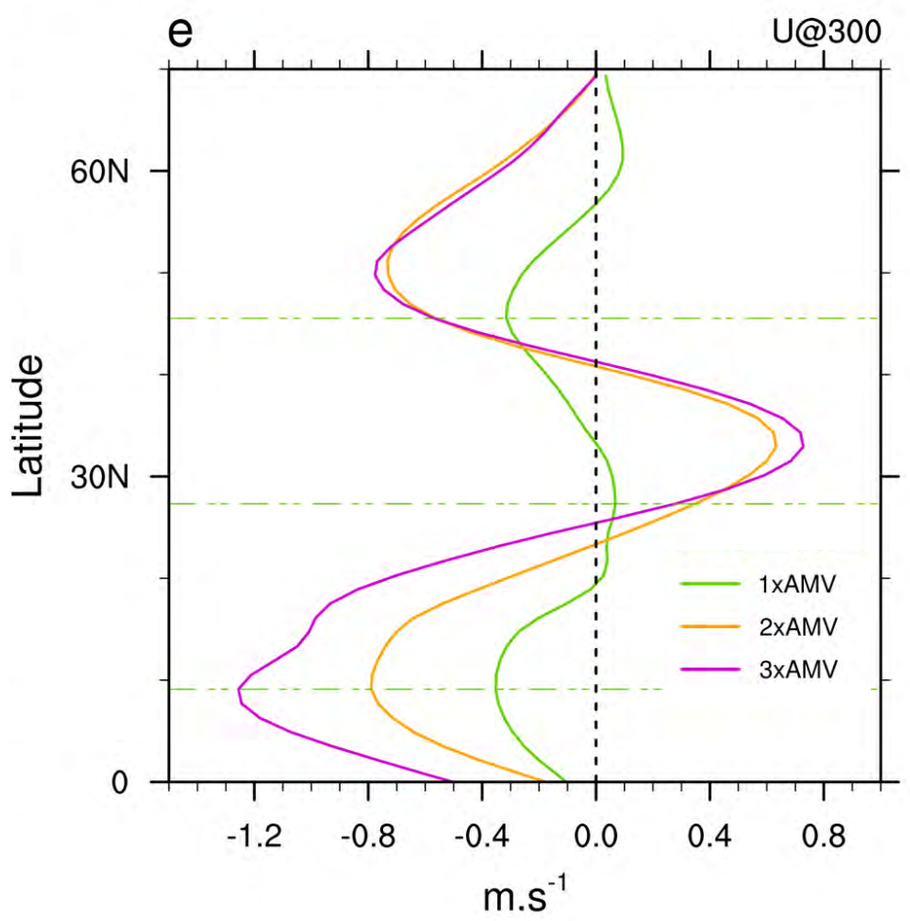
DJF

AMV+ minus AMV -

Z500*(shading) **and SLP**
(contours 1hPa)



Jet at 300hPa
NATL zonal mean

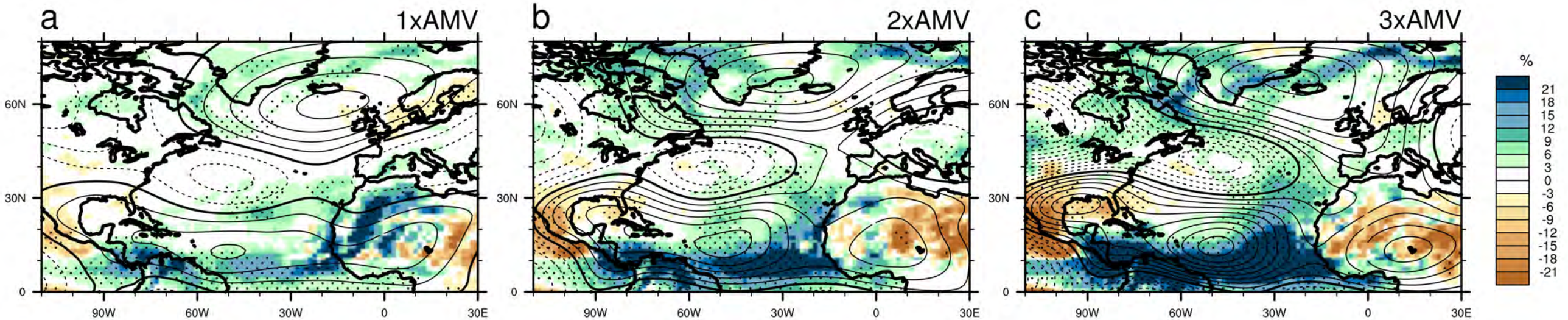


What drives the **dynamical** response?

DJF

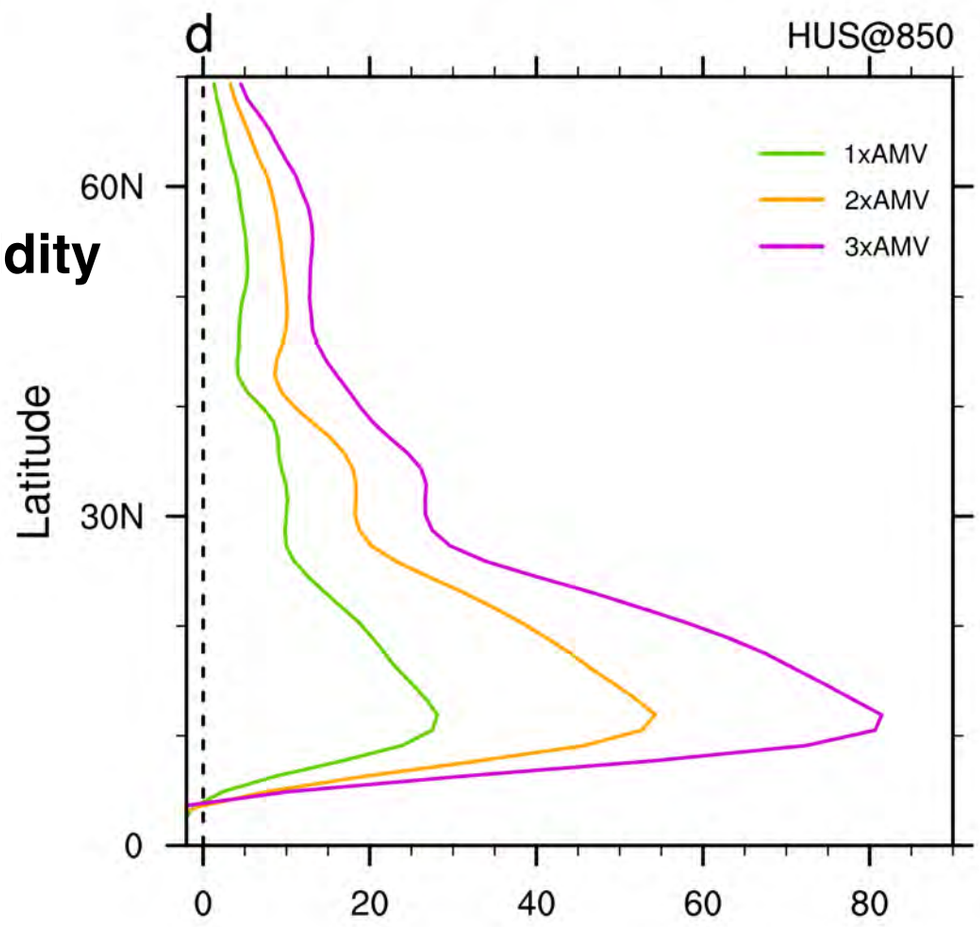
Precipitation (shading) **and 200 hPa streamfunction** (contours)

AMV+ minus AMV -



850 hPa specific humidity

NATL zonal mean



Circulation changes consistent with a Gill-type response driven by the tropics *(Sutton and Hodson 2007, Davini et al. 2015)*

Conclusions (1/2)

- **The winter response to the AMV over the Euro Atlantic region is weak in the 1XAMV experiments but it becomes significant over land in the 2XAMV and 3XAMV experiments**

- **It is characterized by warmer temperatures and increased rainfall over most of the European continent**

- **The thermodynamical response is mainly driven by the advection of warm and moist oceanic anomalies by the western climatological flow and by changes in radiative fluxes associated with cloud cover anomalies.**

- **The dynamical response is driven by a tropically-induced diabatic heating which leads to Rossby wave propagation, cyclonic anomalies and a cooling over Europe.**

Conclusions (2/2)

- **There is a competing effect between the dynamical and thermodynamical response in T2m, which may partly explain the difficulty to detect a response in the models. We expect a large inter-model spread too because of that.**

- **The temperature response is dominated by thermodynamical processes and is broadly linear with respect to AMV strength**

- **The precipitation response is more complex, more regionally dependent. Both dynamical and thermodynamical parts contribute when the AMV forcing gets stronger.**

- **The protocole gives more weight to the tropical forcing of the AMV than to the extratropics. We might underestimate extratropical processes**

=> Need to account for mixed layer variations when doing the restoring (*Ortega et al. 2017)*

Is the temperature response to the AMV linear?