

Efficiency of baroclinic growth in storm tracks

During the growth of extratropical cyclones, cyclones convert potential energy into kinetic energy in a process known as baroclinic conversion. The efficiency of the baroclinic conversion processes depends on the optimal vertical tilt of a growing cyclone. Little is known about the variations in the conversion efficiency and its annual and decadal variations and potential trends.

The aims of this thesis are to investigate the baroclinic eddy efficiency using a novel diagnostic (Schemm and Rivière 2019), to explore its relationship with the cyclone propagation direction and the jet stream and combine the findings with insights obtained from feature-based cyclone tracking.

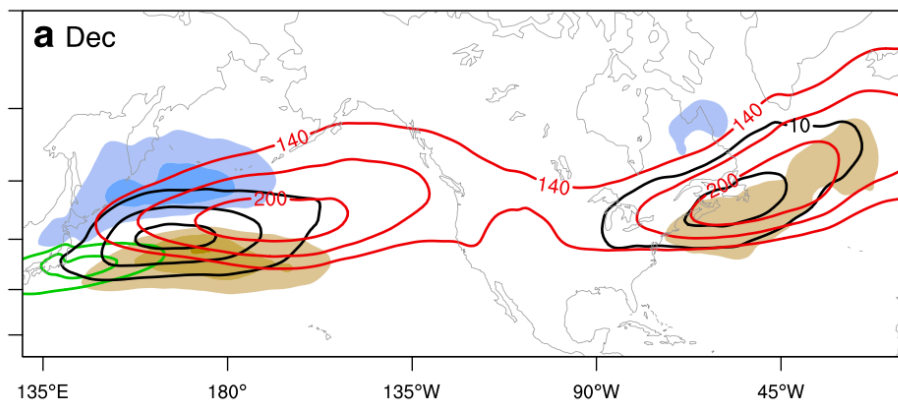


Figure 1: Baroclinic conversion over the North Pacific and change relative to previous month (Schemm and Rivière 2019)

Interests: atmospheric and climate dynamics, interest in analysis of large data sets as well as theoretical work.

Data & tools: ERA-5 reanalysis data, programming with R, Python

Supervisors:

Sebastian Schemm (Sebastian.schemm@env.ethz.ch) and Gwendal Rivière (LMD, Paris).

Reference:

Schemm, S. and G. Rivière, 2019: On the Efficiency of Baroclinic Eddy Growth and How It Reduces the North Pacific Storm-Track Intensity in Midwinter. *J. Climate*, 32, 8373–8398, <https://doi.org/10.1175/JCLI-D-19-0115.1>