Stratospheric Waves over the Southern Andes

Andreas Dörnbrack
DLR Oberpfaffenhofen
Institut für Physik der Atmosphäre
andreas.doernbrack@dlr.de

Overview:

- investigate vertical and horizontal propagation of mountain waves from the Andes into the middle atmosphere
- use combination of ground-based, balloon-borne, and airborne observations gathered during the SouthTRAC mission in Patagonie in September/October 2019
- here: visual impressions and evolution of the meteorological situation during the early SSW in August/September 2019

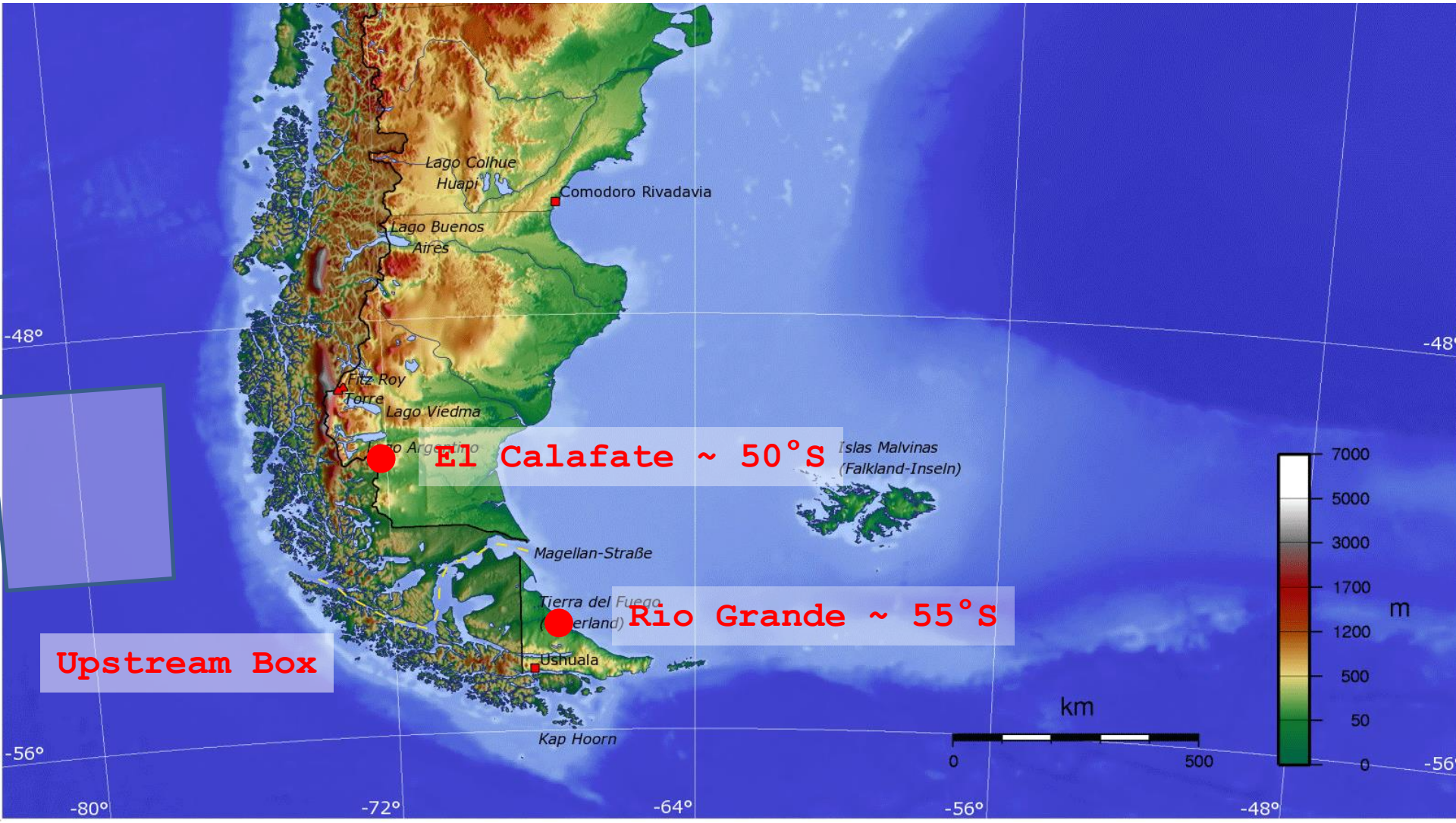
CC BY

SouthTRAC:
Southern Hemisphere Transport, Dynamics, and Chemistry

Foto: Marko Magister, Bigair Factory

CC BY

The Physical Scenery



CC BY

Complementary ground-based observations and radiosondes launches at Rio Grande and El Calafate

CC BY

Instrumented Motor glider in El Calafate

CC BY

The Aerial Scenery

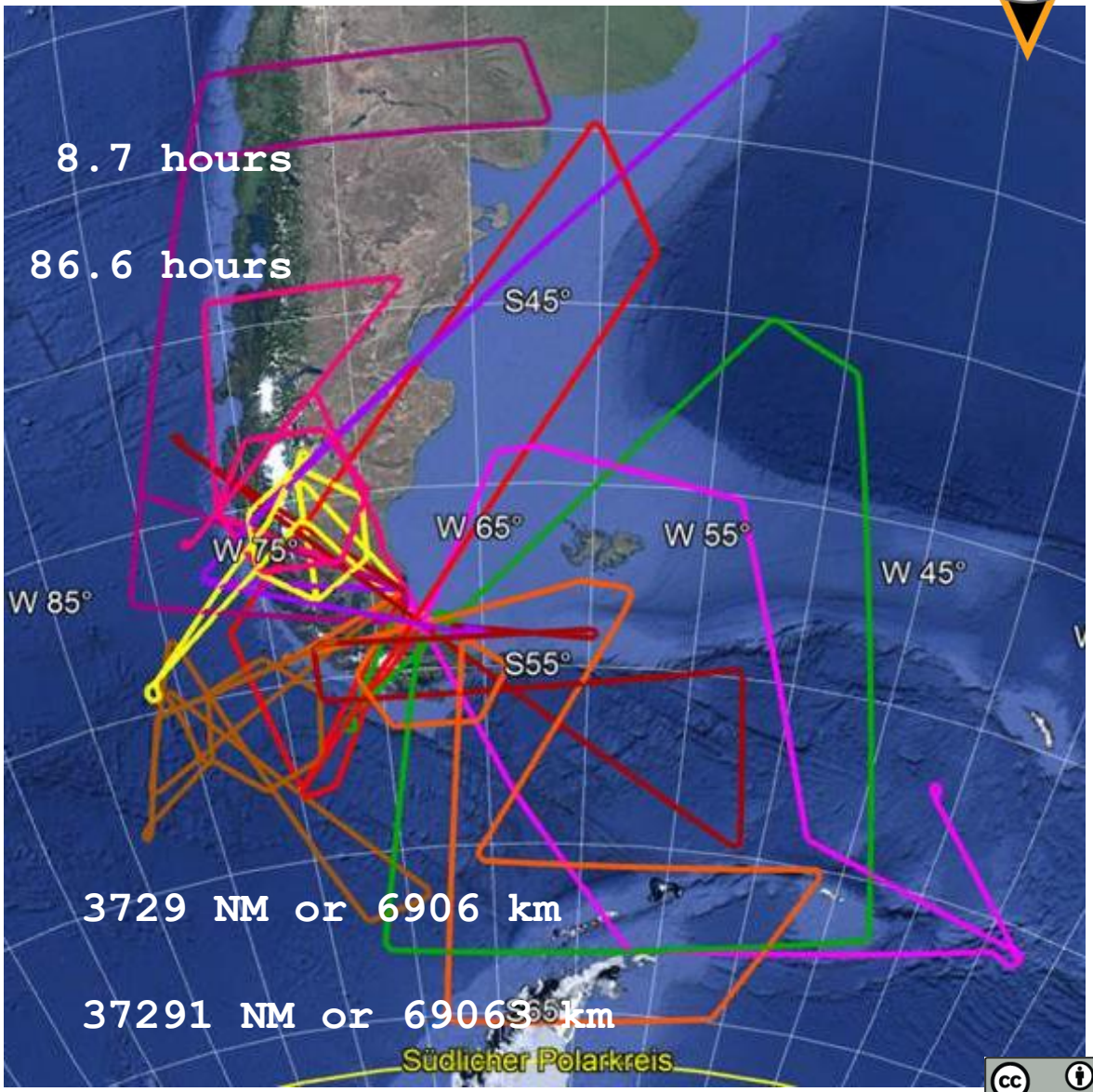
CC BY

Overview SouthTRAC Phase 1 September 2019

10 local flights

Average flight duration 8.7 hours

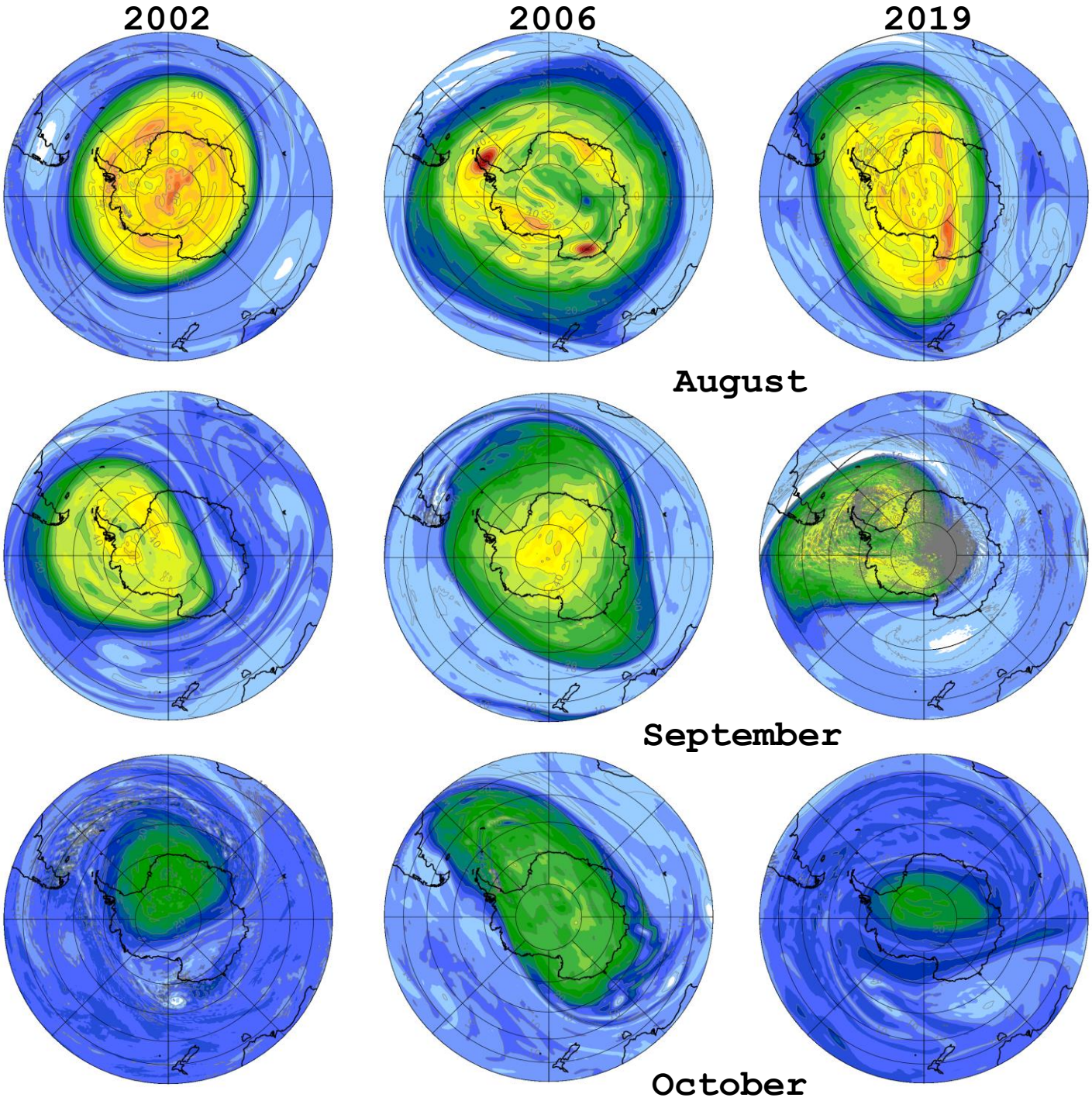
Total flight duration 86.6 hours



Average flight distance 3729 NM or 6906 km

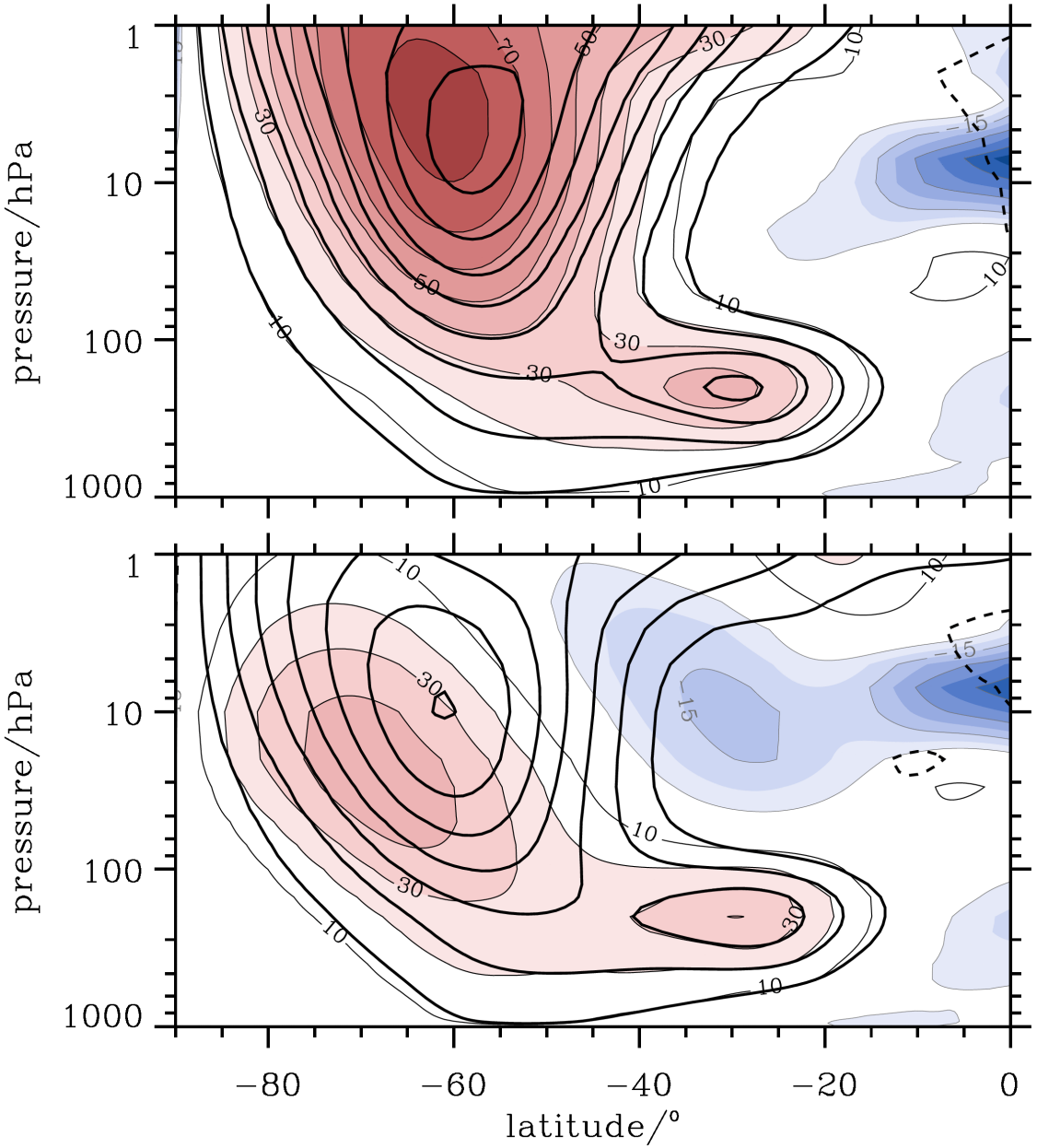
Total flight distance 37291 NM or 69063 km

CC BY

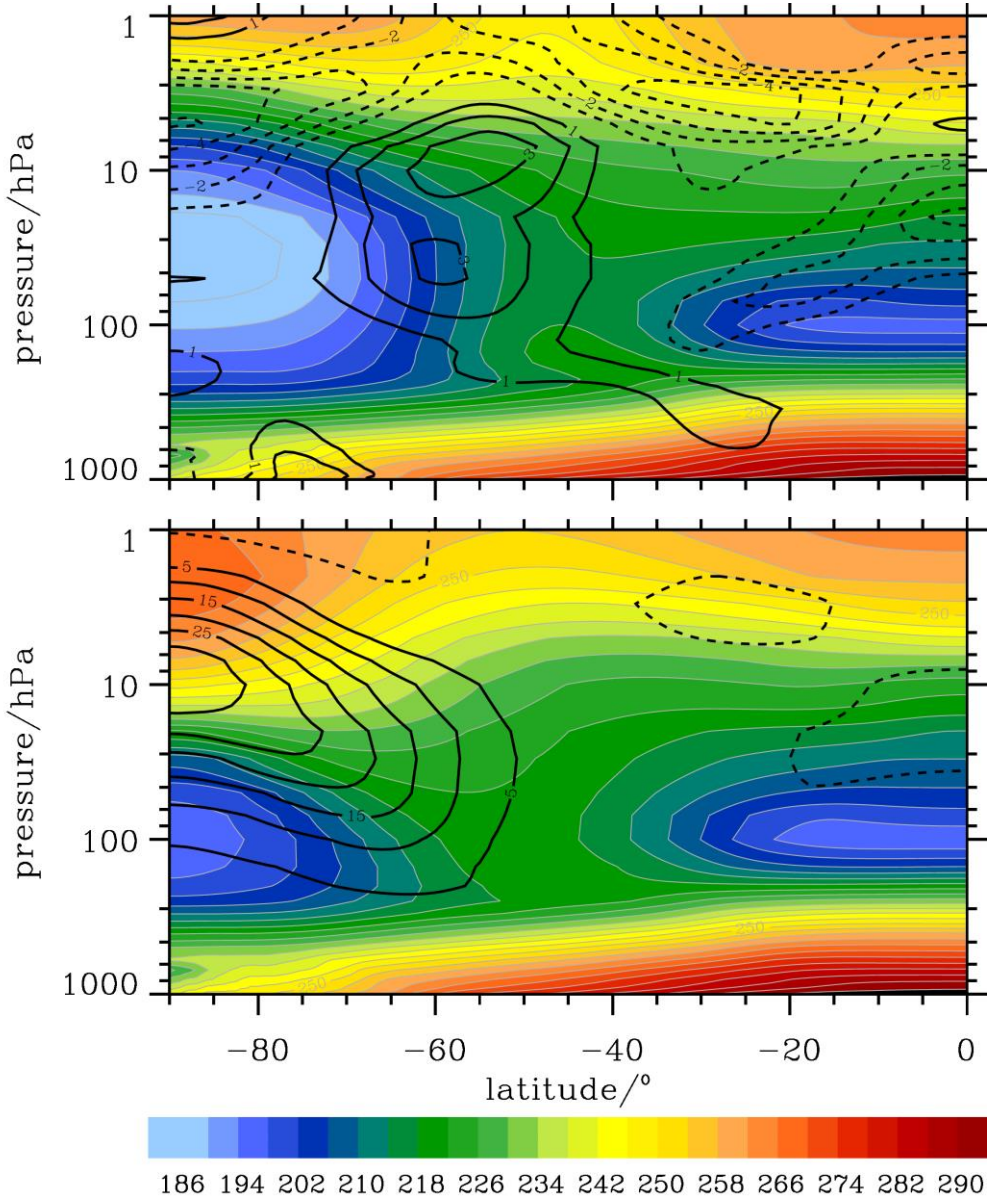


Scaled potential vorticity at 850 K isentropic surface for the 11th of each month at 12 UTC. Data: ERA5 data for all dates expect for September October 2019.

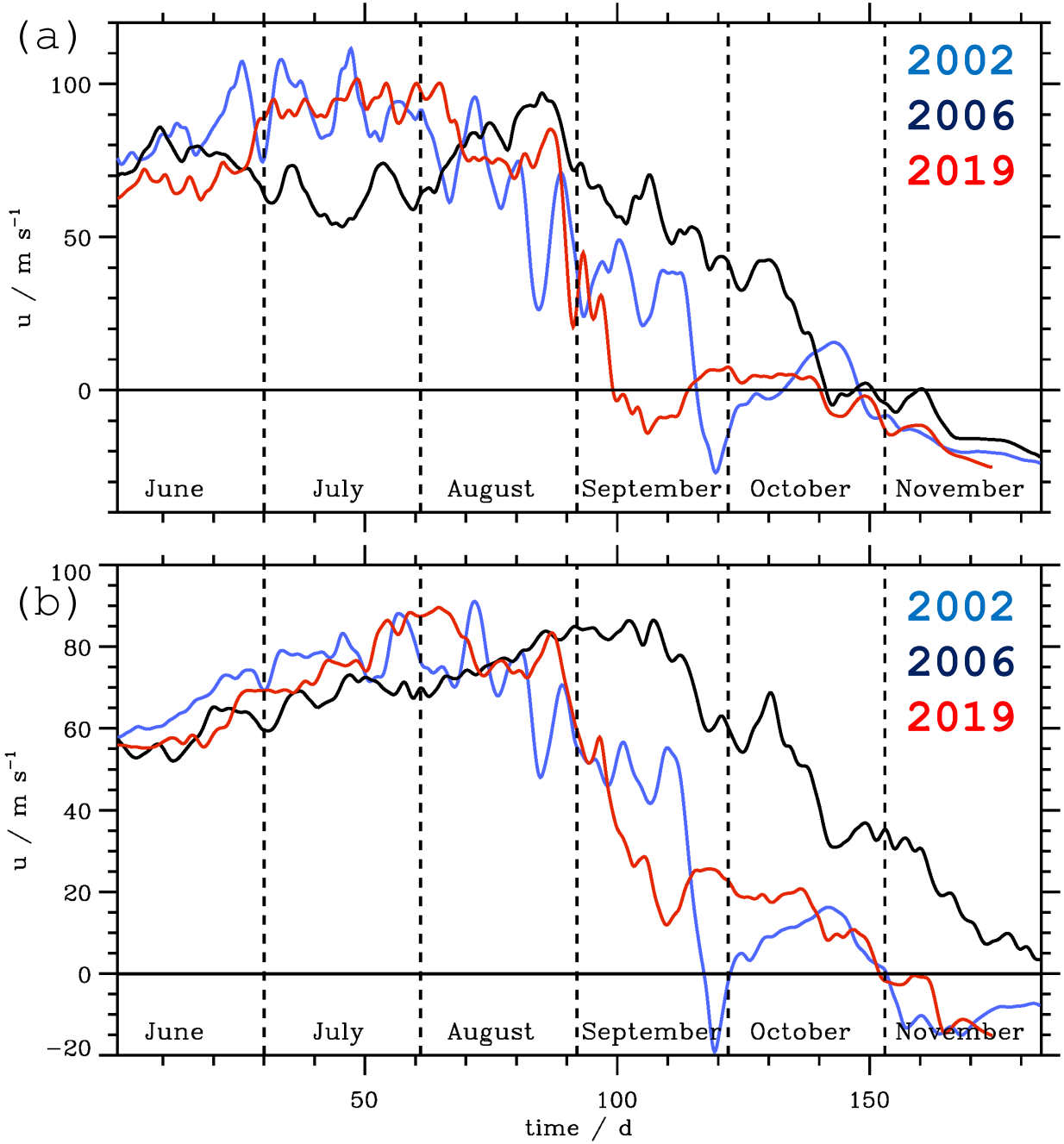
CC BY



Zonal mean zonal winds for August (top) and September (bottom). Color-shaded: ERA5 data for the year 2019. Thick black lines: Zonal mean winds (10 m s^{-1} increments) from the ERA5 climatological mean from 1979 to 2019. The dashed black line is u=0.



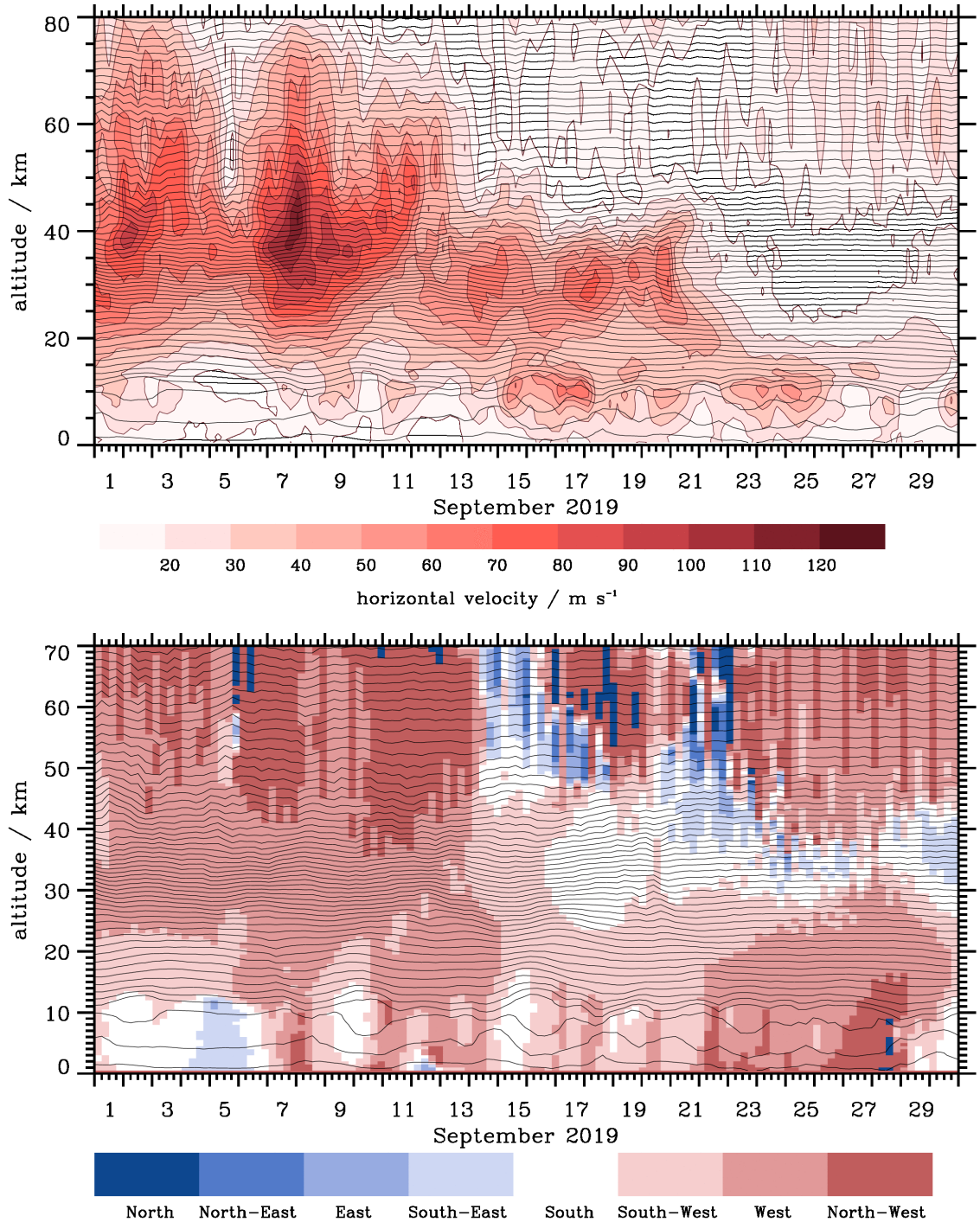
Color-shaded: ERA5 zonal mean temperature (K) for August (top) and September (bottom) 2019. Thick black lines: Temperature anomalies from the ERA5 climatological mean from 1979 to 2019.



Temporal evolution of the zonal mean zonal winds at 1 hPa (a) and 10 hPa (b) averaged between 55°S and 65°S for the year 2002, 2006, and 2019.

CC BY

CC BY



Upstream profiles of horizontal wind (top) and wind direction (bottom) for September 2019. The ERA5 analyses are averaged in a box (80°W ± 5° 50°S ± 5°).

CC BY