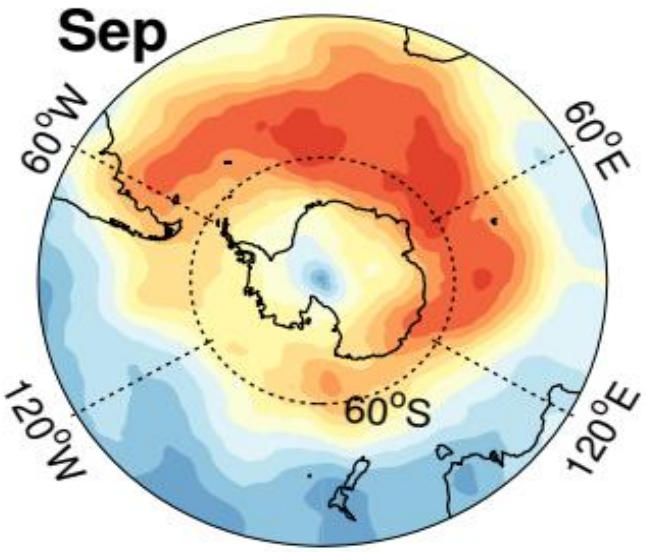
First airborne gravity wave observations at the world's hotspot in Southern Argentina

Markus Rapp[1,2], Bernd Kaifler[1], Andreas Dörnbrack[1], Sonja Gisinger[1], Tyler Mixa[1], Robert Reichert[1], Natalie Kaifler[1], Andreas Giez[3], Peter Preusse[4], Markus Geldenhuys[4], Lukas Krasauskas[4], Wolfgang Woiwode[5], Felix Friedl-Vallon[5], Alejandro de la Torre[8], Jose Luis Hormaechea[9], Martin Riese[4], Björn-Martin Sinnhuber[5], Peter Hoor[6], Andreas Engel[7]

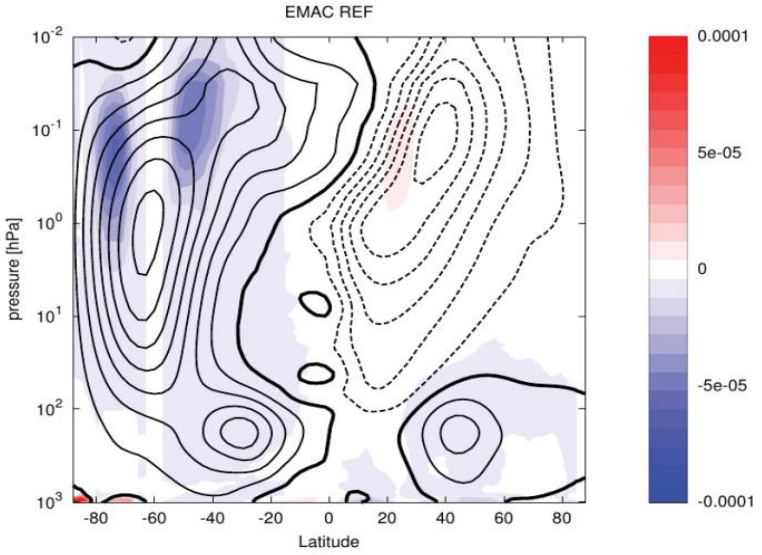
[1]Deutsches Zentrum für Luft- und Raumfahrt, Institut für Physik der Atmosphäre, Oberpfaffenhofen, Germany; [2]Meteorologisches Institut München, Ludwig-Maximilians-Universität München, Munich, Germany; [3]Deutsches Zentrum für Luft- und Raumfahrt, Einrichtung Flugexperimente, Oberpfaffenhofen, Germany; [4]Forschungszentrum Jülich, Institute of Energy- and Climate Research, Stratosphere (IEK-7), Jülich, Germany; [5]Karlsruhe Institute of Technology, Institute of Meteorology and Climate Research, Karlsruhe, Germany; [6]Institute of Atmospheric Physics, Johannes Gutenberg-University of Mainz, Germany;
[7]Institute for Atmospheric and Environmental Sciences, Goethe University Frankfurt, Germany; [8]Facultad de Ingeniería, Universidad Austral and CONICET, Buenos Aires, Argentina; [9]Estacion Astronomica Rio Grande, Facultad de Ciencias Astronomicas y Geofisicas, Universidad Nacional de La Plata & CONICET, Argentina



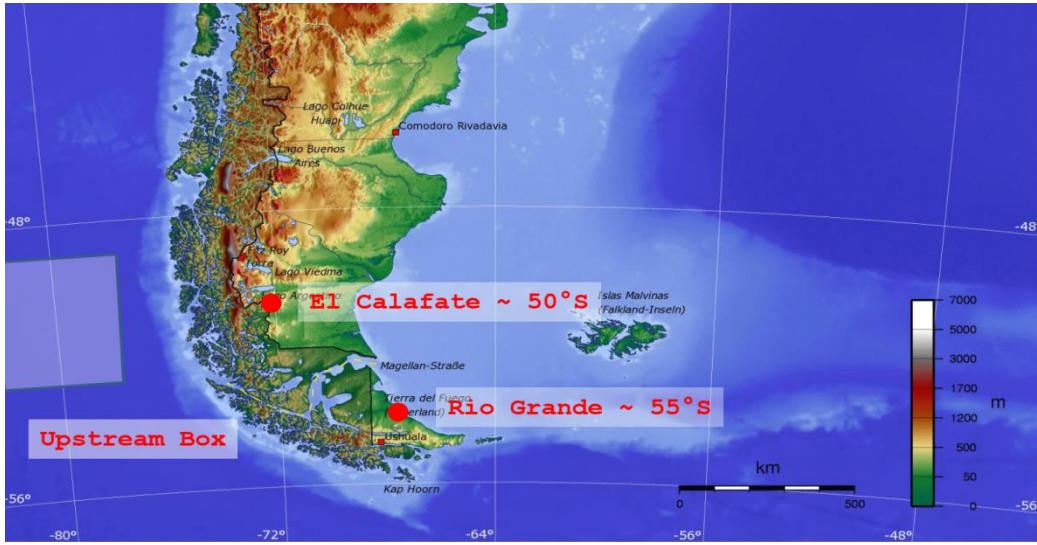
Scientific motivation: The gravity wave belt at 60°S & Campaign setting



Hindley et al., ACP 2015



Garny et al., WASCLIM-prop. 2018



The geographical setting

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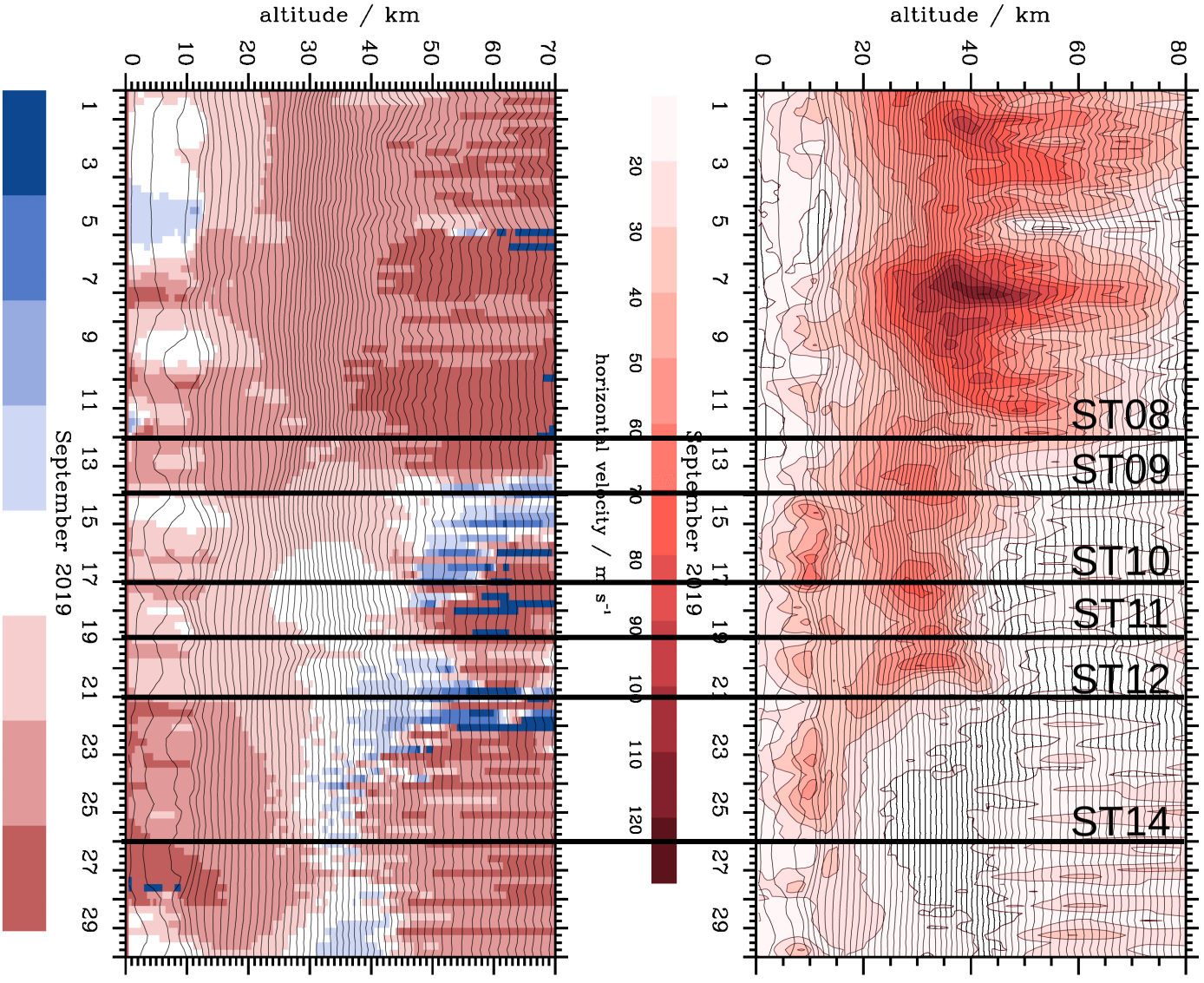


Local GW flights

Flight	Date	Length [h]	Objectives
ST08	19-09-12	08:31	MW, deep propagation, breaking, horizontal propagation into Drake passage, 2nd GWs
ST09	19-09-14	09:06	non-oro. GWs upstream Andes, MW
ST10	19-09-17	08:58	MW in vicinity of tropopause jet, GW at inner edge of pv, subtropical jet as GW source?, breaking in stratosphere
ST11	19-09-19	08:13	MW propagation from 40S to exit region at 60S; PV edge disturbed by GWs
ST12	19-09-21	09:10	MW, time dev. at source, oblique propagation, upwind propagation
ST14	19-09-26	09:17	MW over the southern Andes & Antarctic P. with weak forcing; horizontal prop. Into Drake passage

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

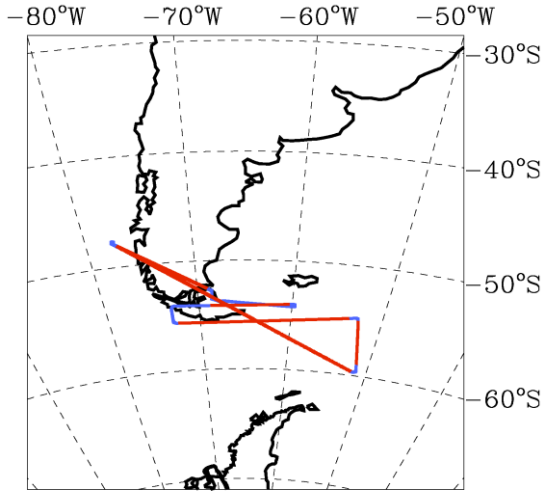


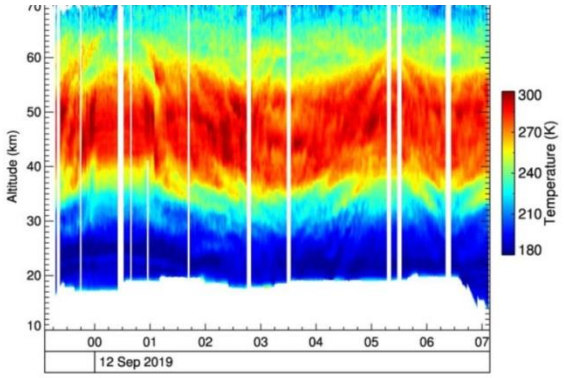
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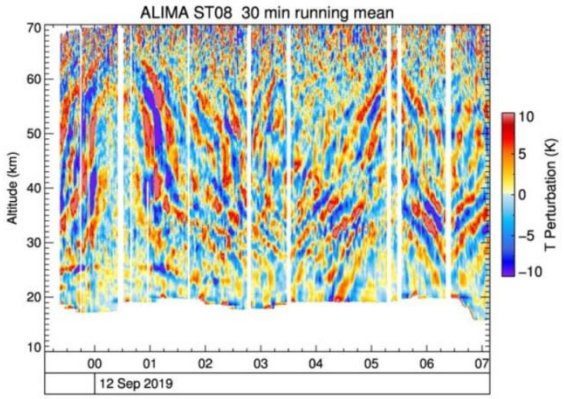
analysis by A. Dörnbrack, AGU-fall meeting 2019

ST08

MW, deep propagation, breaking, horizontal propagation into Drake passage, 2nd GWs



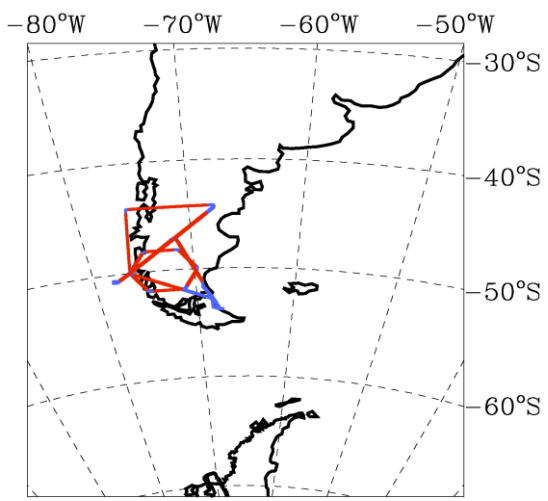


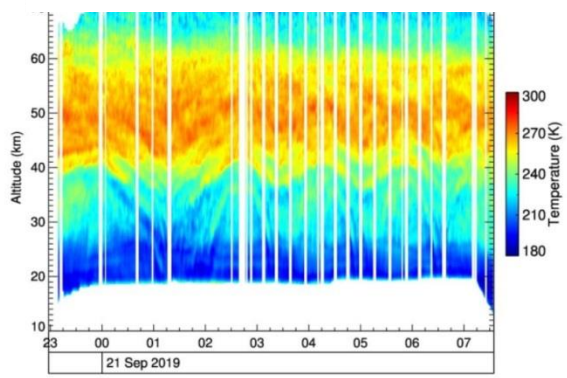


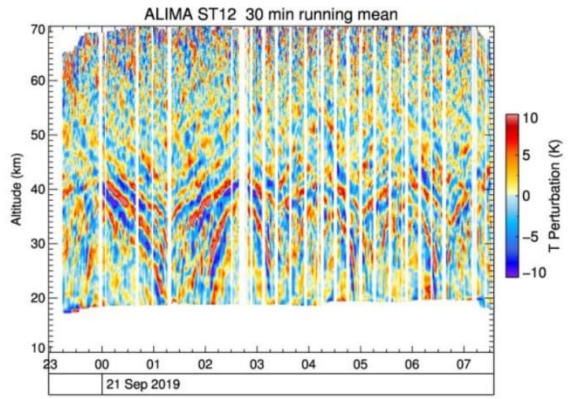
ST12

MW, time dev. at source, oblique propagation, upwind propagation

Critical level filtering at 40km







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Summary

- We conducted 6 dedicated research flights targeting GW dynamics
- Tropospheric forcing conditions were similar to DEEPWAVE (but untypical for this region and time of year?; to be demonstrated)
- The meteorological conditions were not optimal due to a minor SSW in September 2019
- ST08 was conducted early in the SSW allowing propagation up to 75km
- In all other cases, GW experienced critical level filtering at ~40 km
- We found clear evidence for horizontal propagation of waves into the polar vortex

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