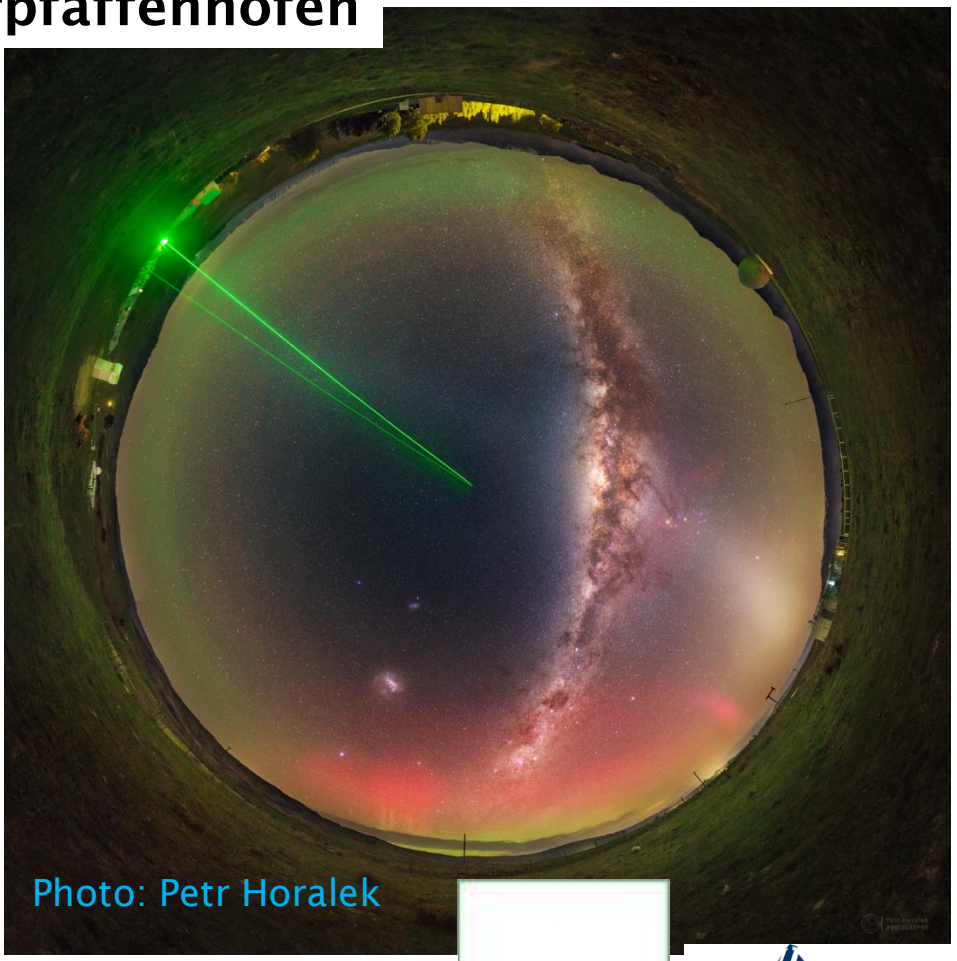
Large-scale atmospheric conditions during DEEPWAVE-NZ

Andreas Dörnbrack
DLR Oberpfaffenhofen



universität innsbruck

NCAR
NATIONAL CENTER FOR ATMOSPHERIC RESEARCH

GATS

DLR

JOHANNES GUTENBERG UNIVERSITÄT MAINZ

JG|U

Yale UNIVERSITY

NIWA
Taihoro Nukurangi

LMU

UtahState University

DLR Contributions

1. Ground-based Lidar data analysis
2. Radiosonde analysis
3. DLR Falcon data analysis
4. Non-Orographic Wave Source
5. Synoptic Overview

DLR Contributions

1. Ground-based Lidar data analysis

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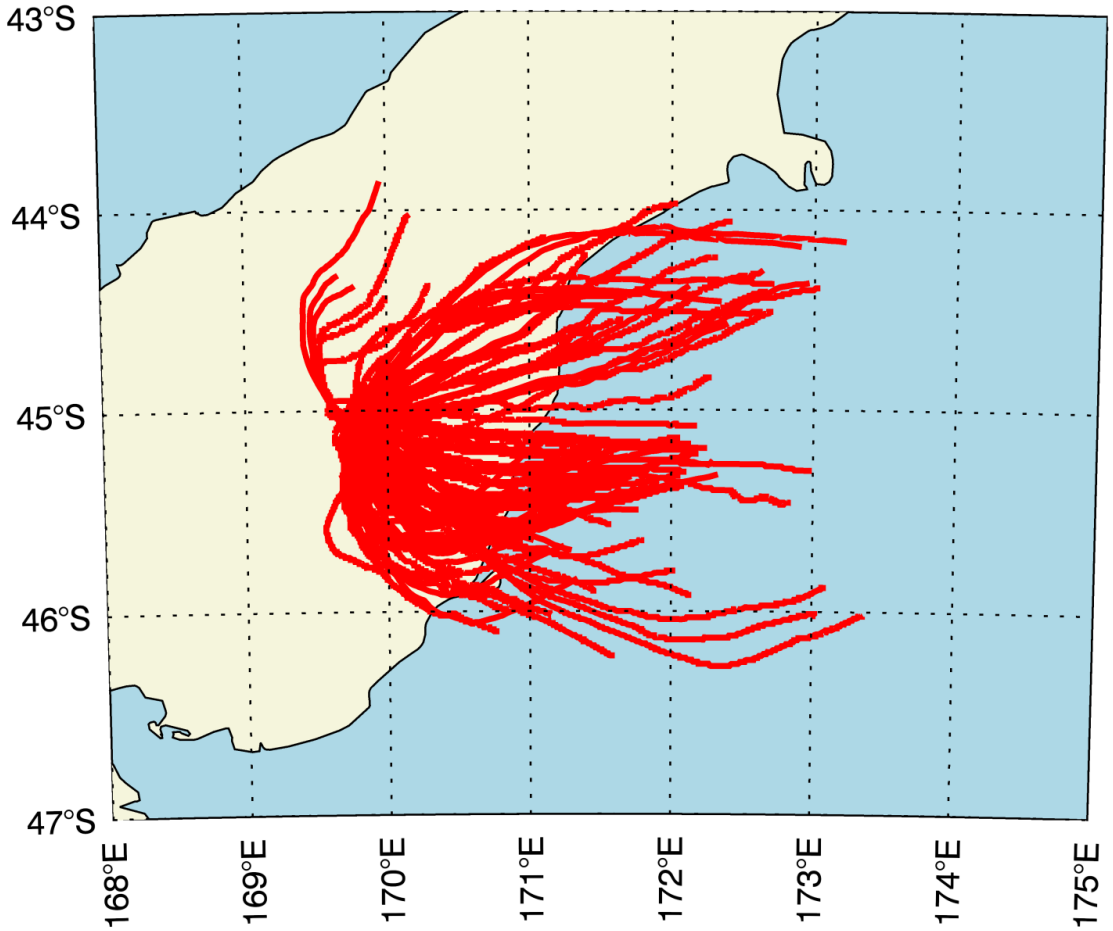
4. Non-Orographic Wave Source

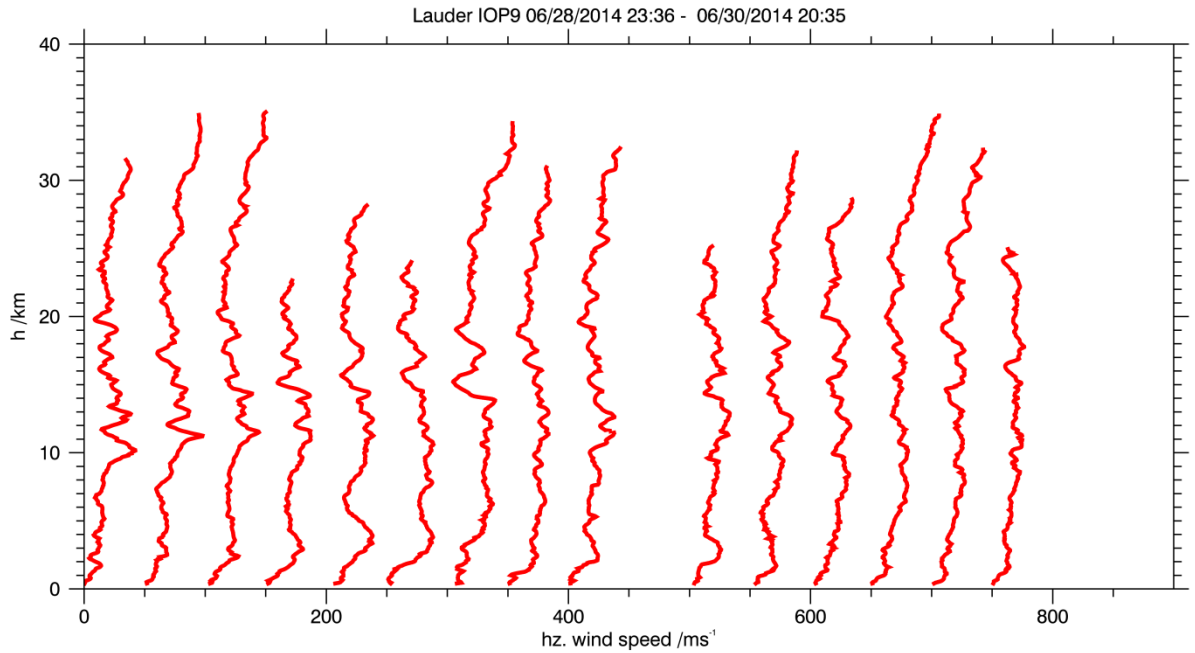
5. Synoptic Overview

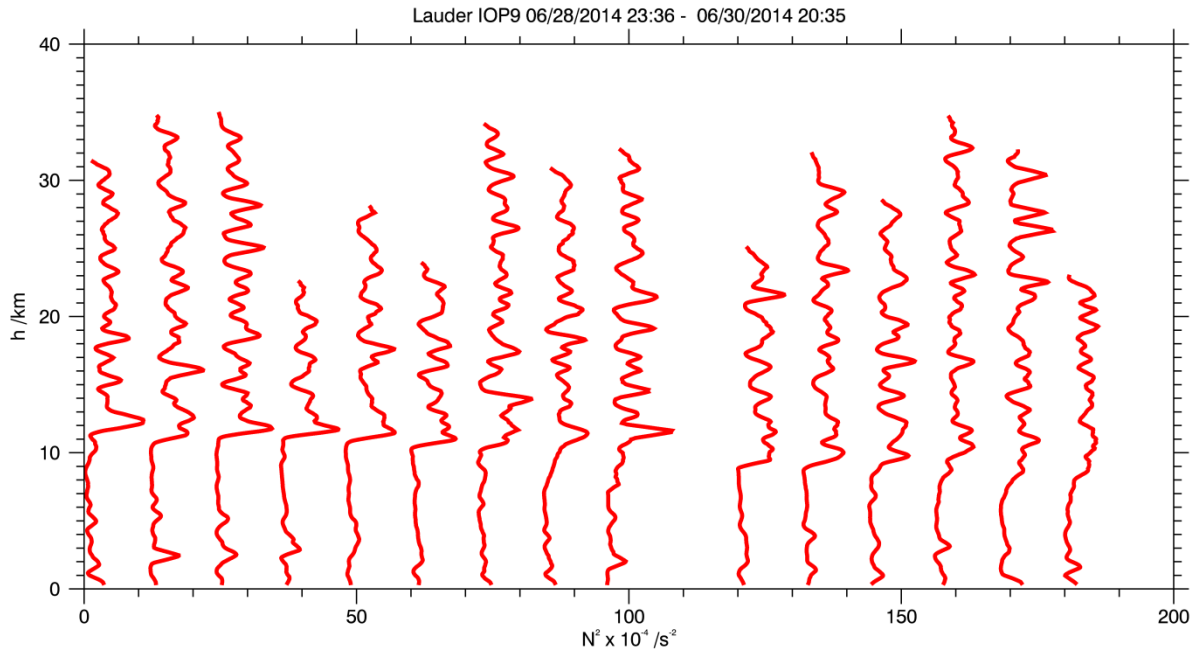
Radiosonde launches from Lauder/NZ (45°S, 169°E)



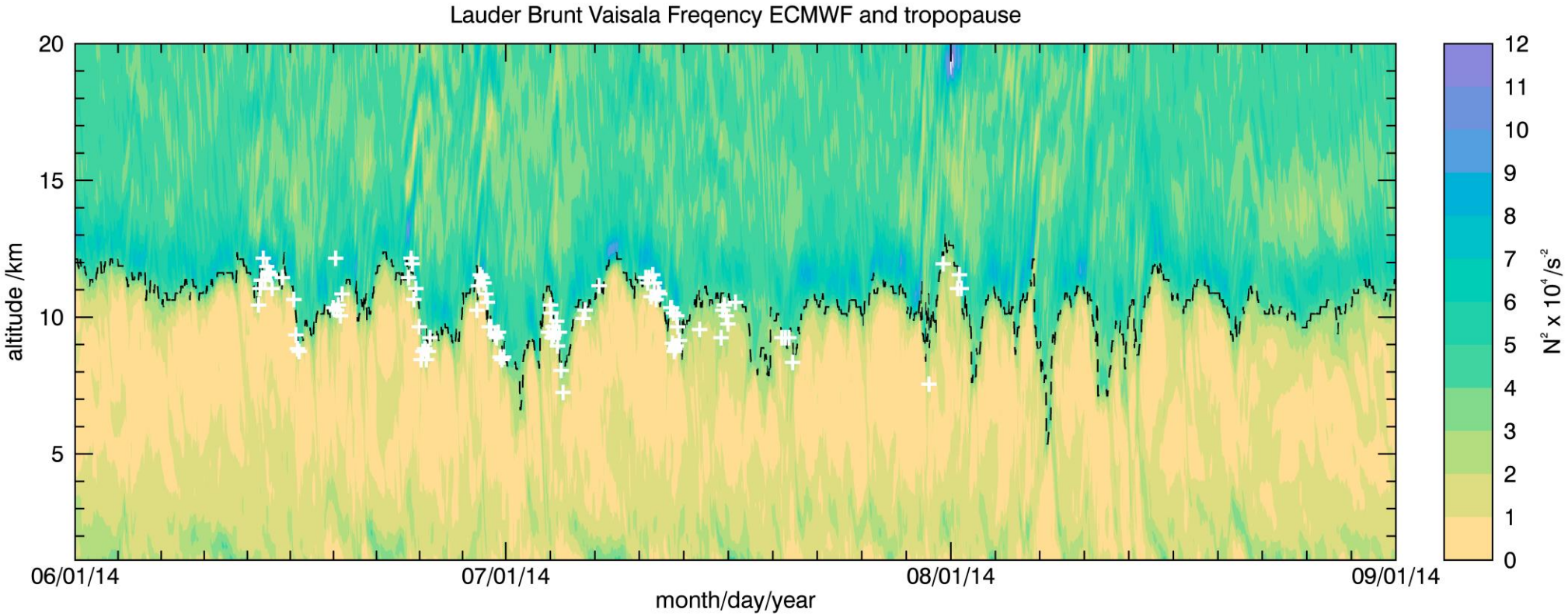
- 98 soundings in total
- mean height reached: 31.1 km
- maximum height reached: 36.6 km

Sonja Gisinger, DLR





Sonja Gisinger, DLR



Sonja Gisinger, DLR

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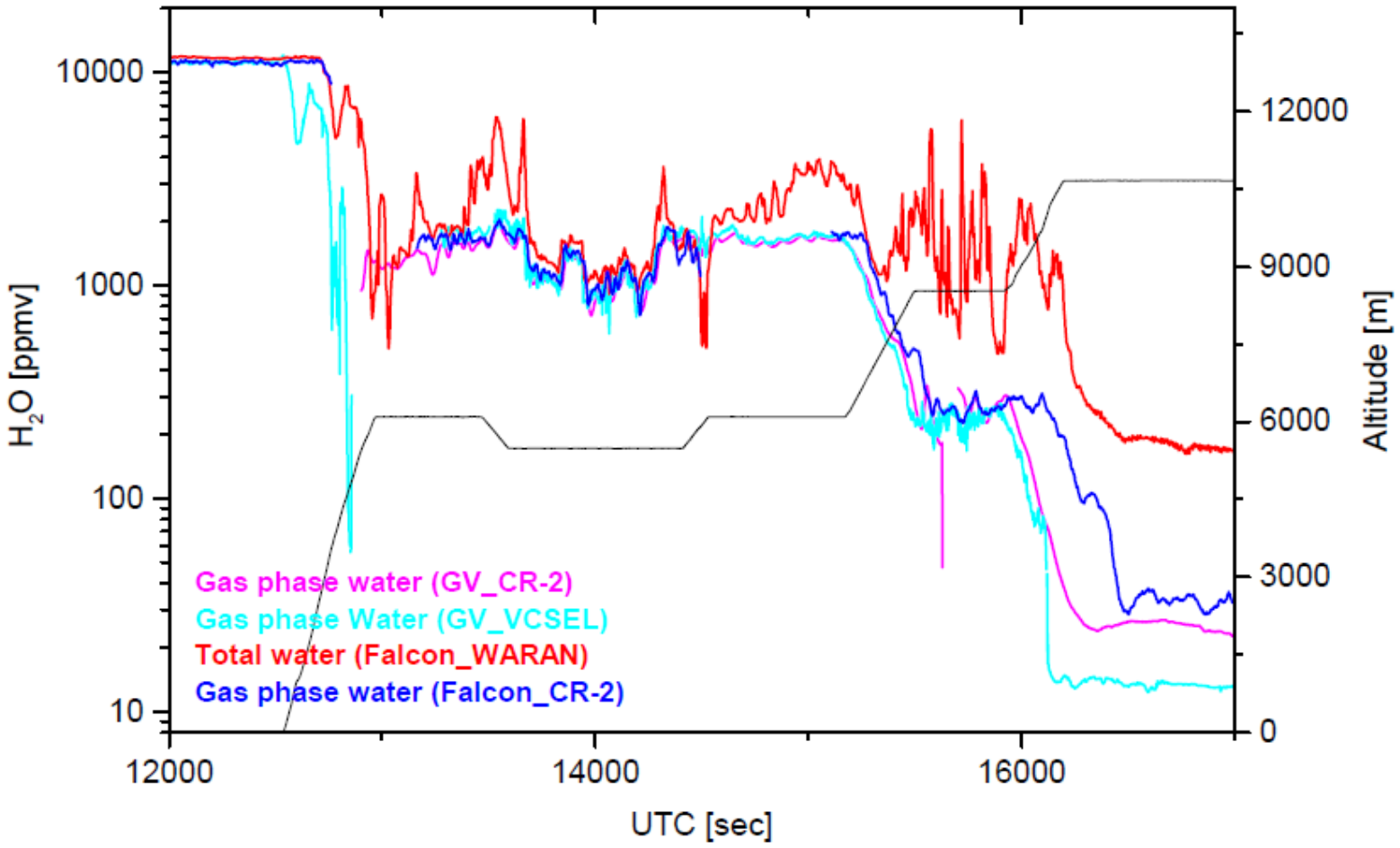
5. Synoptic Overview

DeepWave, flight 140710a, intercomparison

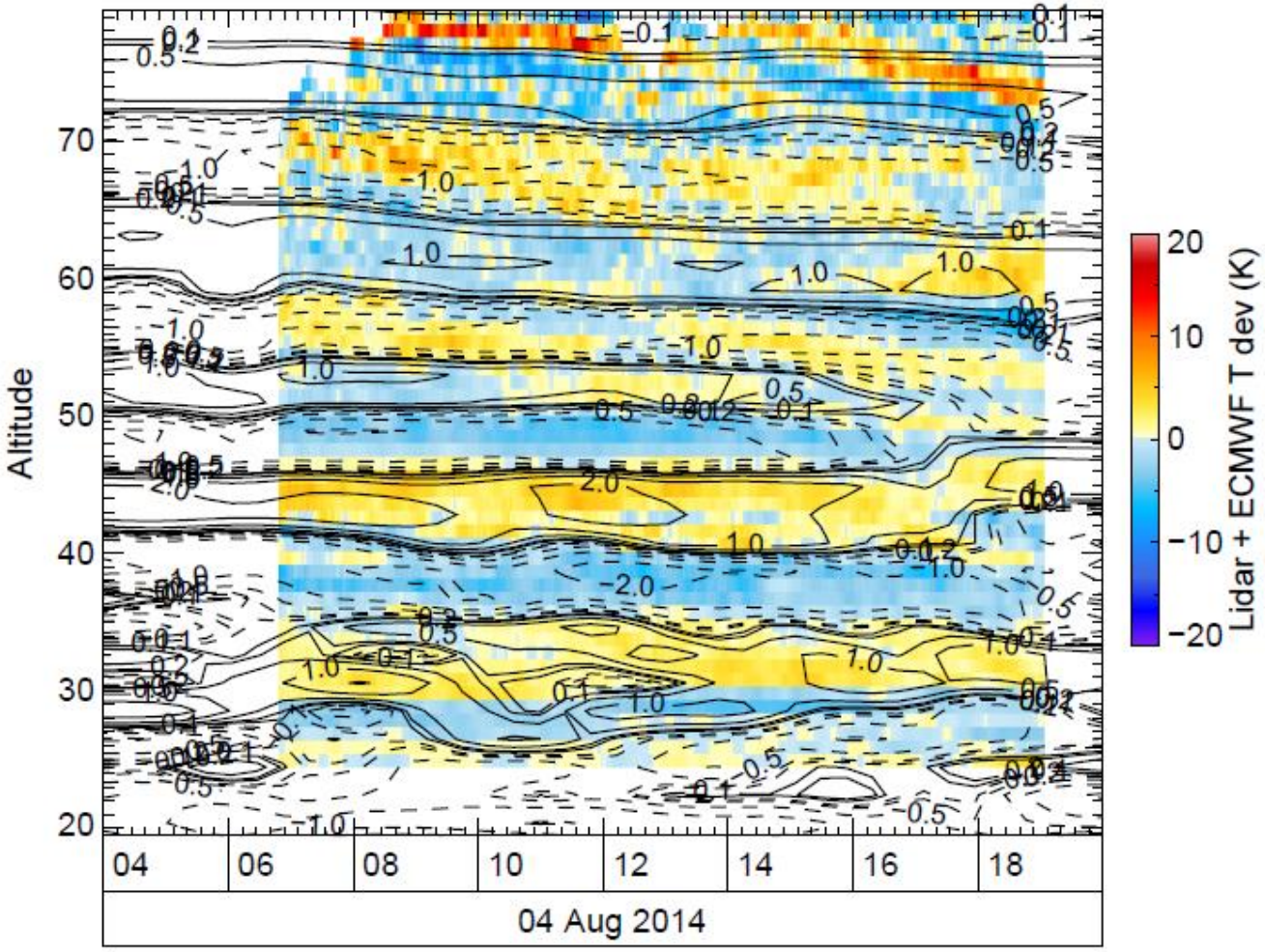
preliminary data, for quicklook use only

Stefan Kaufmann, Romy Schlage, Christiane Voigt



4 July 2014 (IOP 10)

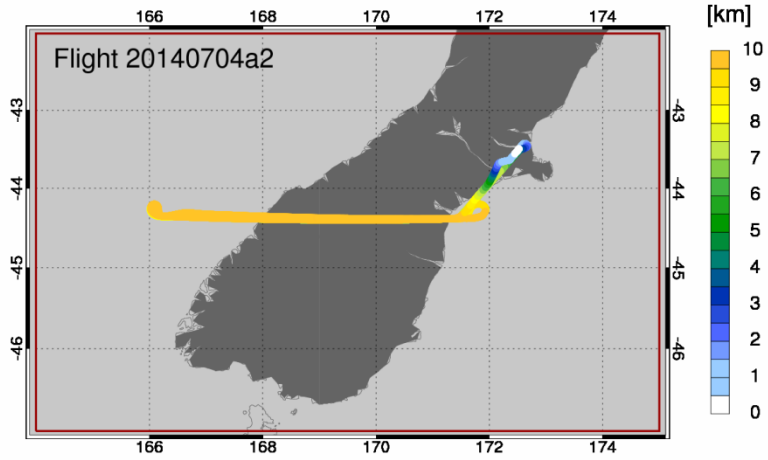
Lauder Rayleigh Lidar

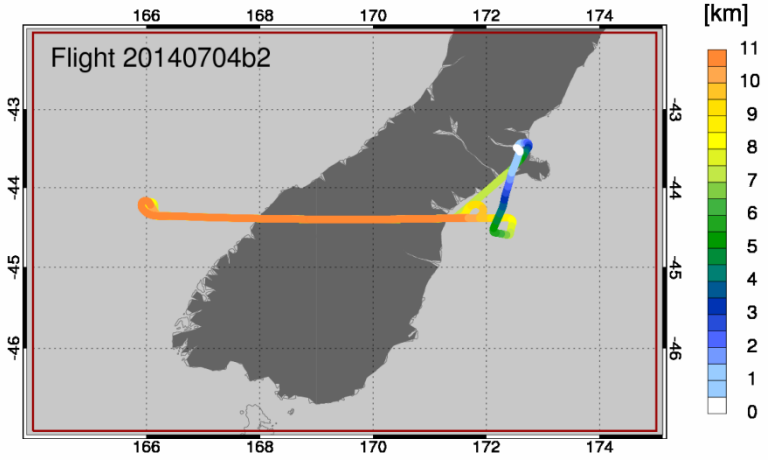


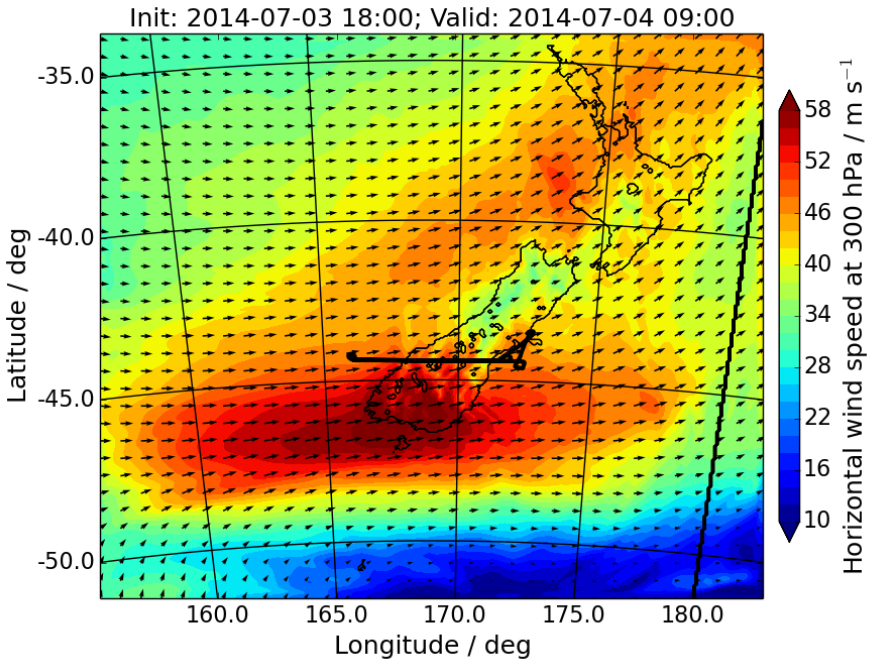
Bernd & Natalie Kaifler,
Benedikt Ehard, DLR

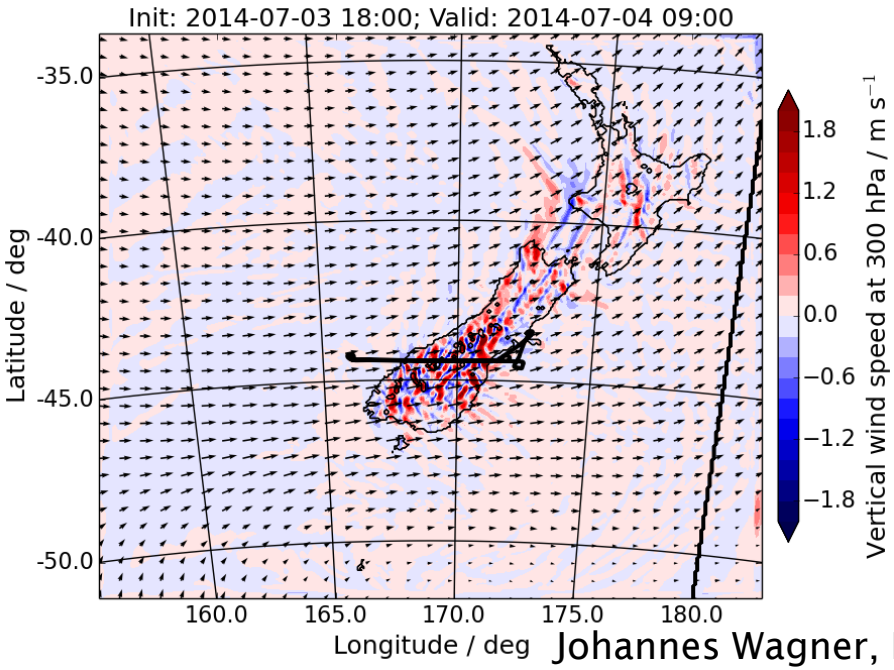
DLR Falcon Research Flights

FF04 and FF05 (4 July 2014)





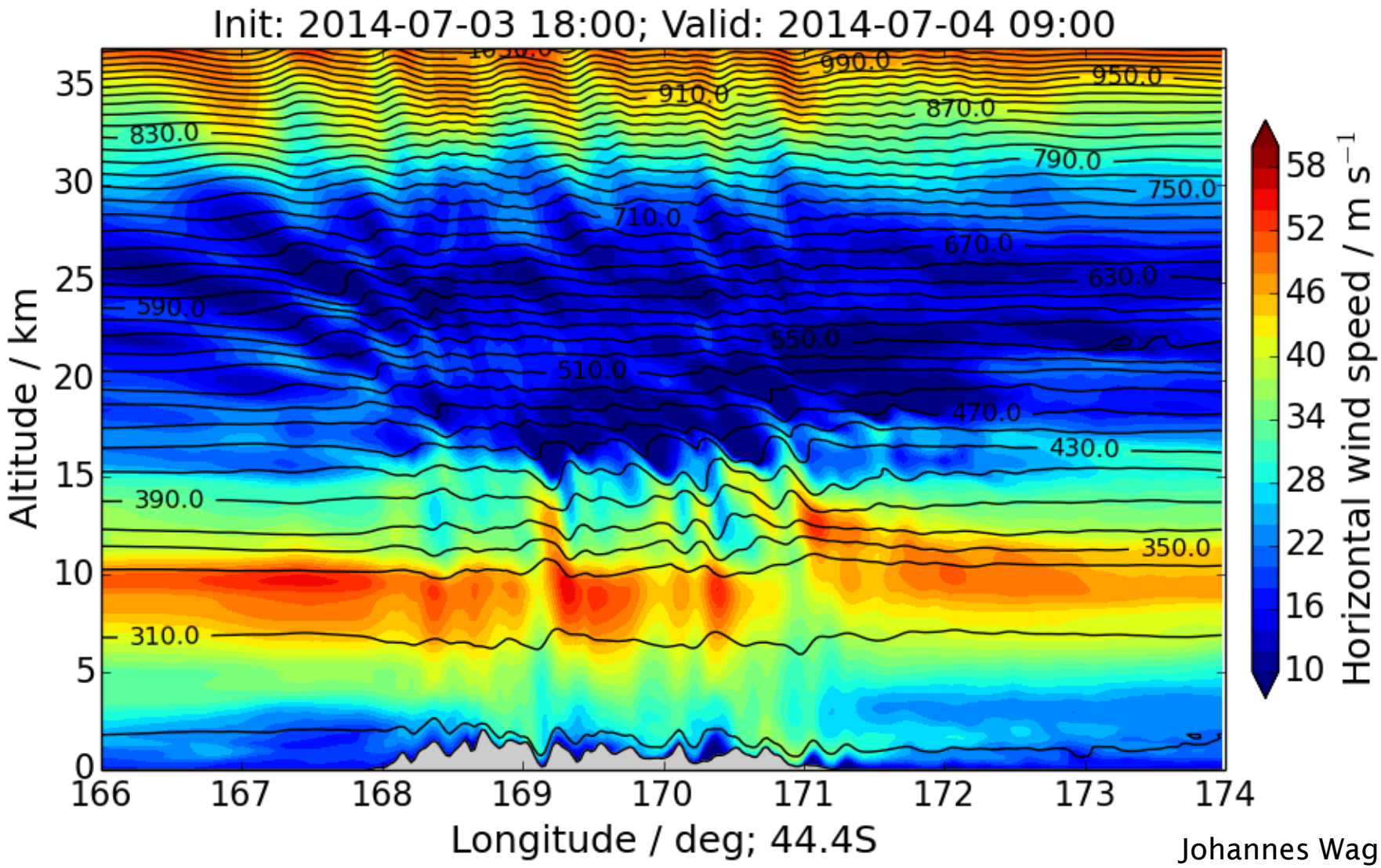




Johannes Wagner, DLR

DLR Falcon Research Flights

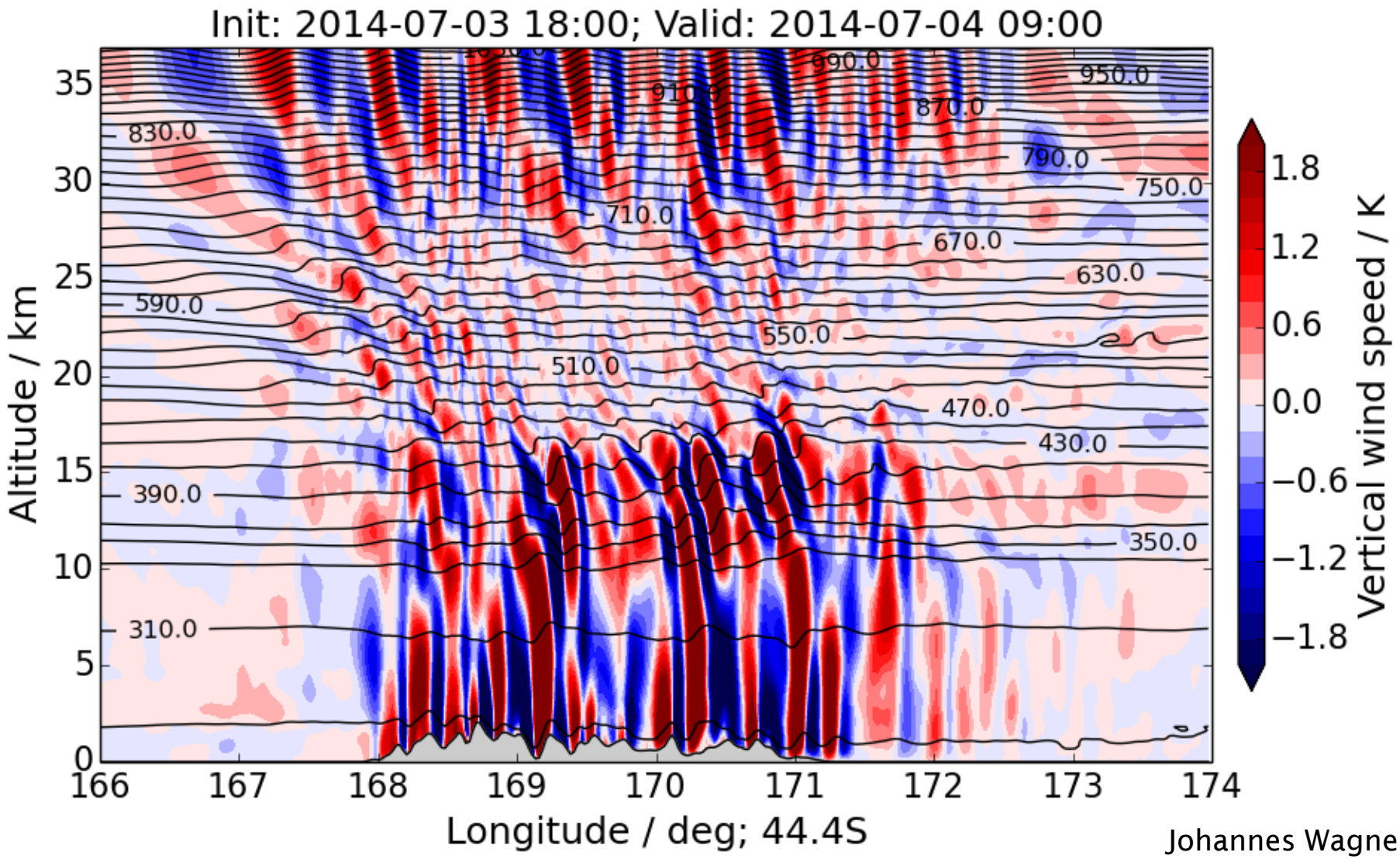
FF04 and FF05 (4 July 2014)



Johannes Wagner, DLR

DLR Falcon Research Flights

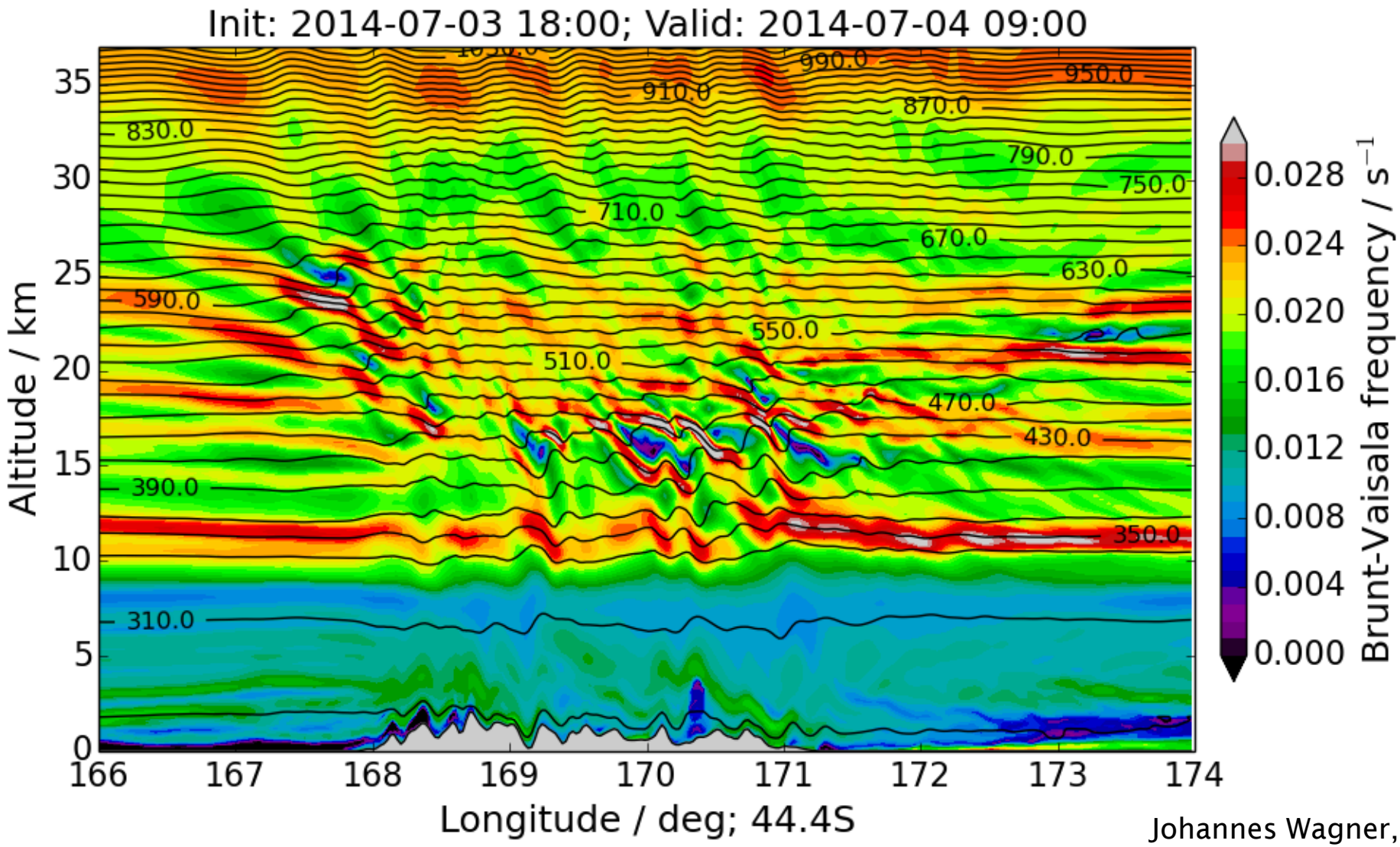
FF04 and FF05 (4 July 2014)



Johannes Wagner, DLR

DLR Falcon Research Flights

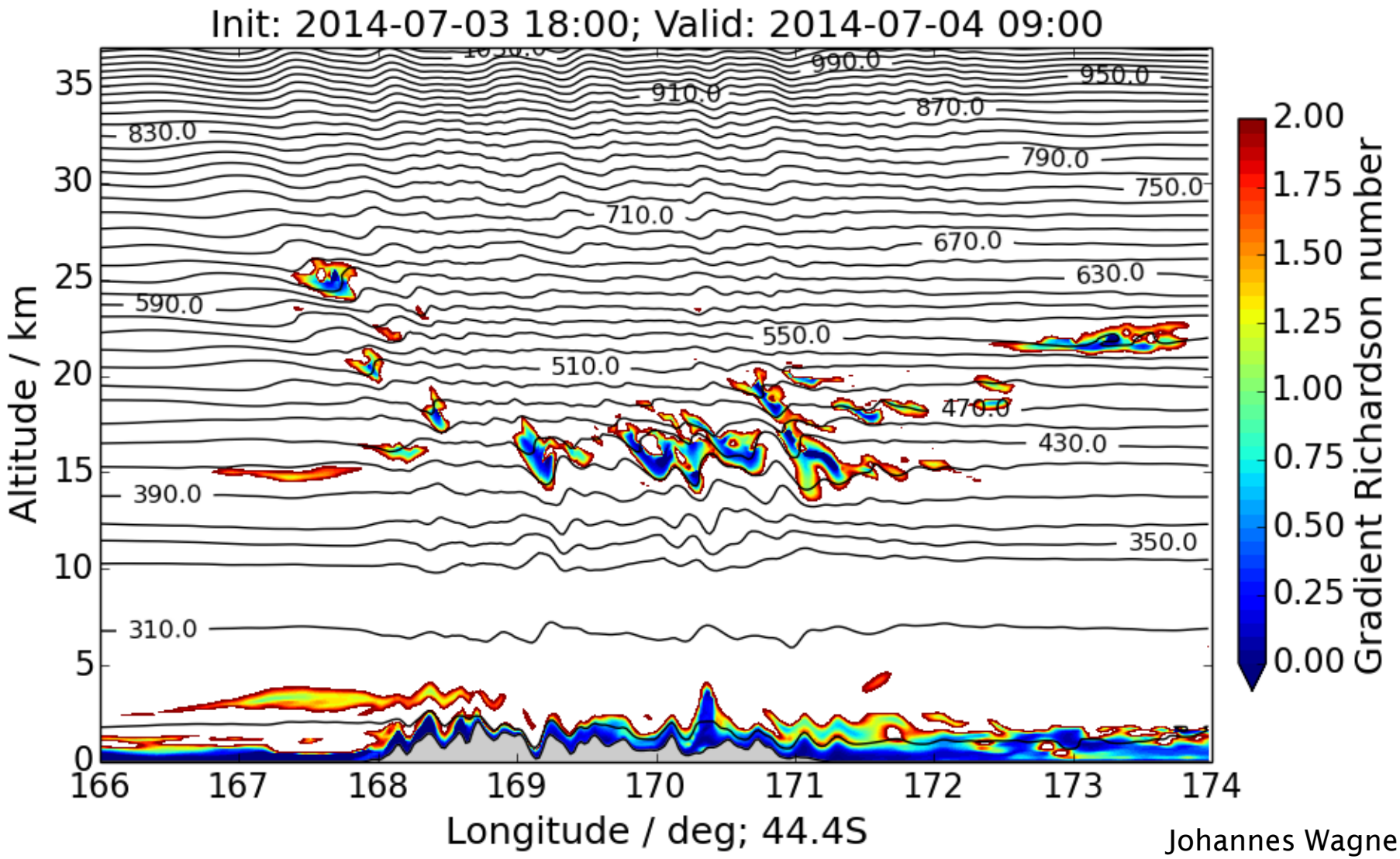
FF04 and FF05 (4 July 2014)



Johannes Wagner, DLR

DLR Falcon Research Flights

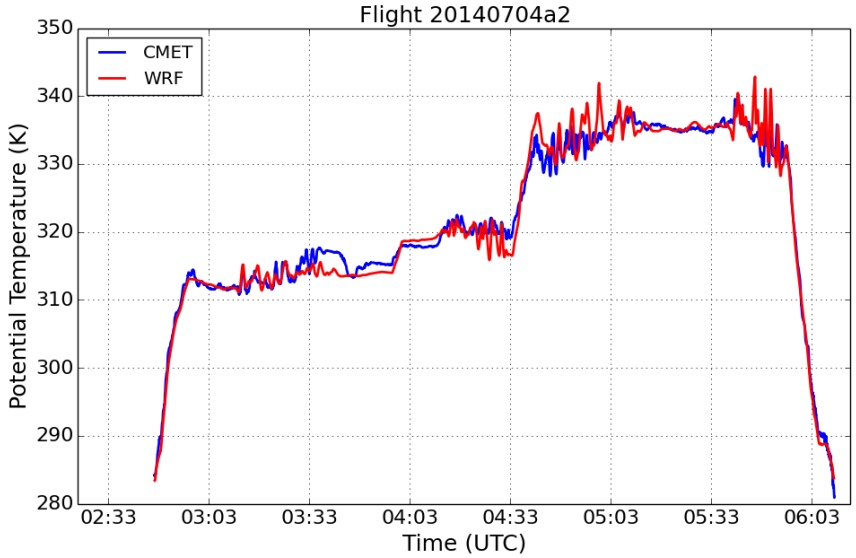
FF04 and FF05 (4 July 2014)

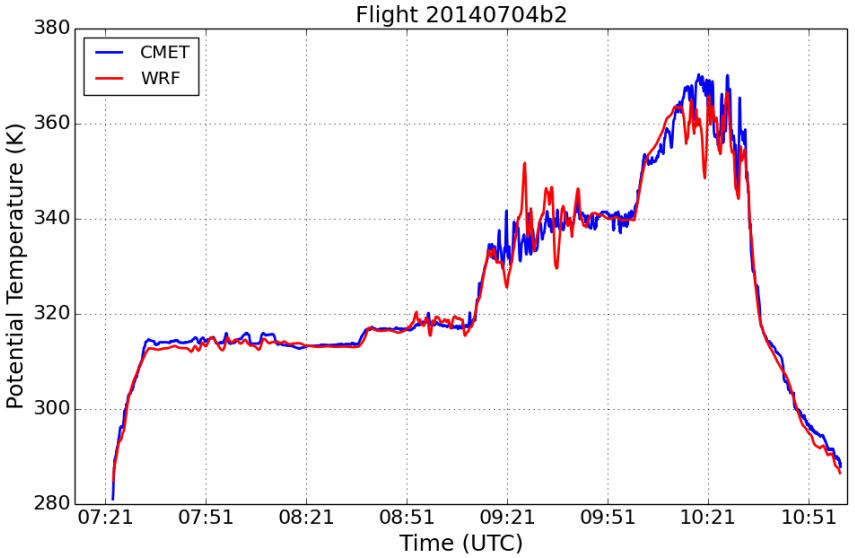


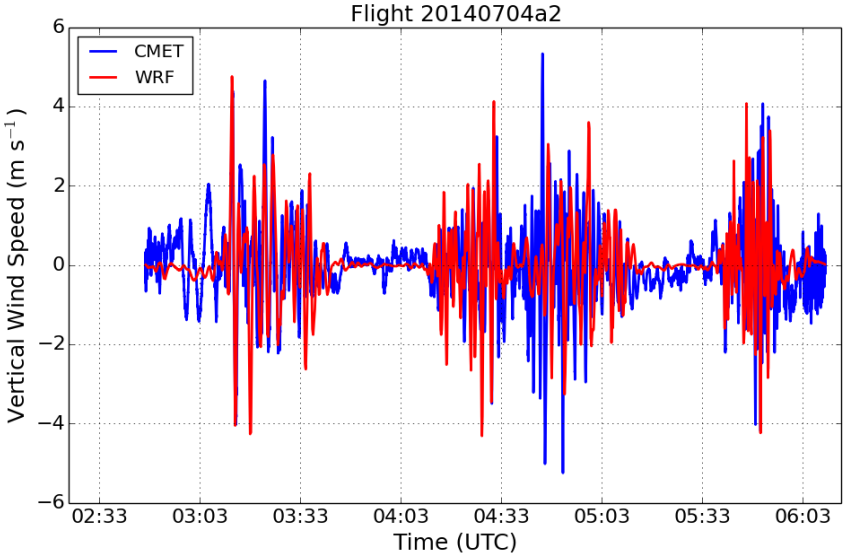
Johannes Wagner, DLR

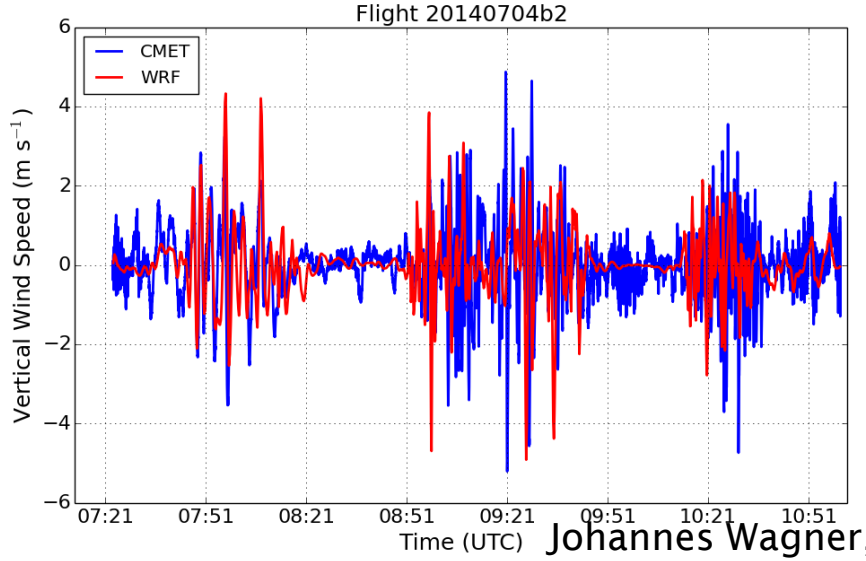
DLR Falcon Research Flights

FF04 and FF05 (4 July 2014)





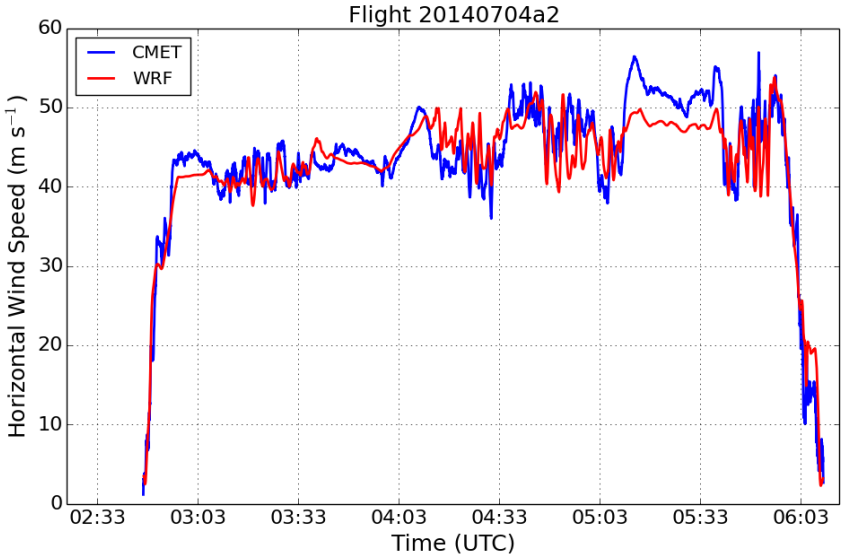


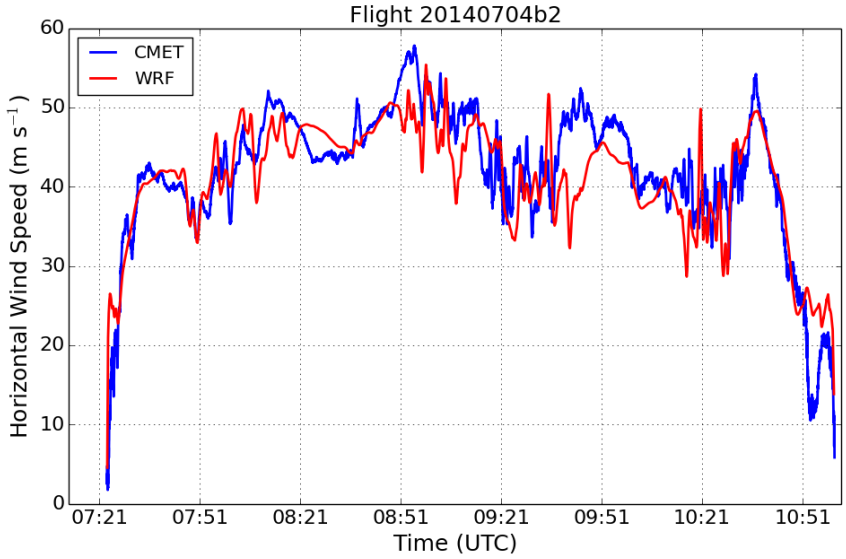


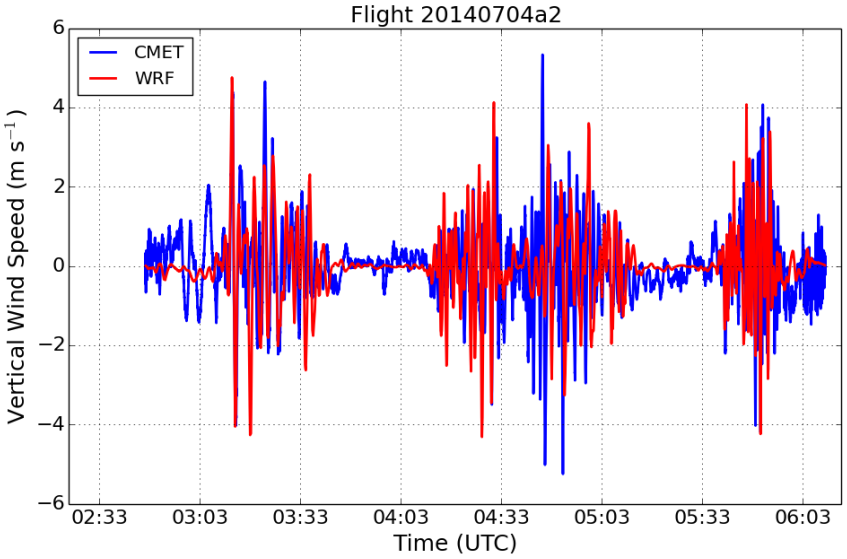
Johannes Wagner, DLR

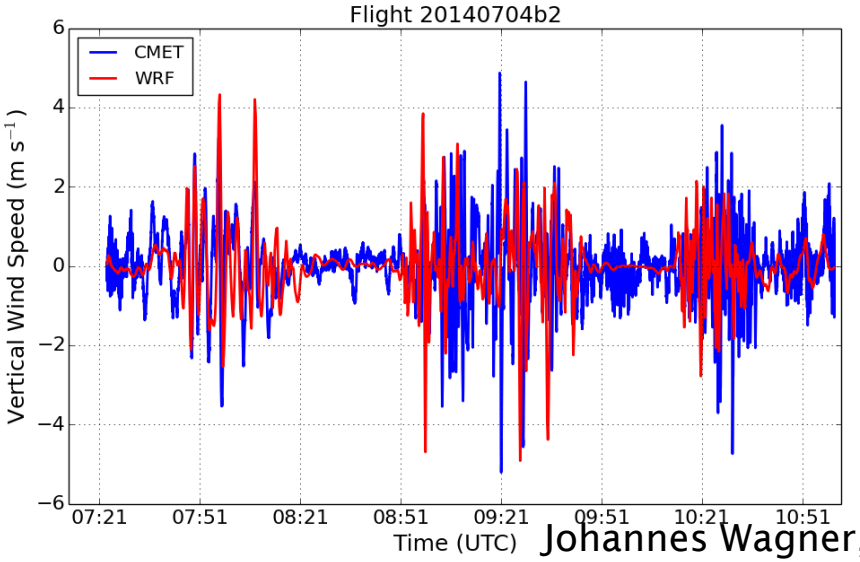
DLR Falcon Research Flights

FF04 and FF05 (4 July 2014)









Johannes Wagner, DLR

DLR Contributions

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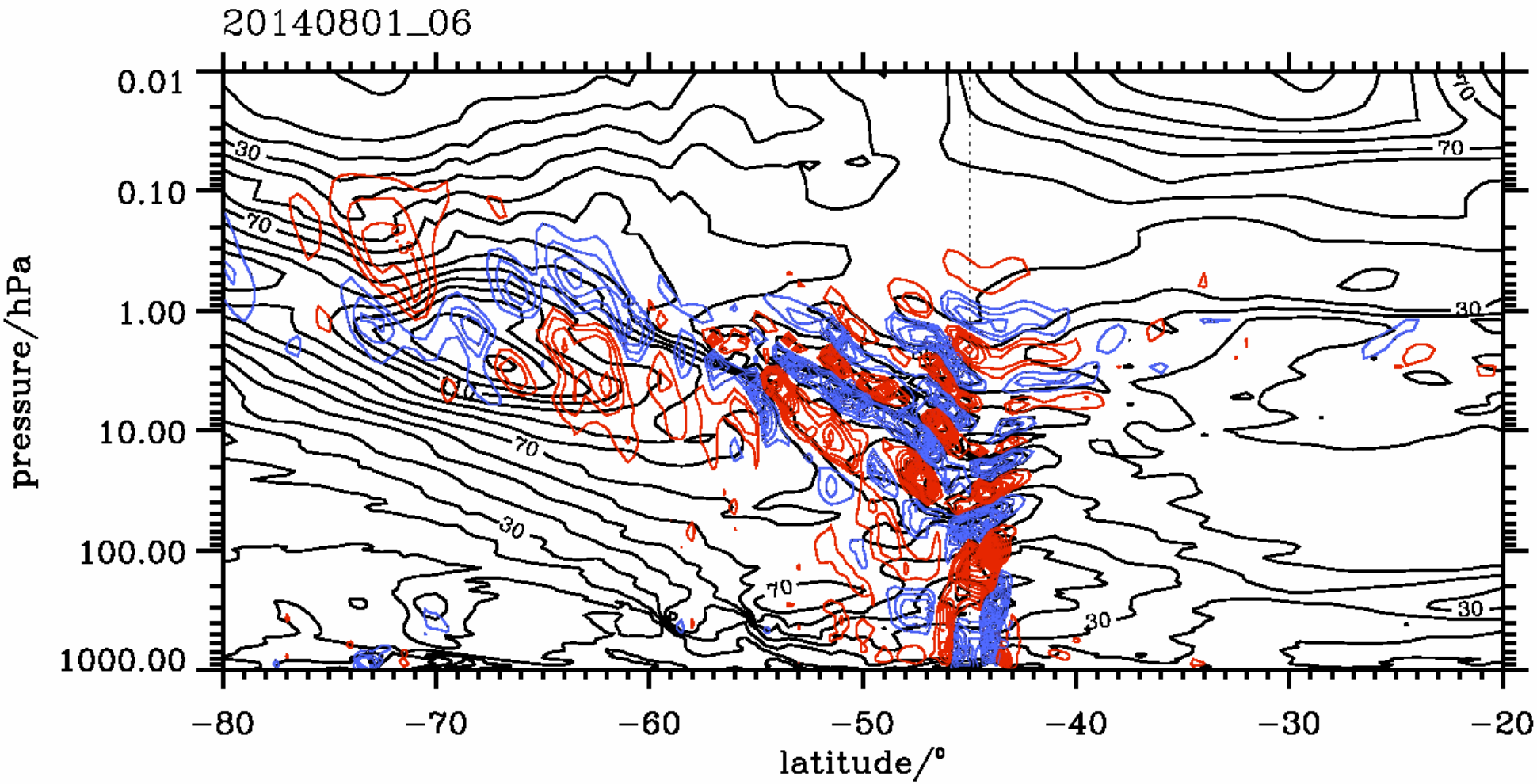
4. **Non-Orographic Wave Source**
5. Synoptic Overview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0.10
1.00
10.00
100.00
1000.00
pressure/hPa
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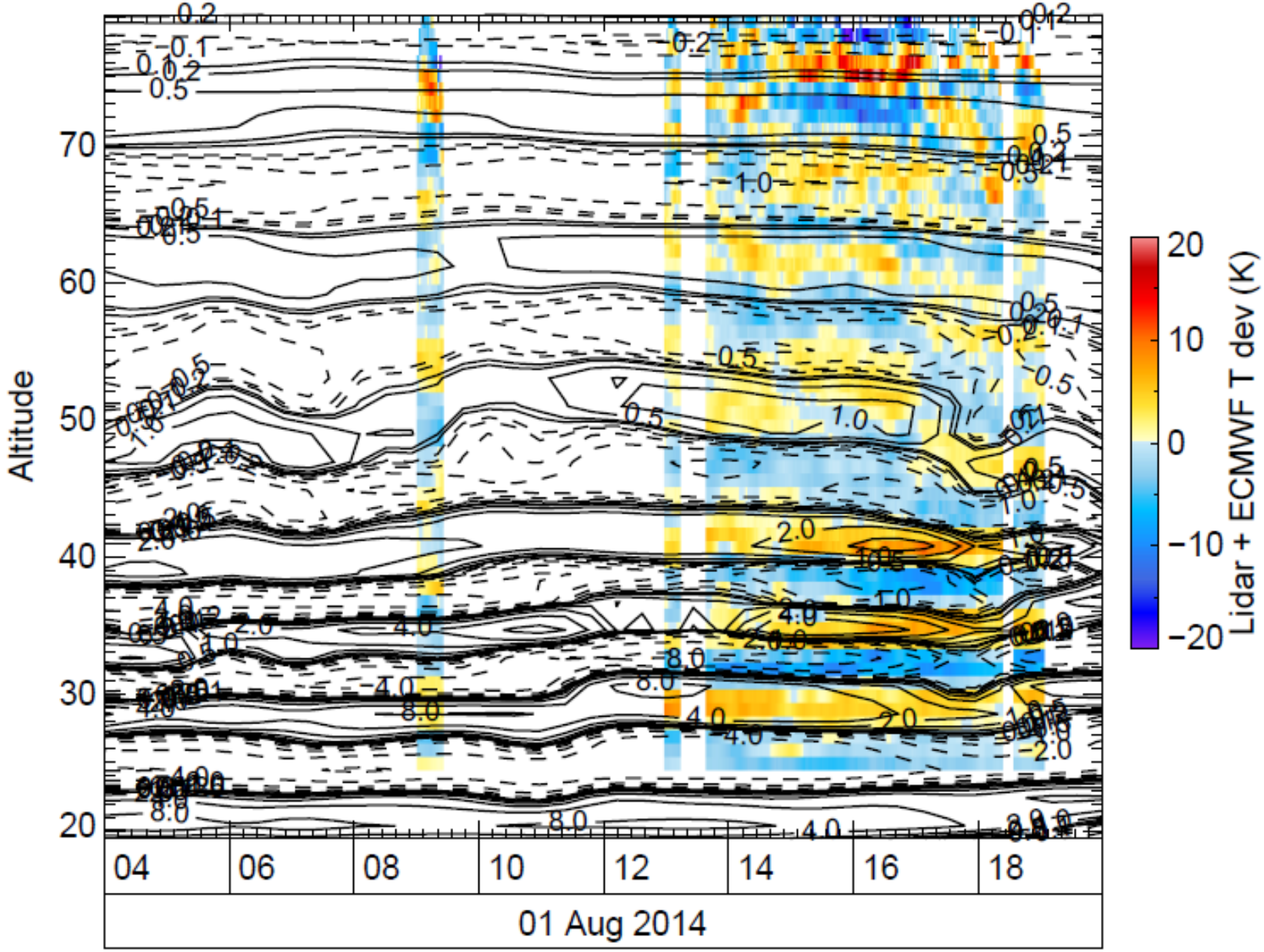
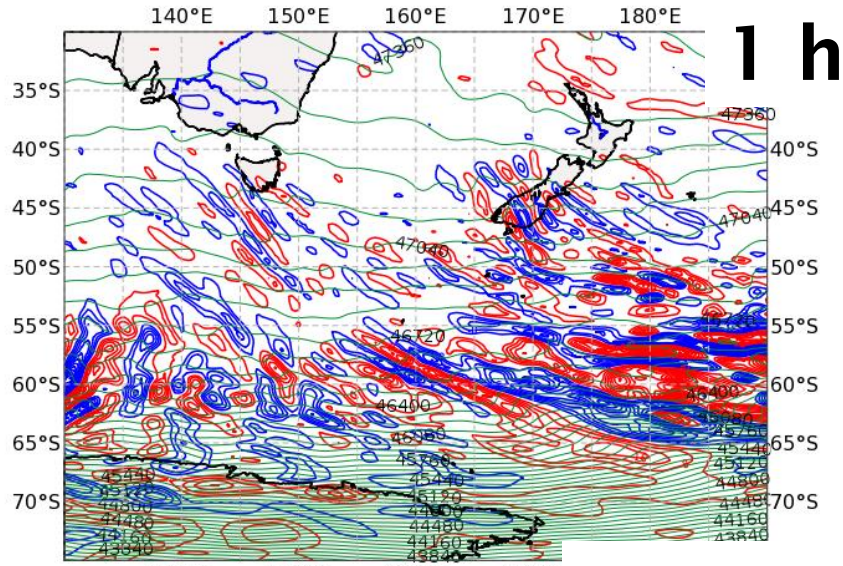
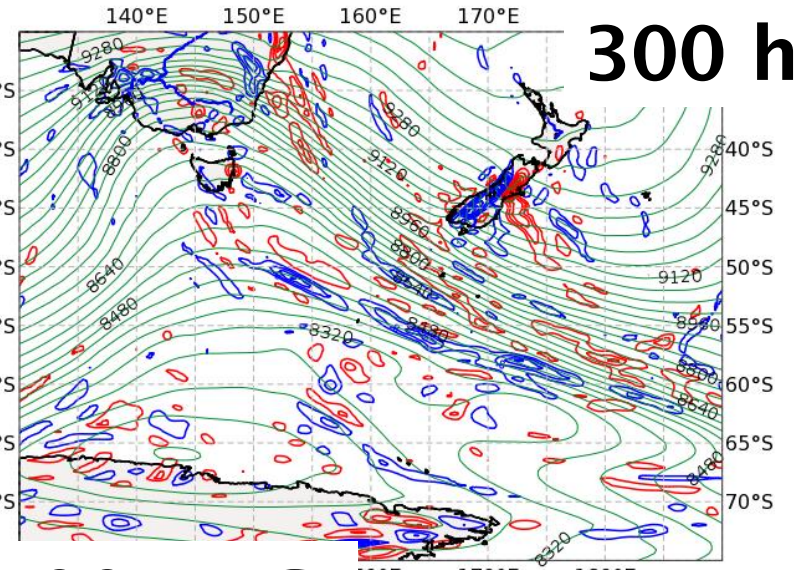
−70
−60
−50
−40
−30
−20
latitude/°
30
70
00

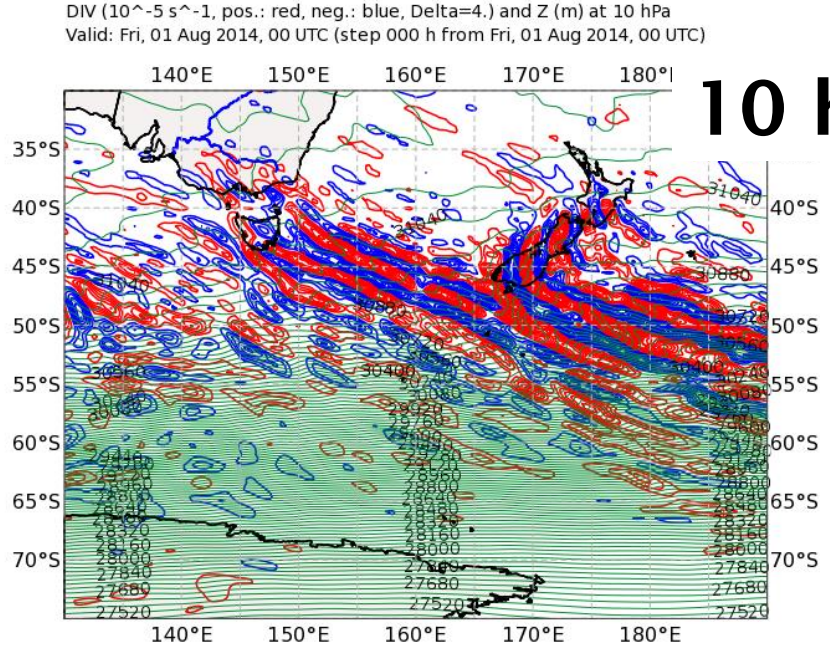


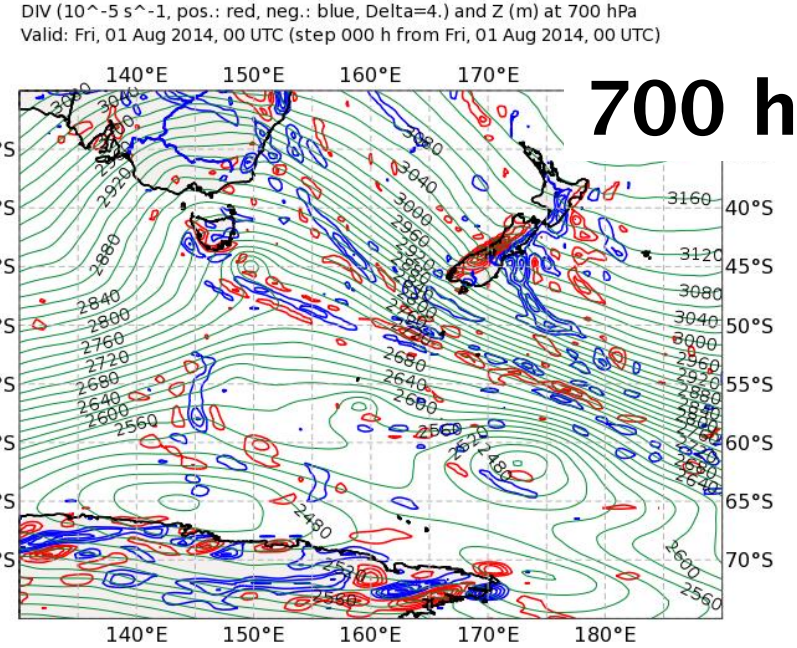
Bernd & Natalie Kaifler,
Benedikt Ehard, DLR

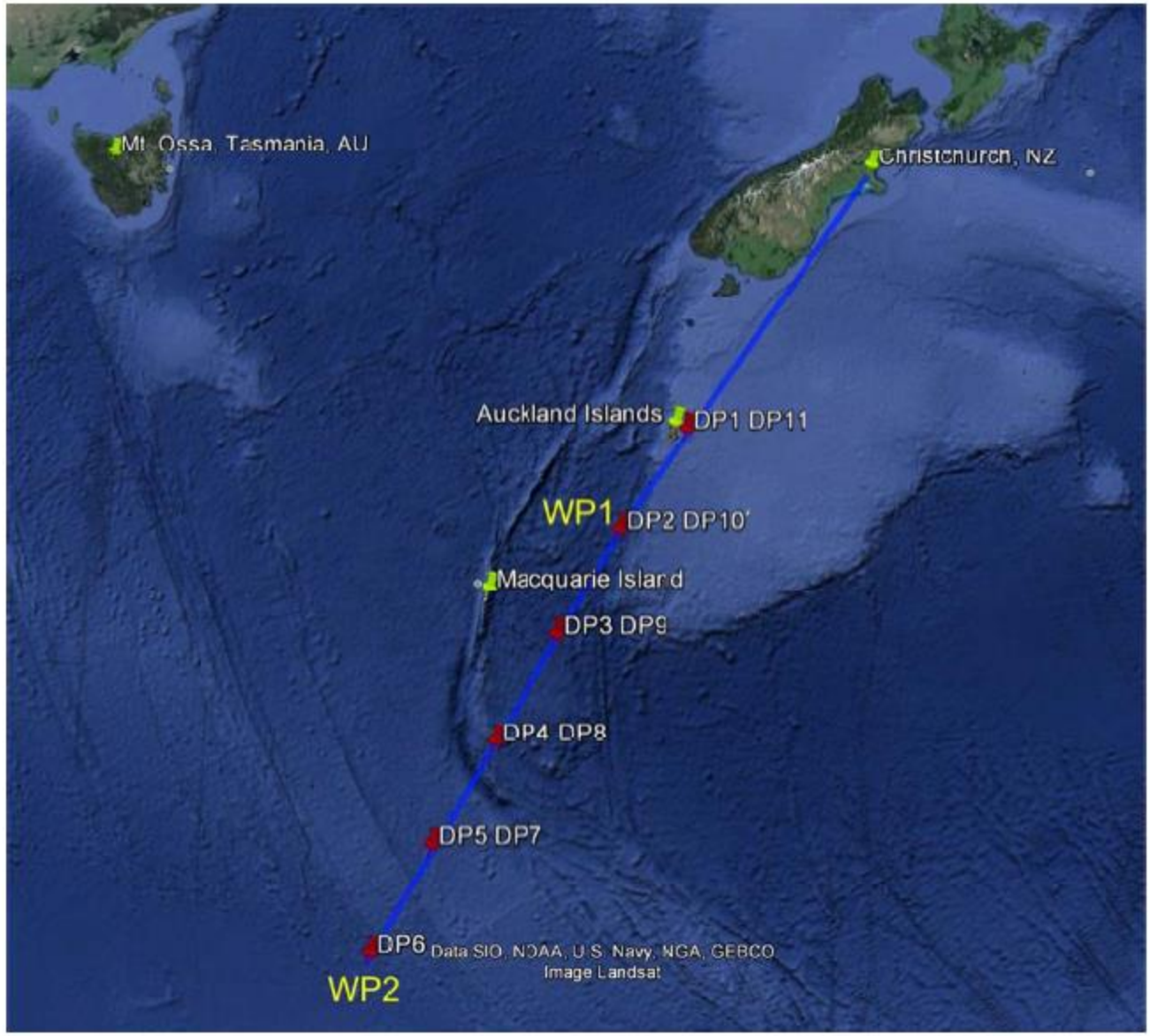


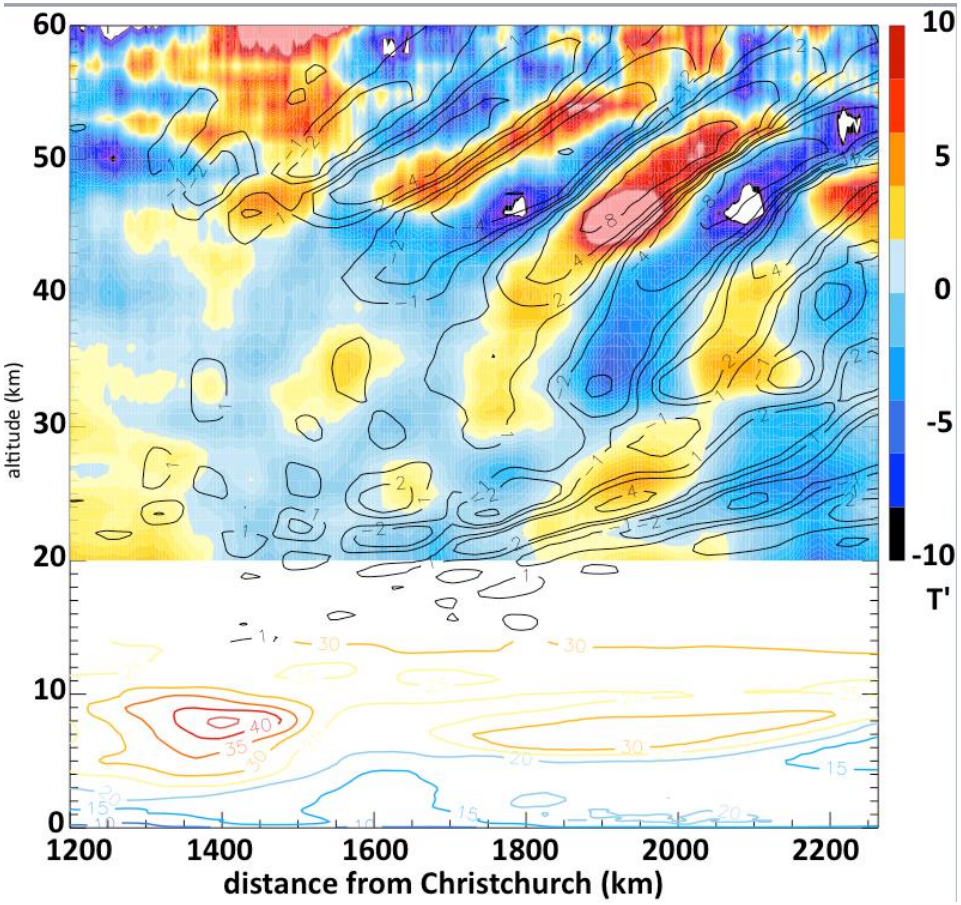


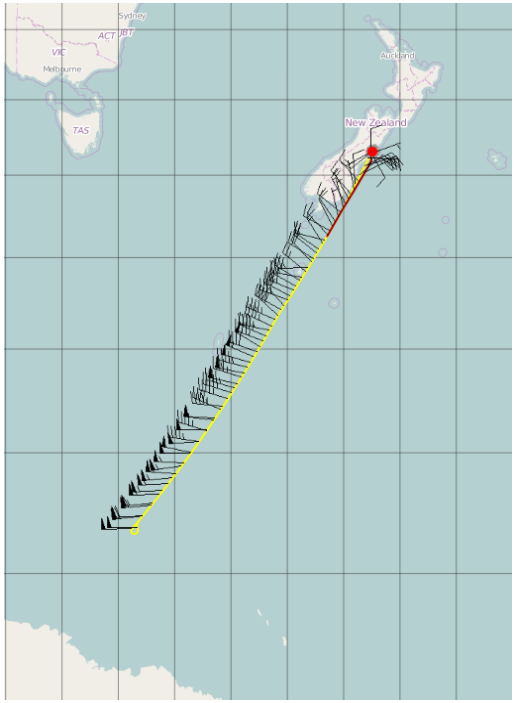
1 August 2014 00 UTC

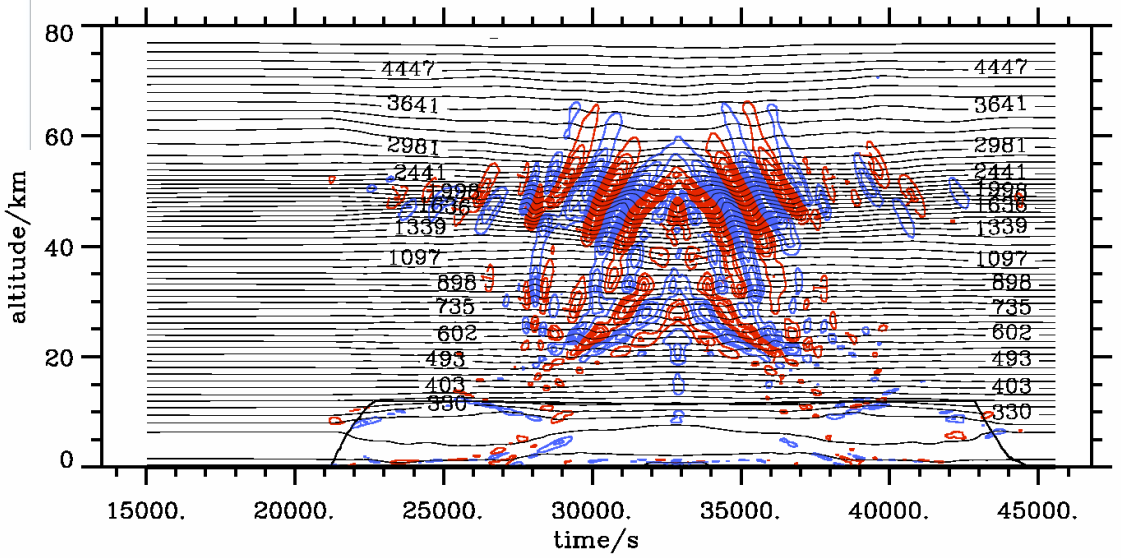





Mt Ossa, Tasmania, AU
Christchurch, NZ
Auckland Islands
DP1 DP11
WP1
DP2 DP10
Macquarie Island
DP3 DP9
DP4 DP8
DP5 DP7
DP6
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat
WP2

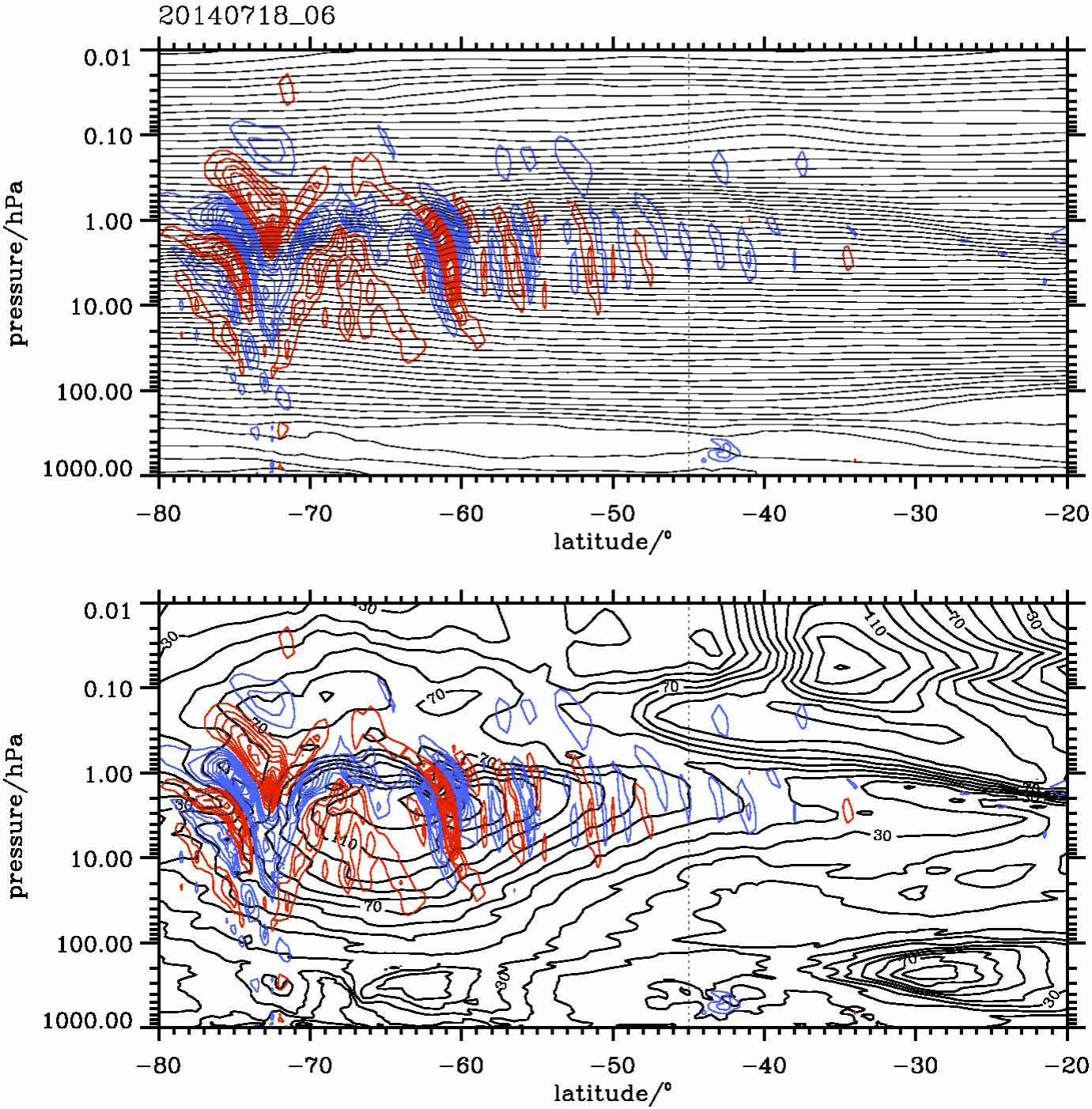






min/max T perturbations: −13.7 K, 11.9 K

Biff Williams & Dave Fritts, GATS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pressure/hPa
0.01
0.10
1.00
10.00
100.00
1000.00
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−70
−60
−50
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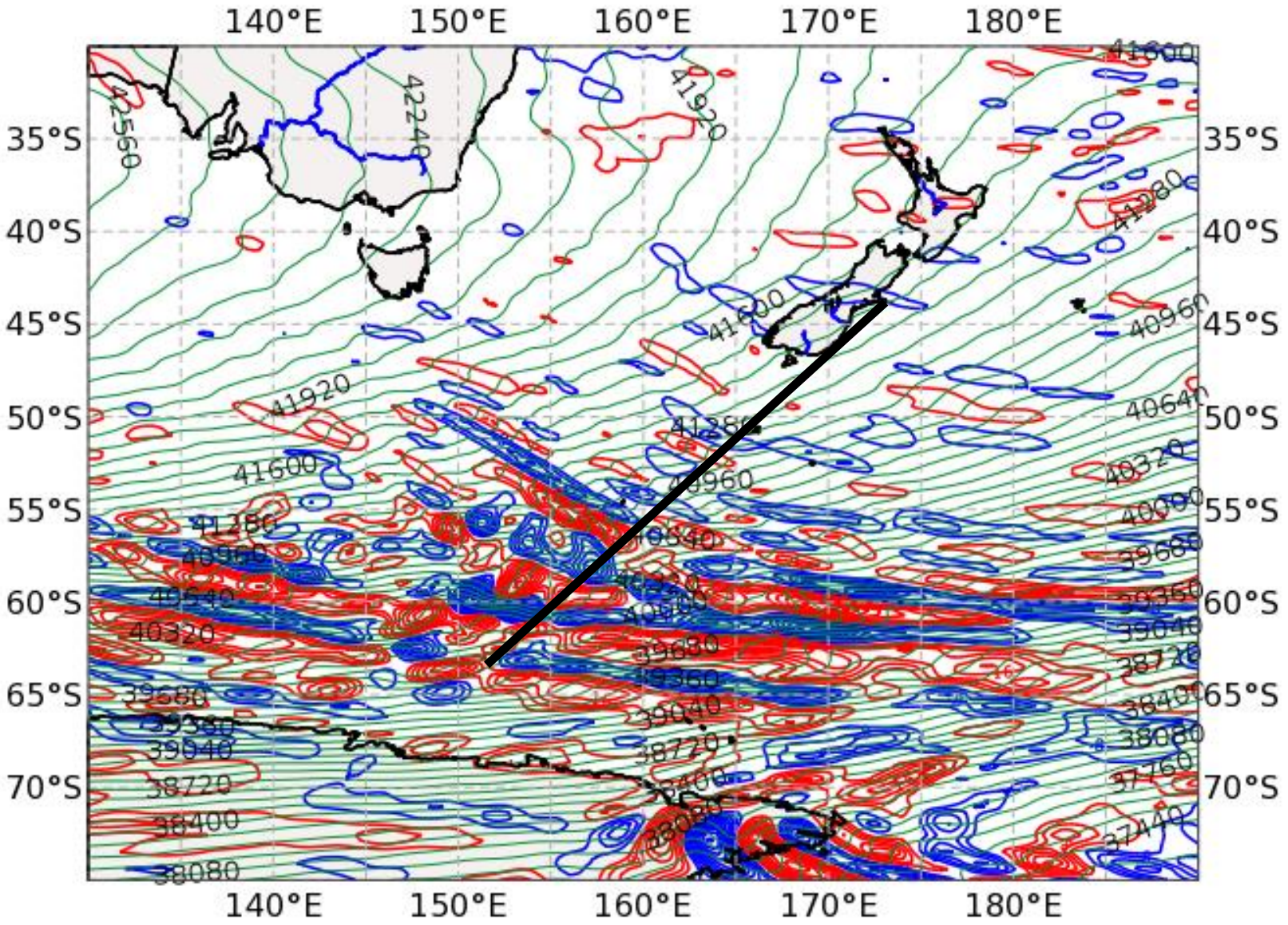
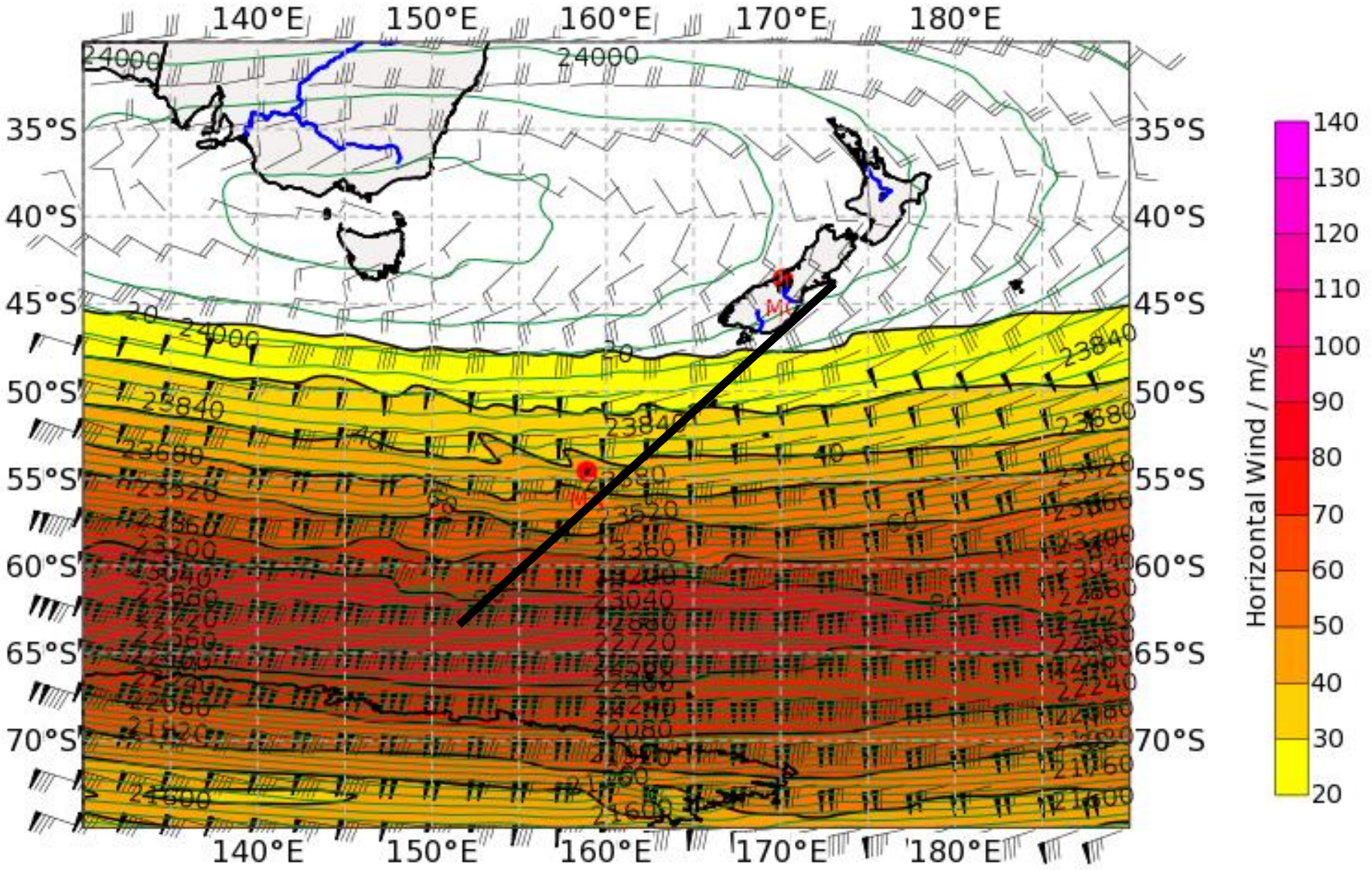
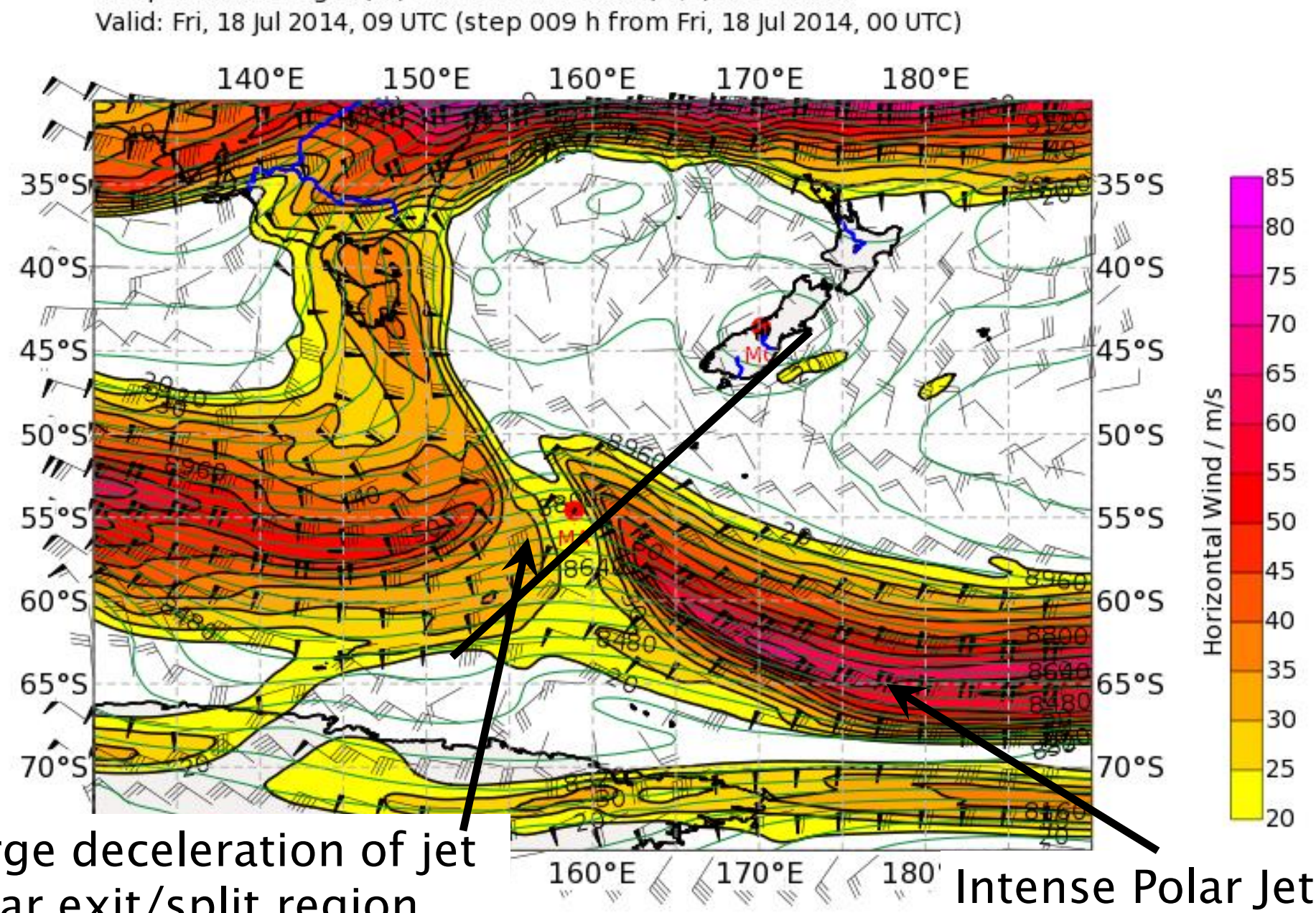
−20
latitude/°
pressure/hPa
0.01
0.10
1.00
10.00
100.00
1000.00
−80
−70
−60
−50
−40
−30
−20
latitude/°


DIV (10^-5 s^-1, pos.: red, neg.: blue, Delta=4.) and Z (m) at 2 hPa
Valid: Fri, 18 Jul 2014, 09 UTC (step 009 h from Fri, 18 Jul 2014, 00 UTC)
140°E
150°E
160°E
170°E
180°E
35°S
40°S
45°S
50°S
55°S
60°S
65°S
70°S


Geopotential Height (m) & Horizontal Wind (m/s) at 30 hPa
Valid: Fri, 18 Jul 2014, 09 UTC (step 009 h from Fri, 18 Jul 2014, 00 UTC)
140°E
150°E
160°E
170°E
180°E
35°S
40°S
45°S
50°S
55°S
60°S
65°S
70°S
Horizontal Wind / m/s
140
130
120
110
100
90
80
70
60
50
40
30
20


Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Fri, 18 Jul 2014, 09 UTC (step 009 h from Fri, 18 Jul 2014, 00 UTC)
140°E
150°E
160°E
170°E
180°E
35°S
40°S
45°S
50°S
55°S
60°S
65°S
70°S
Horizontal Wind / m/s
85
80
75
70
65
60
55
50
45
40
35
30
25
20
large deceleration of jet
near exit/split region
Intense Polar Jet

DLR Contributions

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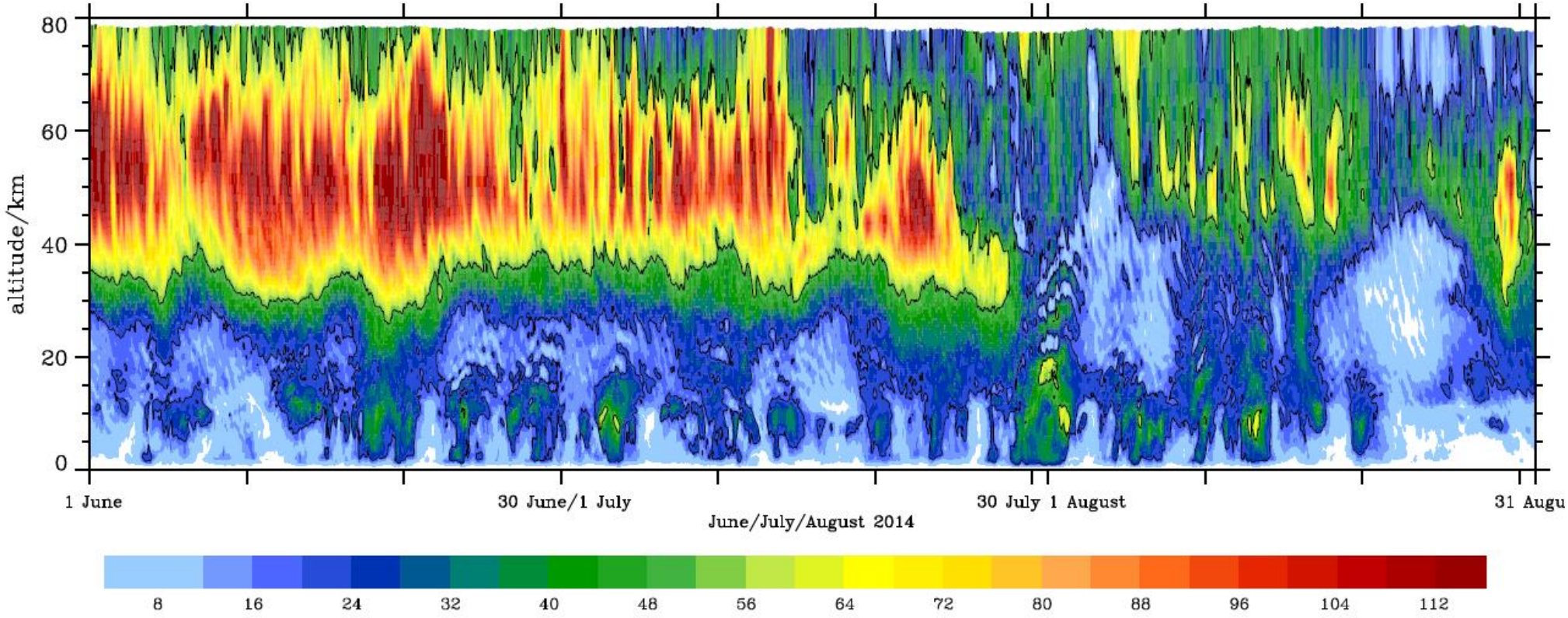
4. Non-Orographic Wave Source
5. **Synoptic Overview**

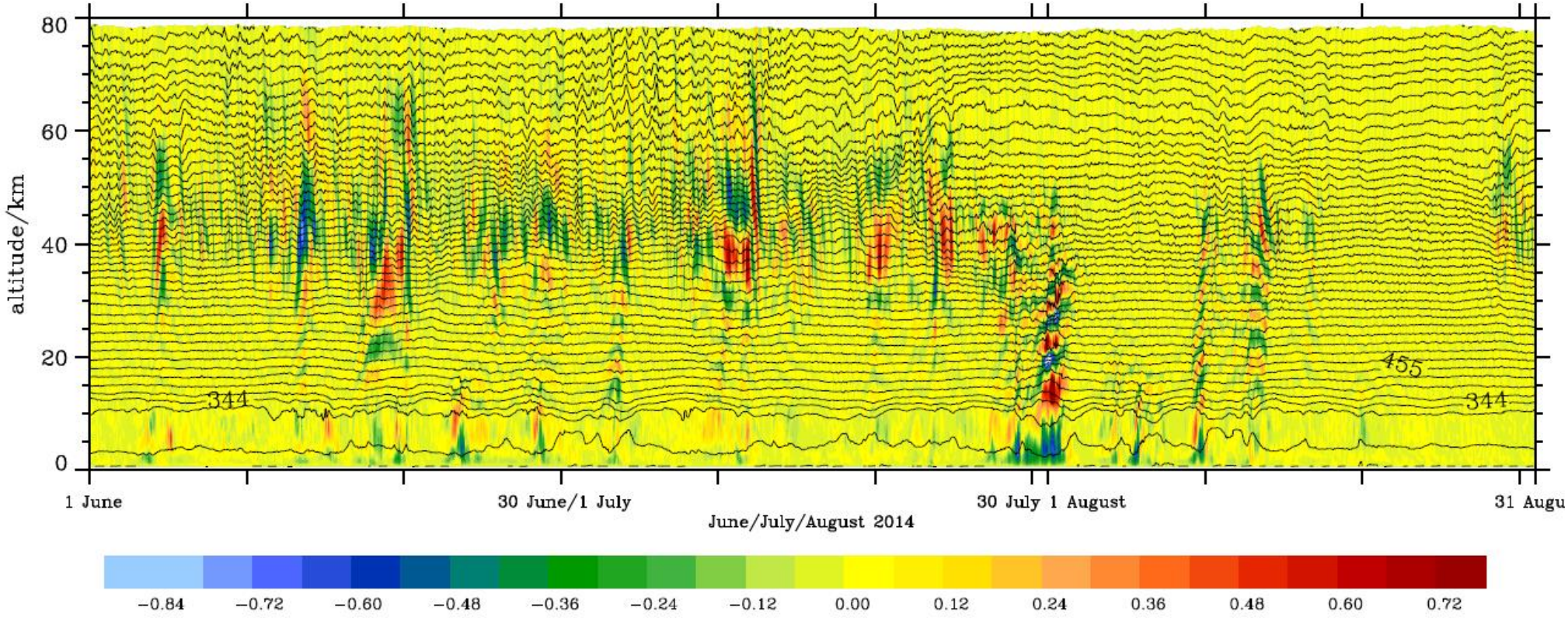
Height-Time Series at Lauder/NZ



ECMWF T1279/L137 operational analyses (6 h)
and 1 hourly high-resolution IFS predictions

V_{HOR}/ms^{-1}

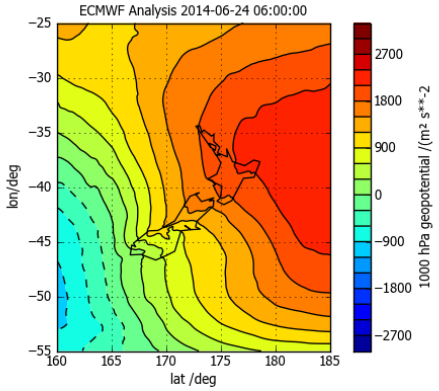
Height-Time Series at Lauder/NZ



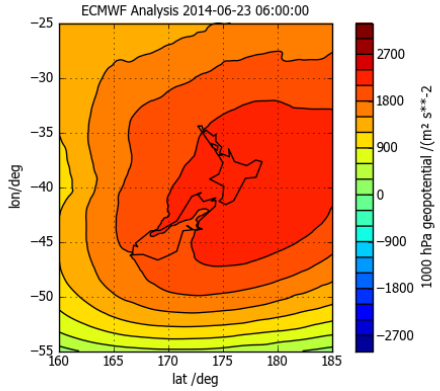
ECMWF T1279/L137 operational analyses (6 h)
and 1 hourly high-resolution IFS predictions

w/ms^{-1}

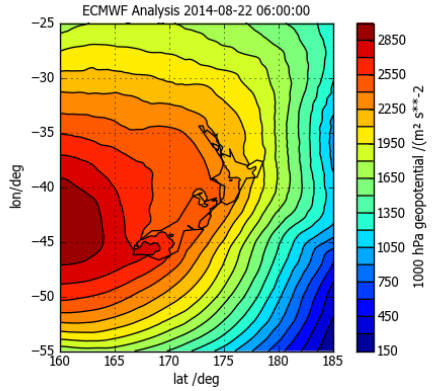
Examples of different synoptic regimes
(1000 hPa Geopotential)



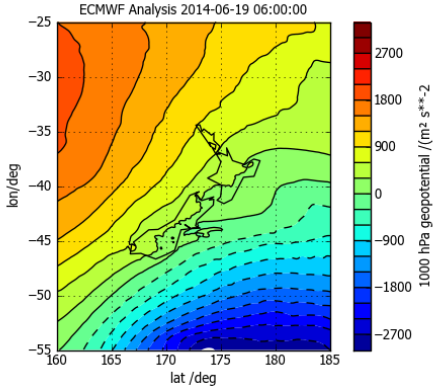
High East (8 d)



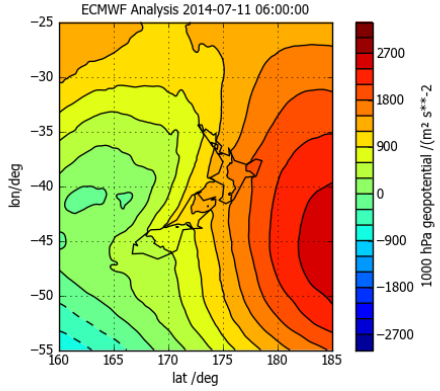
High South East (9 d)



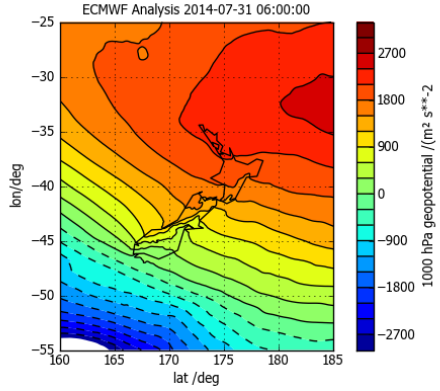
High West (7 d)



South West (14 d)



Trough North West (5 d)

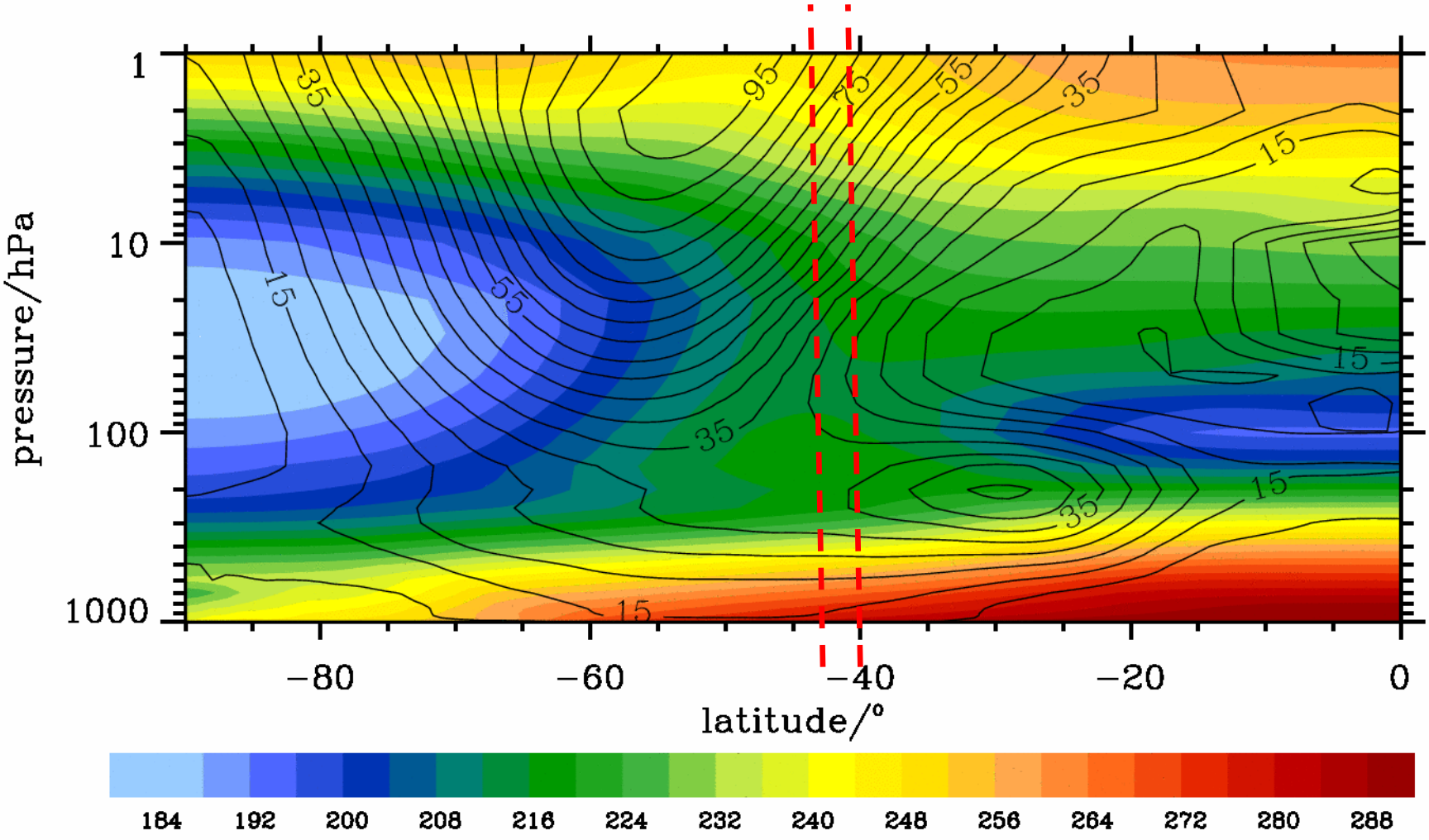


West (3 d)

Sonja Gisinger, DLR

Zonal mean temperature (K) and horizontal wind (m/s)

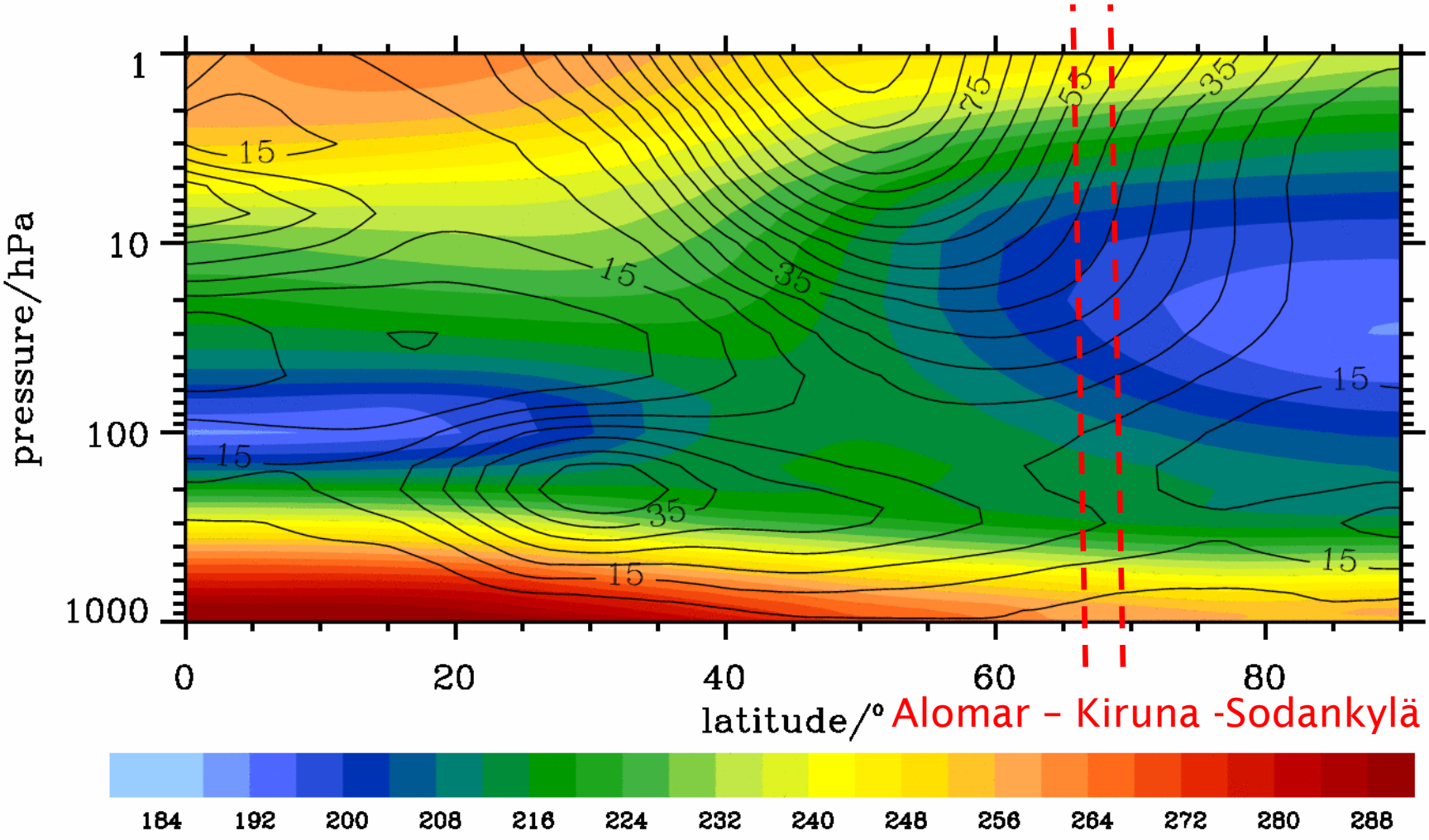
Monthly mean July 2014 DEEPWAVE-NZ



ECMWF T1279/L137 operational analyses (6 h)

Zonal mean temperature (K) and horizontal wind (m/s)

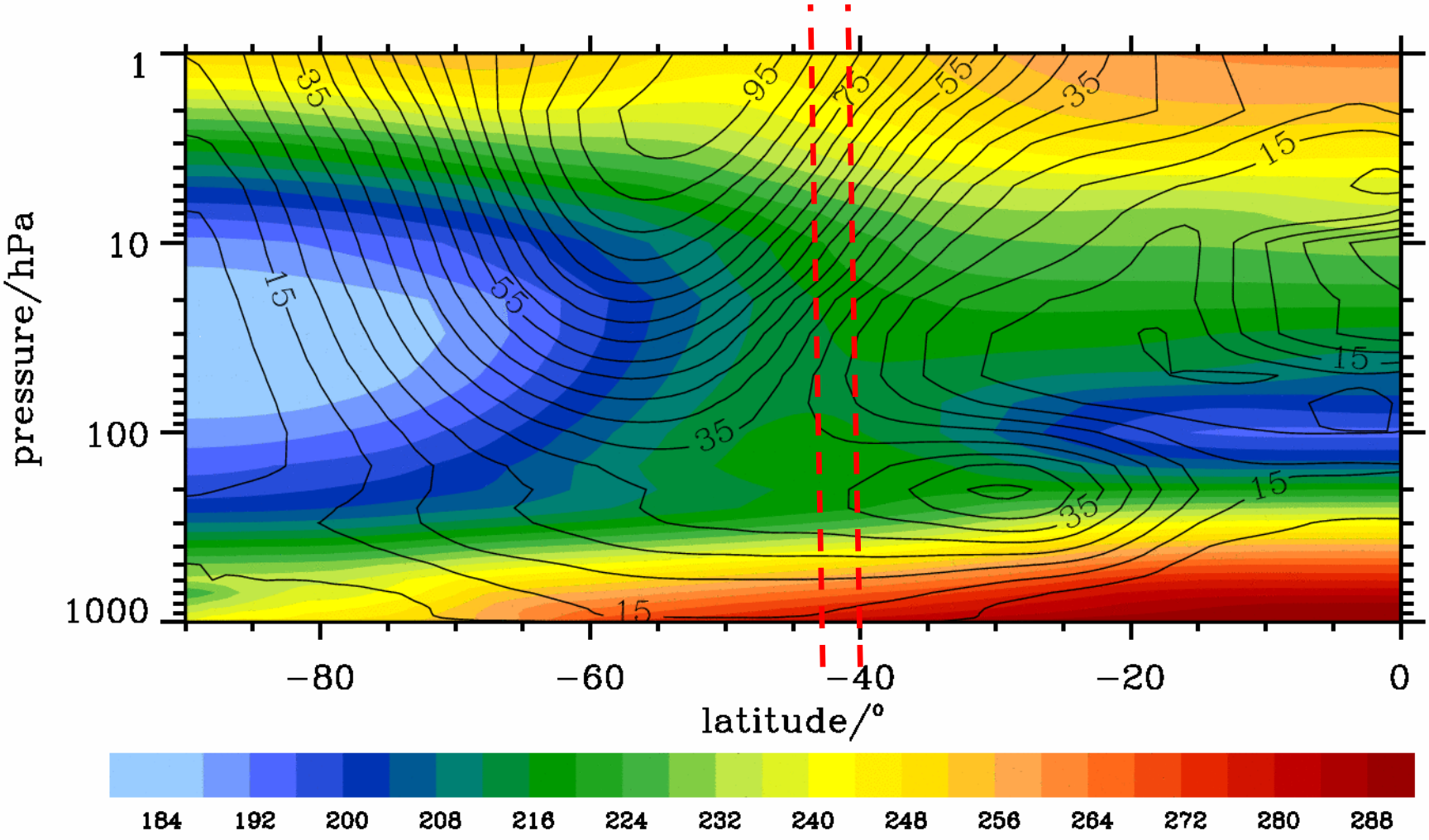
Monthly mean December 2013 GW-LCYCLE 1



ECMWF T1279/L137 operational analyses (6 h)

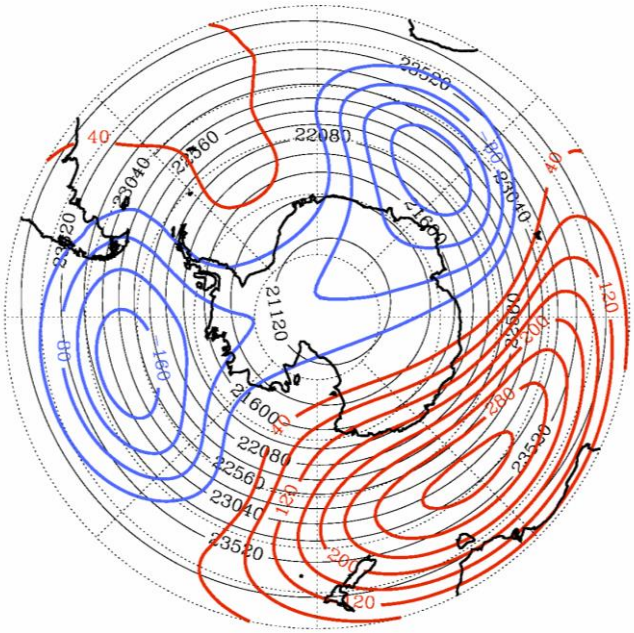
Zonal mean temperature (K) and horizontal wind (m/s)

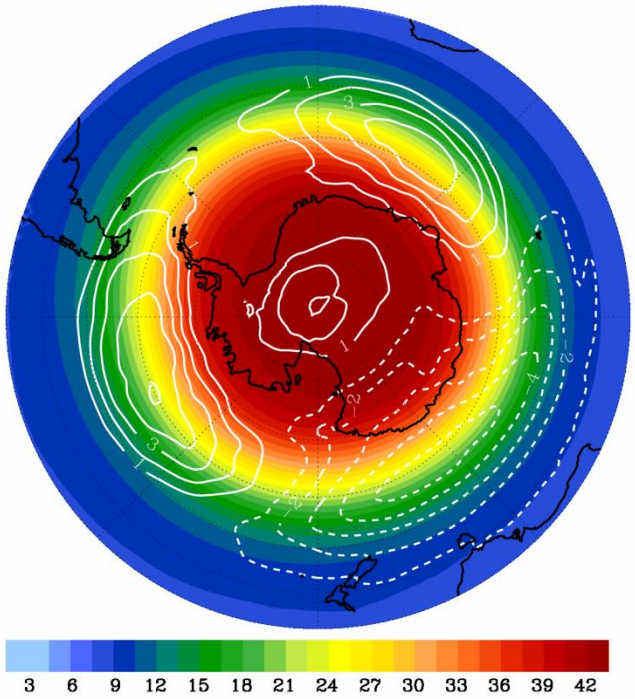
Monthly mean July 2014 DEEPWAVE-NZ

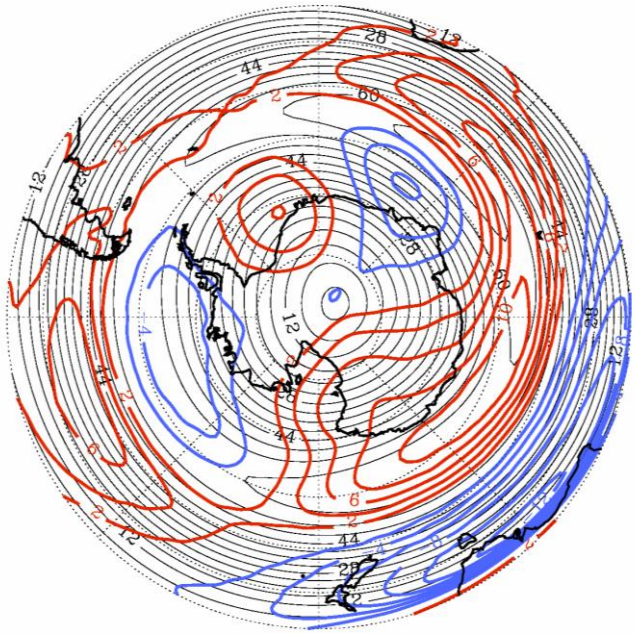


ECMWF T1279/L137 operational analyses (6 h)

ERA-Interim Mean (1979-2014) and Anomaly for July 2014



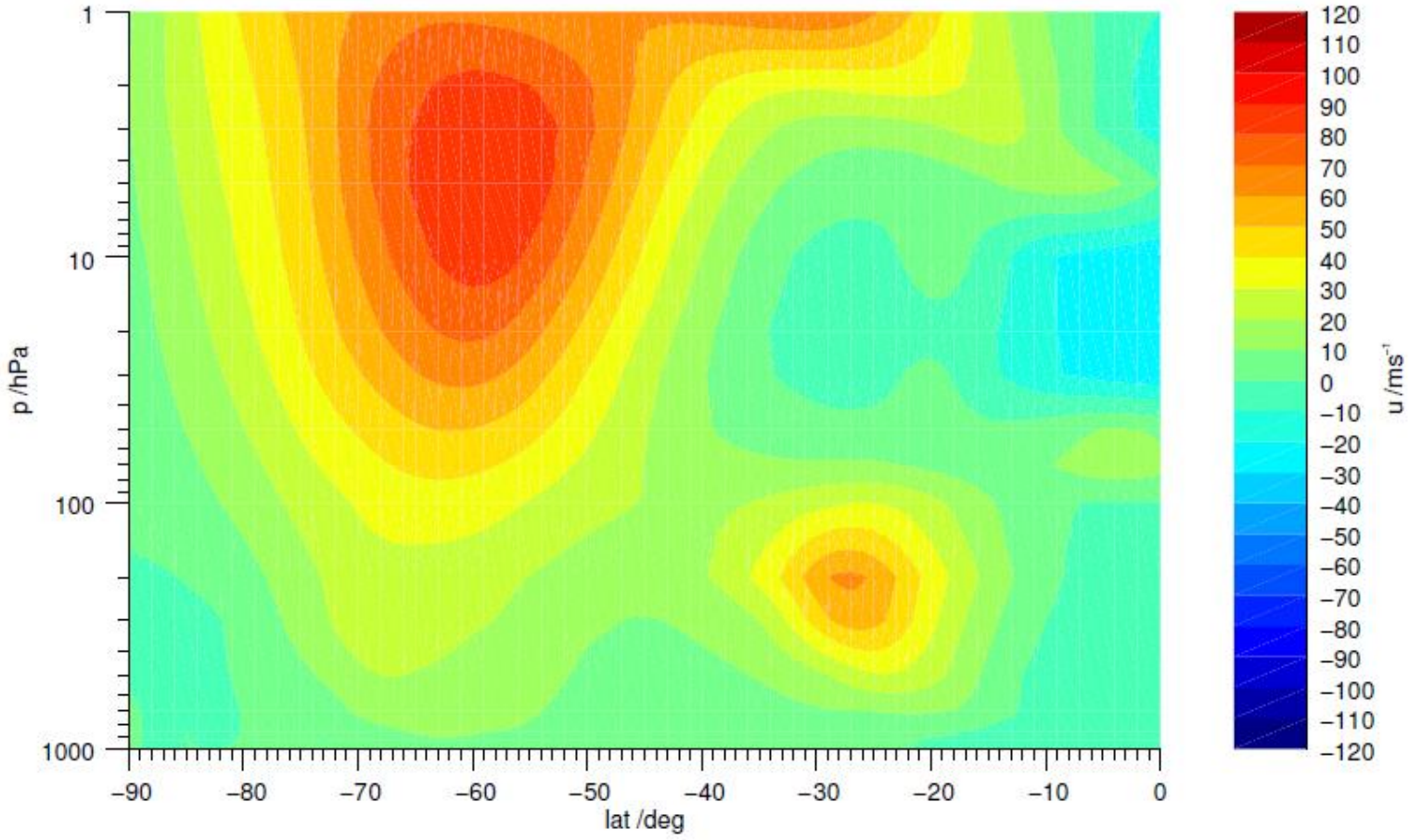




Z, Z‘ at 30 hPa MPV, MPV‘ at 600 K V_H, V_H‘ at 30 hPa

$$\mathrm{MPV} = \mathrm{EPV} \cdot \left(\frac{\theta}{420\ K} \right)^{-9/2}$$

Zonal mean zonal wind (m/s)
Monthly mean July 2014 DEEPWAVE-NZ



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Zonal mean zonal wind anomaly (m/s)
Monthly mean July 2014 DEEPWAVE-NZ

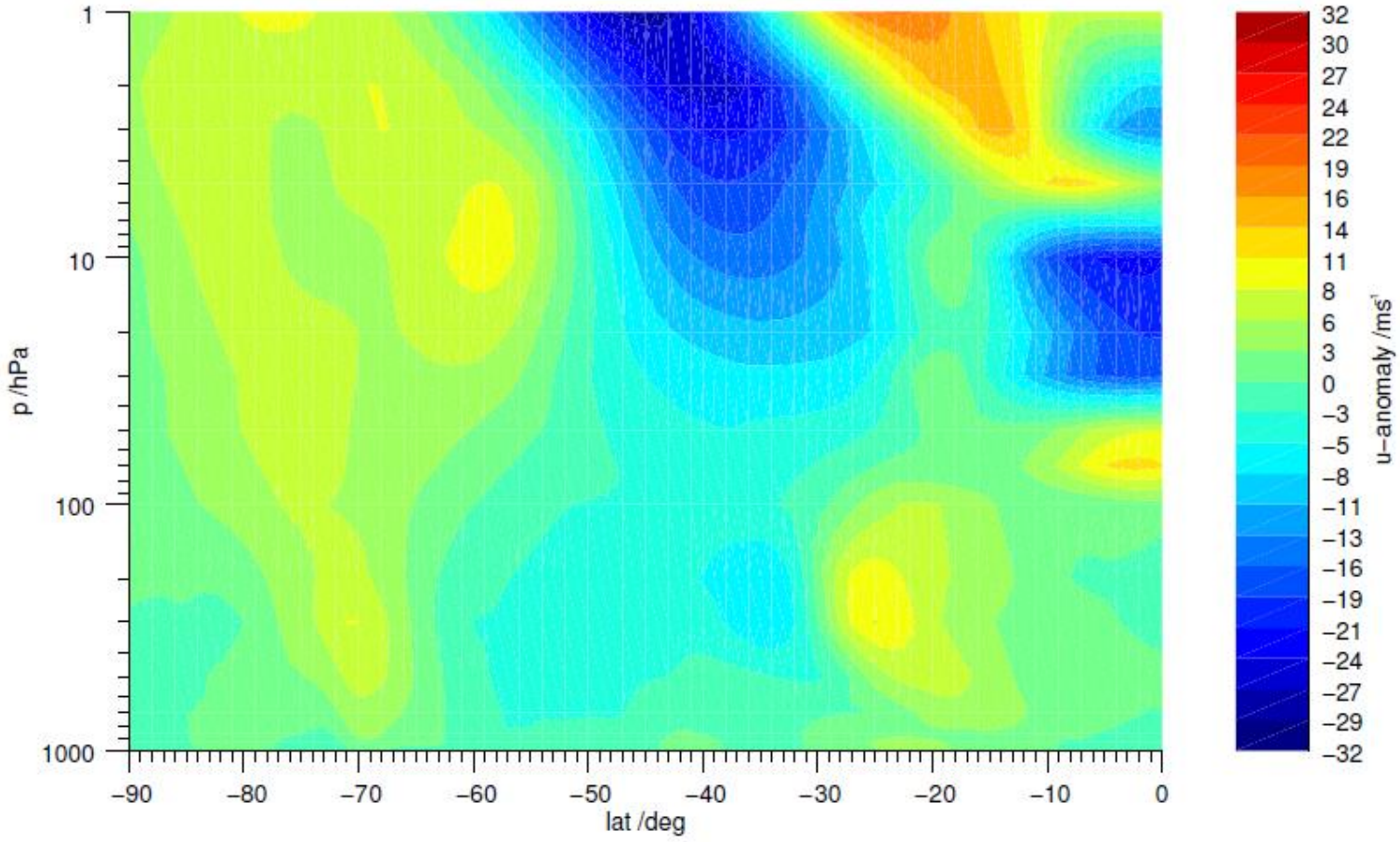

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Photo: Sonja Gisinger