

GATS primary initial research interests

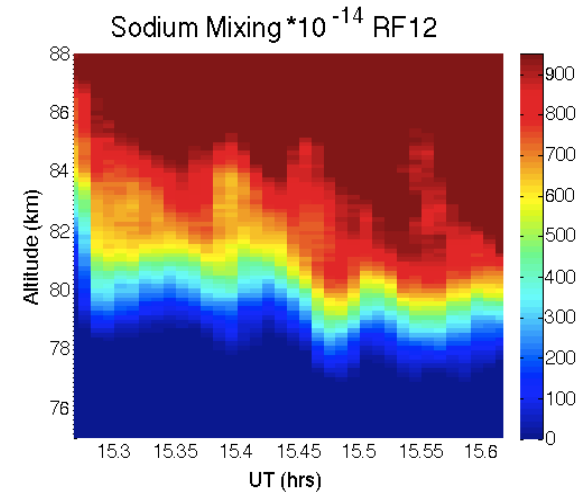
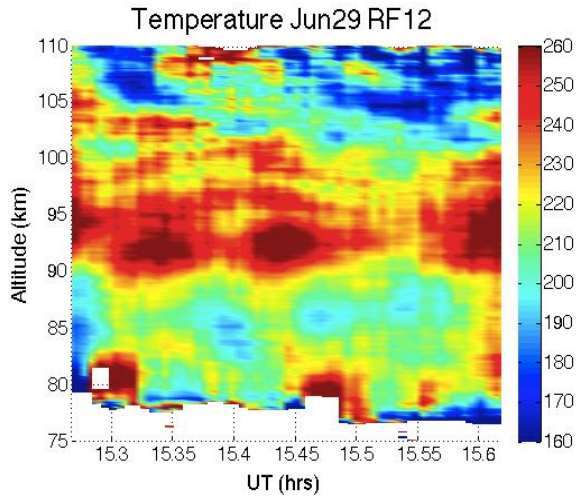
GATS initial research interests:

1. MW responses in the stratosphere, mesosphere, and thermosphere for various forcing conditions
2. GW responses to other sources – jet streams/fronts, convection, secondary generation (breaking and "packet" scales), other?
3. GW momentum fluxes, localization, and temporal variability
4. GW breaking and instability dynamics
5. Data/model comps. to define GW sources, evaluate responses & GW params.

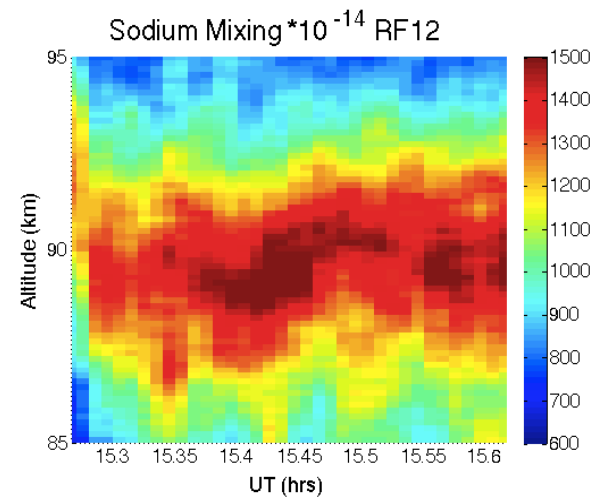
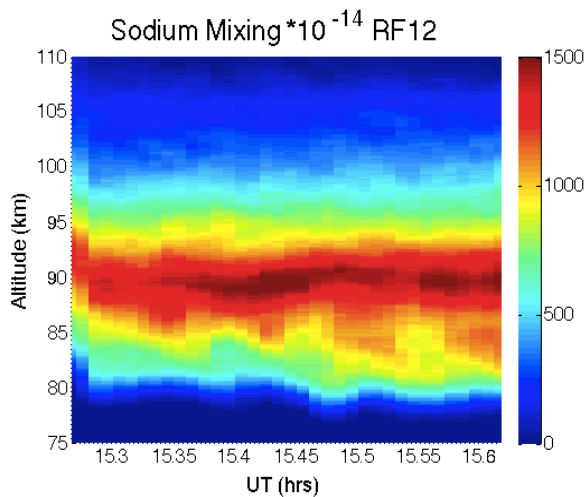
RF12

RF12 Over Mt. Cook

Multiscale GW activity and events observed in temperatures

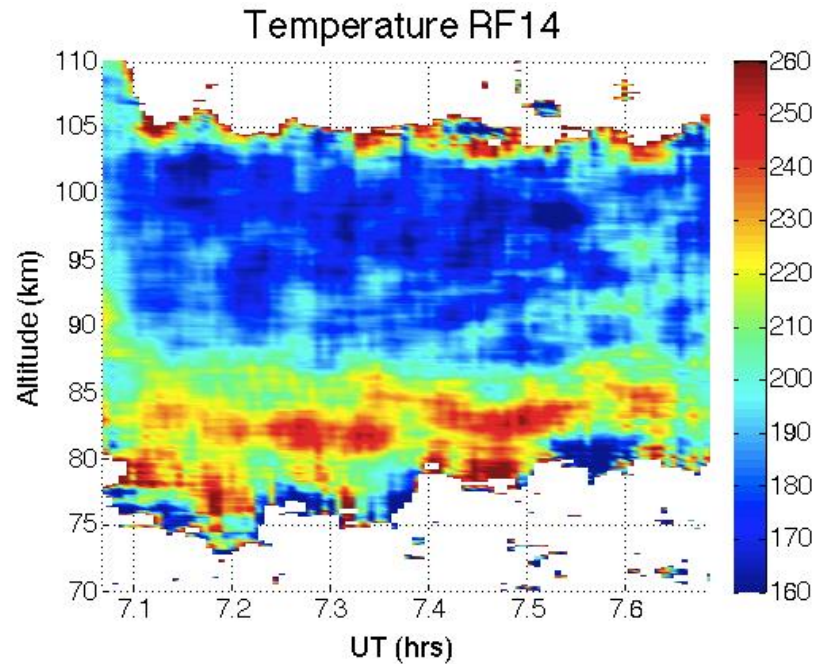
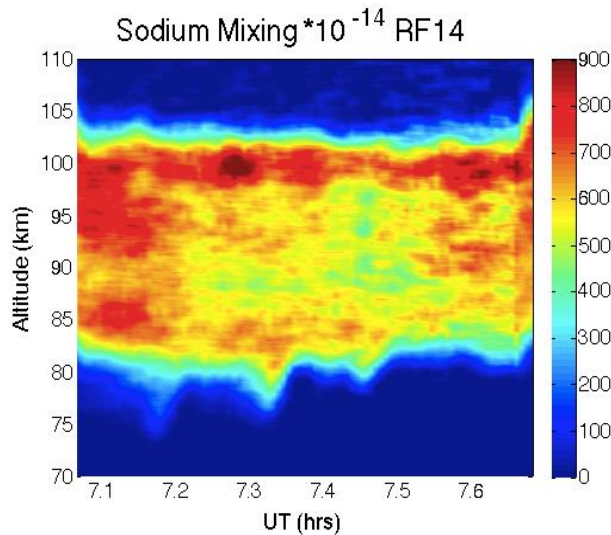
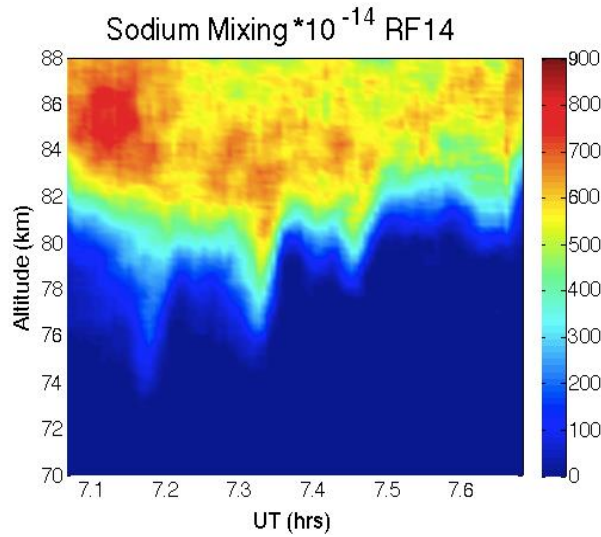


Overtuning and instability observed throughout sodium density layer.



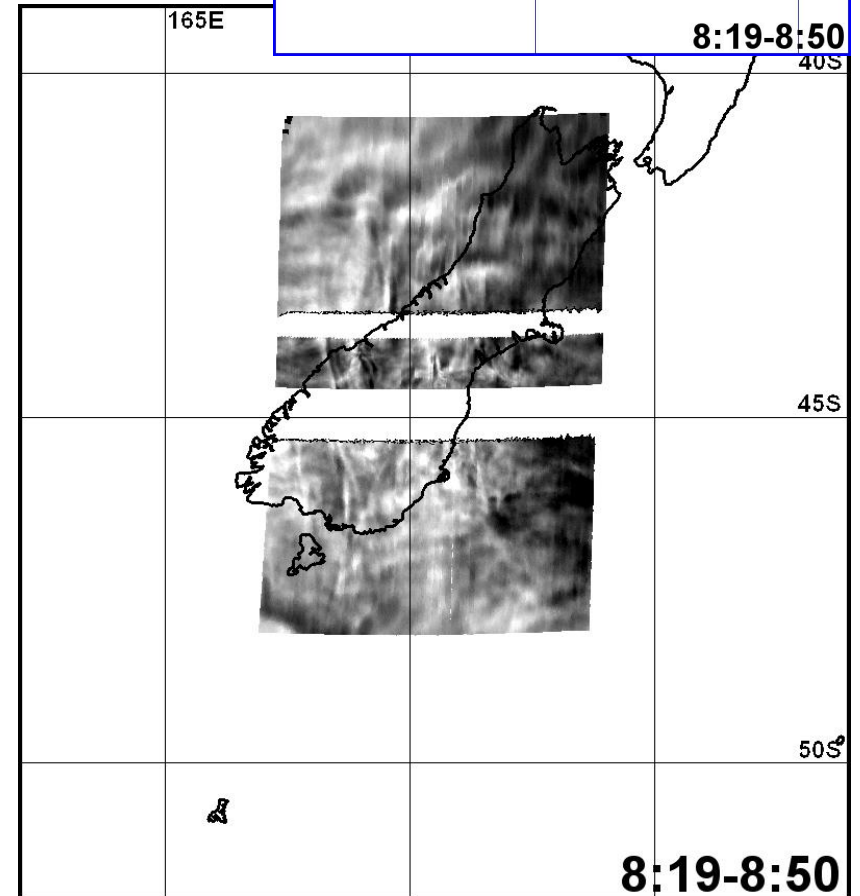
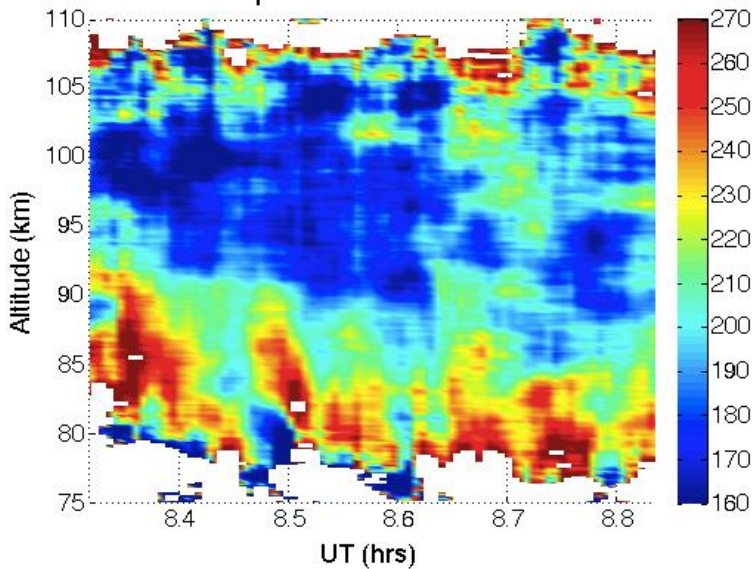
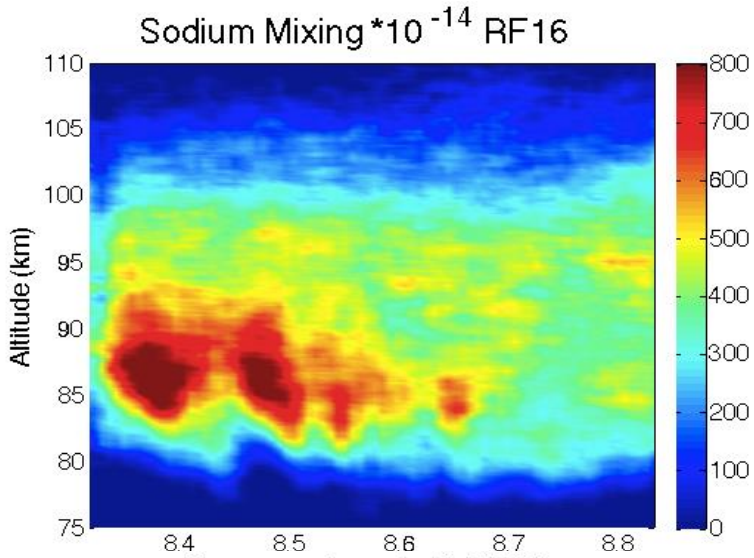
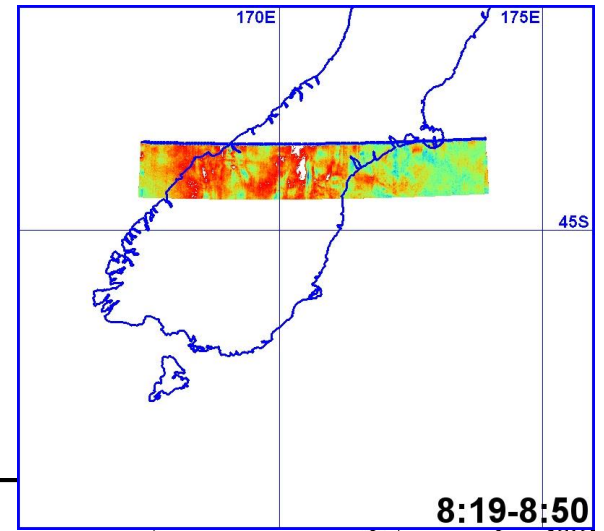
RF14

GWs observed over the south island of NZ during the beginning of the flight. Both temperatures and densities are available.



RF16

Very large amplitude
GW event observed
over south island.

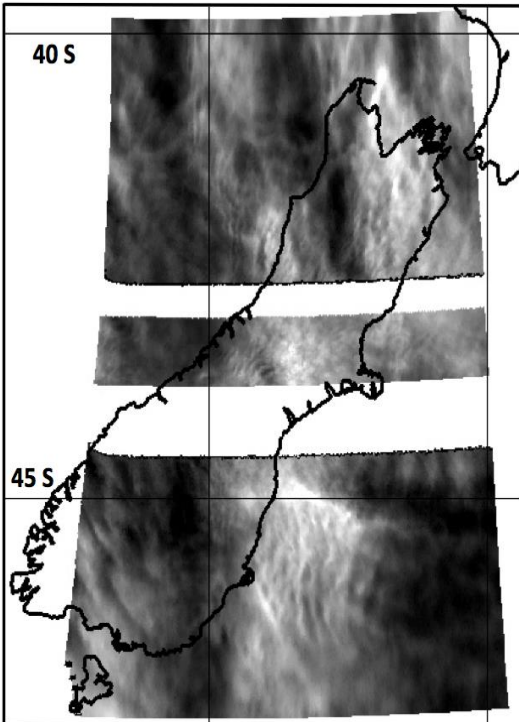


RF22

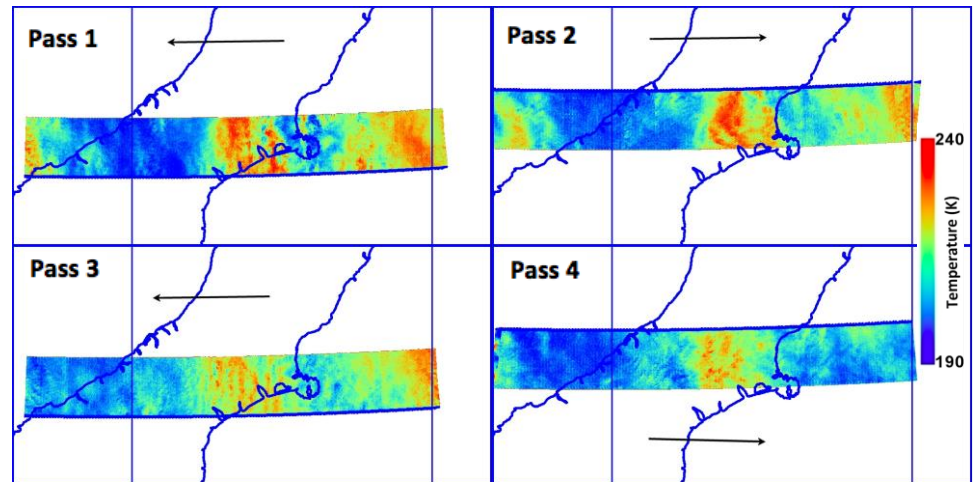
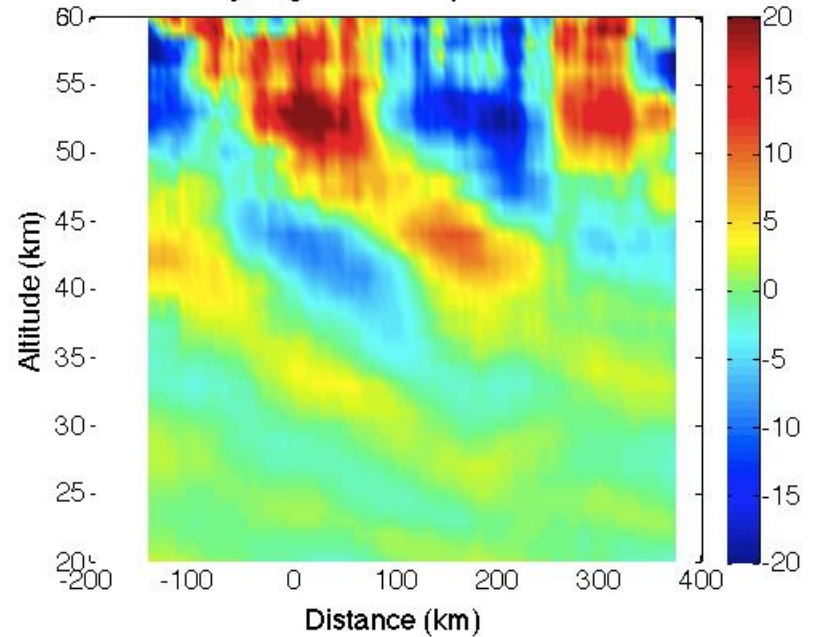
Multiple scales of GWs observed:

~240km most clearly visible, seen in sodium lidar, UV lidar, and AMTM

-Large amplitude smaller-scale ~30km GWs also observed



Rayleigh Lidar Tp Pass 4

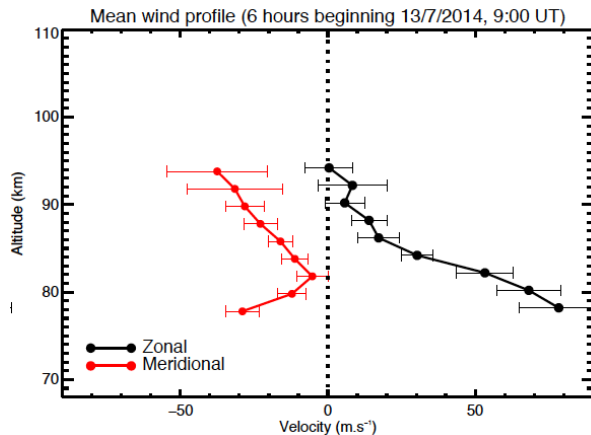
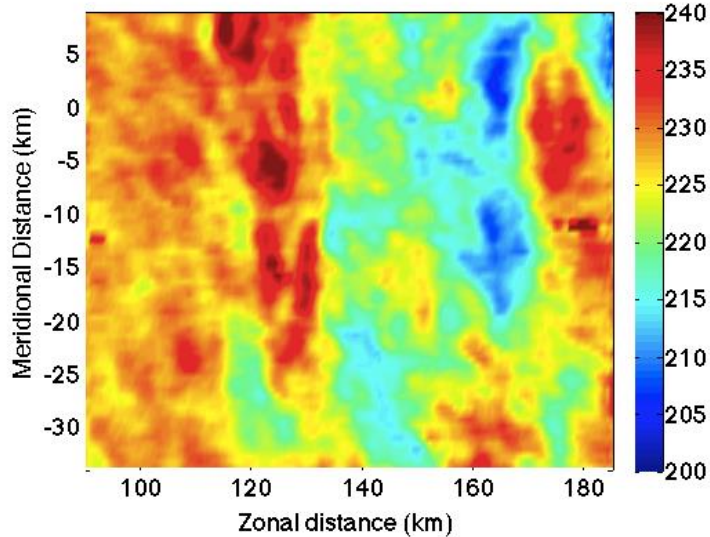


RF22 – MW breaking and secondary GW generation?

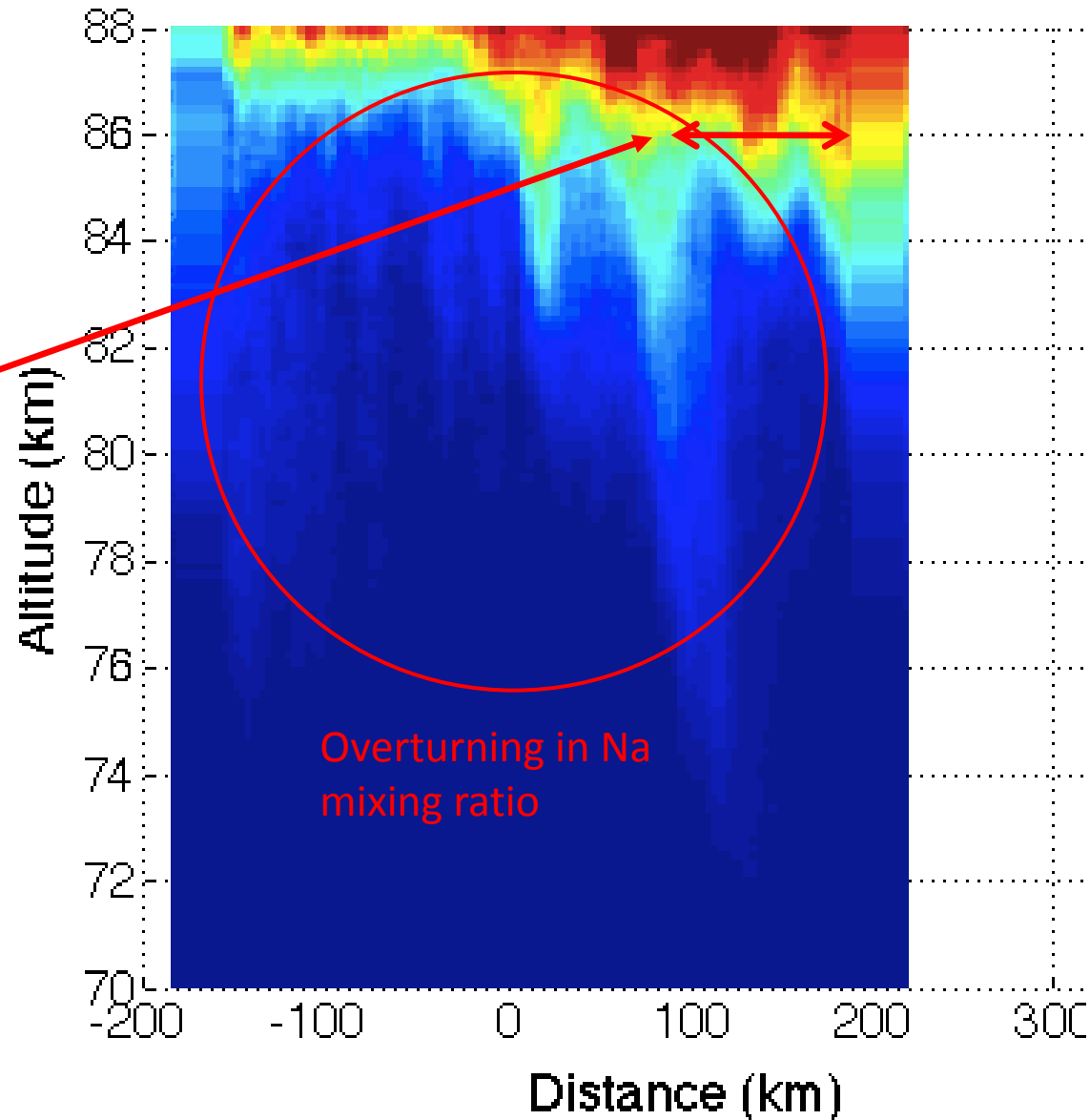
Pass 1

~60-240 km MWs approaching a critical level ~90 km

Pass 1

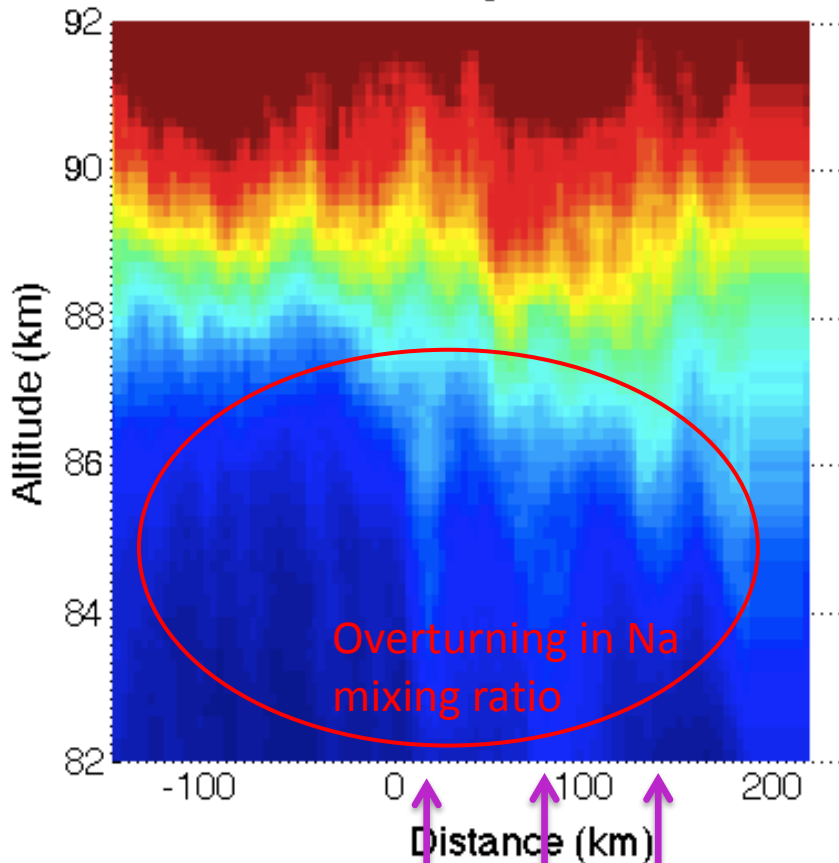


Sodium Mixing * 10⁻¹⁴ Pass 1

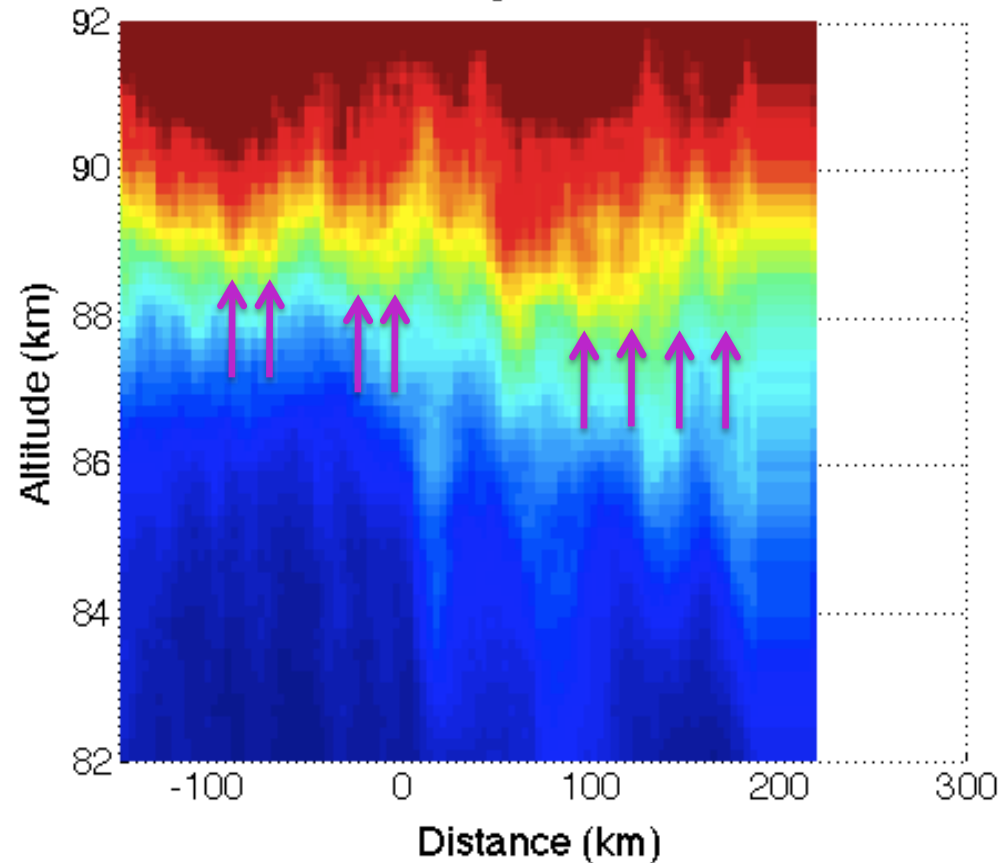


RF22 – MW breaking and secondary GW generation?

Sodium Mixing $\times 10^{-14}$ Pass 1

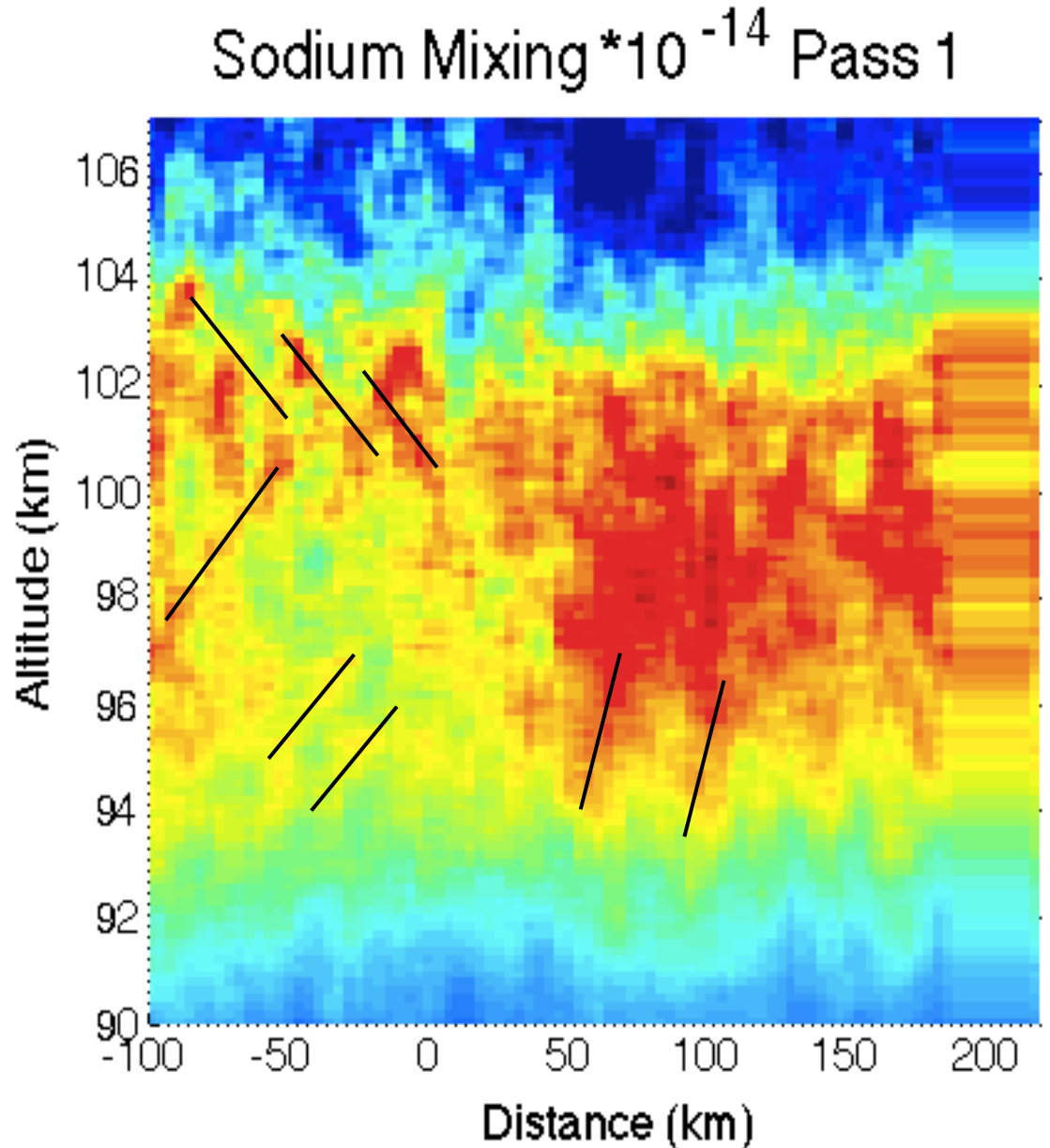


Sodium Mixing $\times 10^{-14}$ Pass 1



RF22 – MW breaking and secondary GW generation?

Evidence of smaller-scale, 20-30 km, cross-hatched GW propagation in both directions at higher altitudes



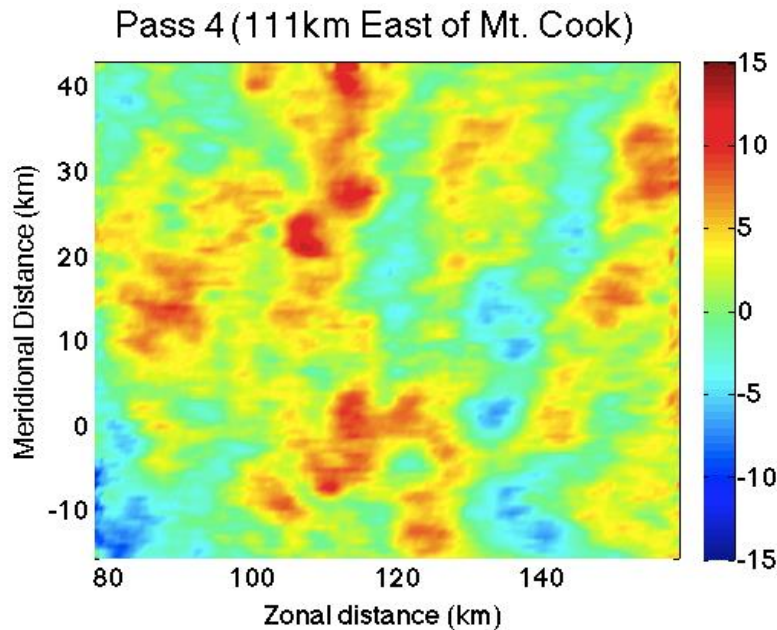
RF22 – MW breaking and secondary GW generation?

Pass 4

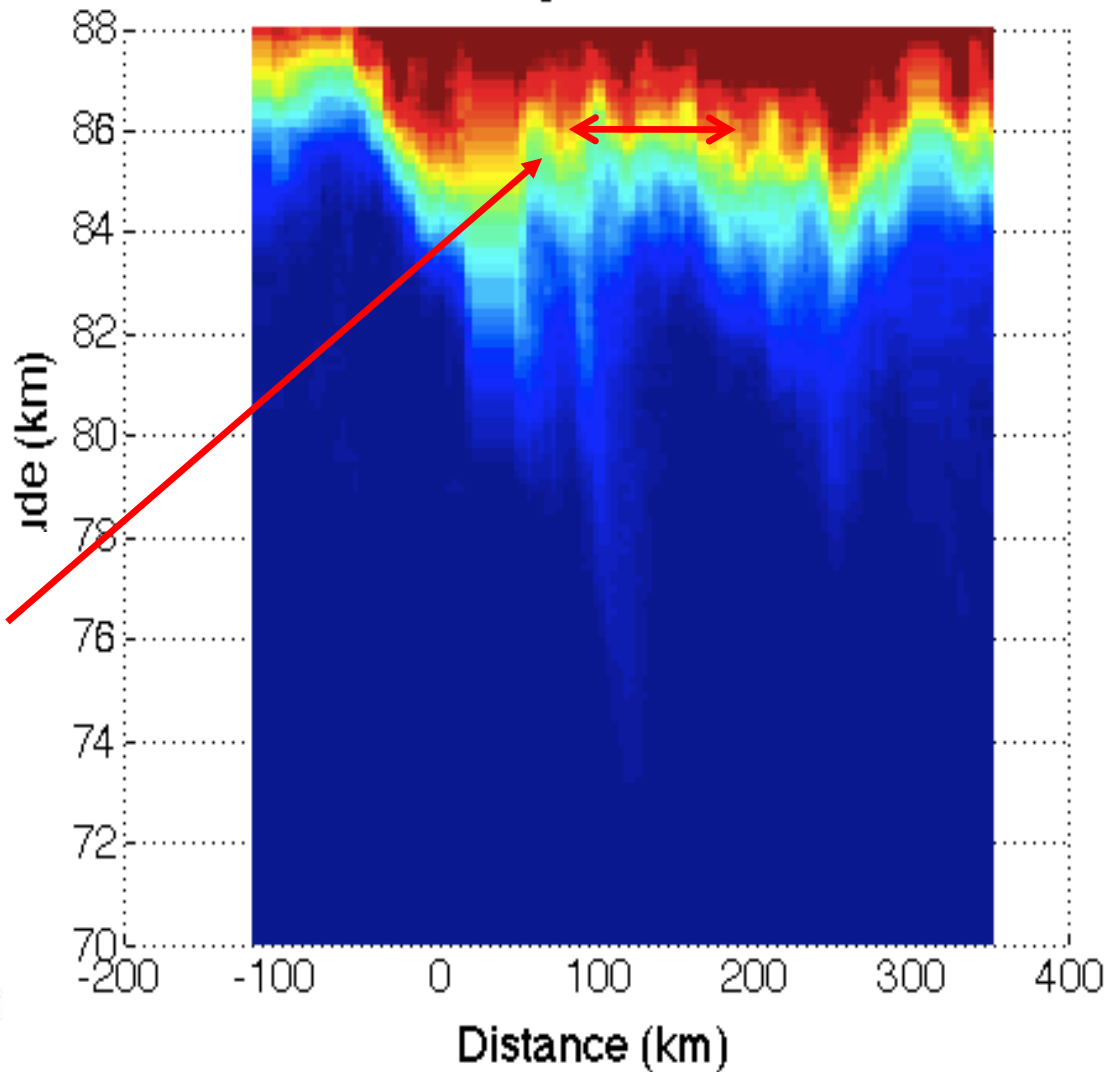
Observed a ~ 30 km GW with zero phase speed

=> potential MW scales of ~ 30 -240 km in this case

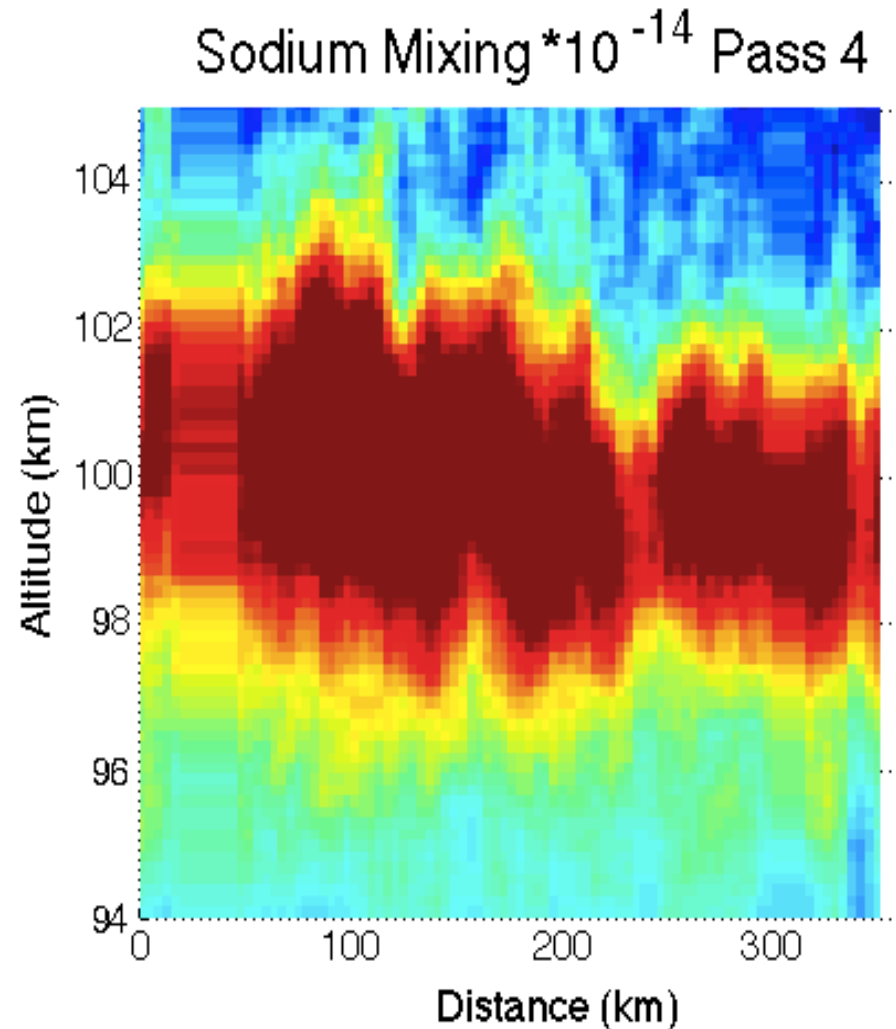
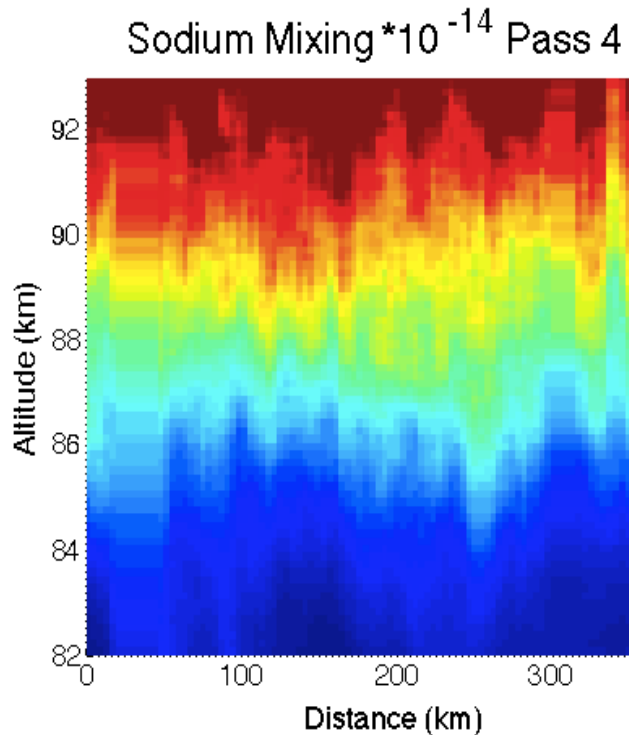
very large vertical peak-peak dz , ~ 3 -8 km below a critical level



Sodium Mixing $\times 10^{-14}$ Pass 4



RF22 – MW breaking and secondary GW generation?

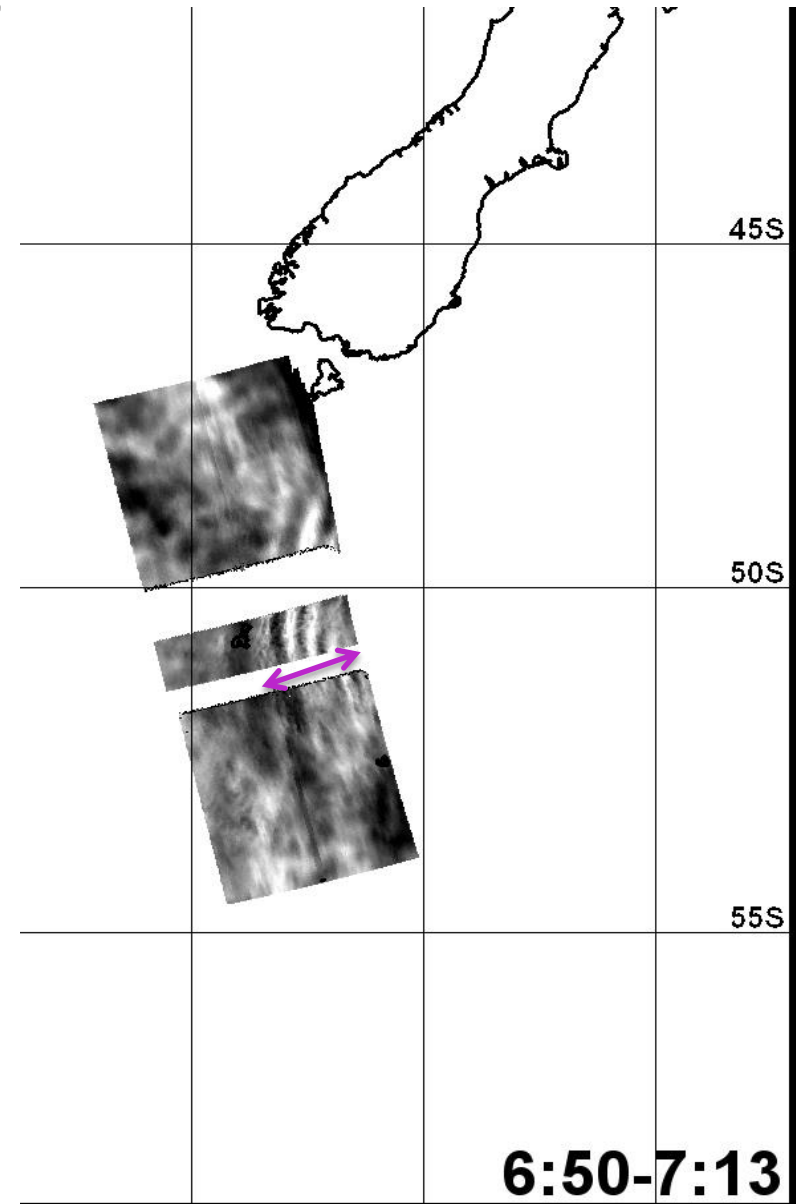
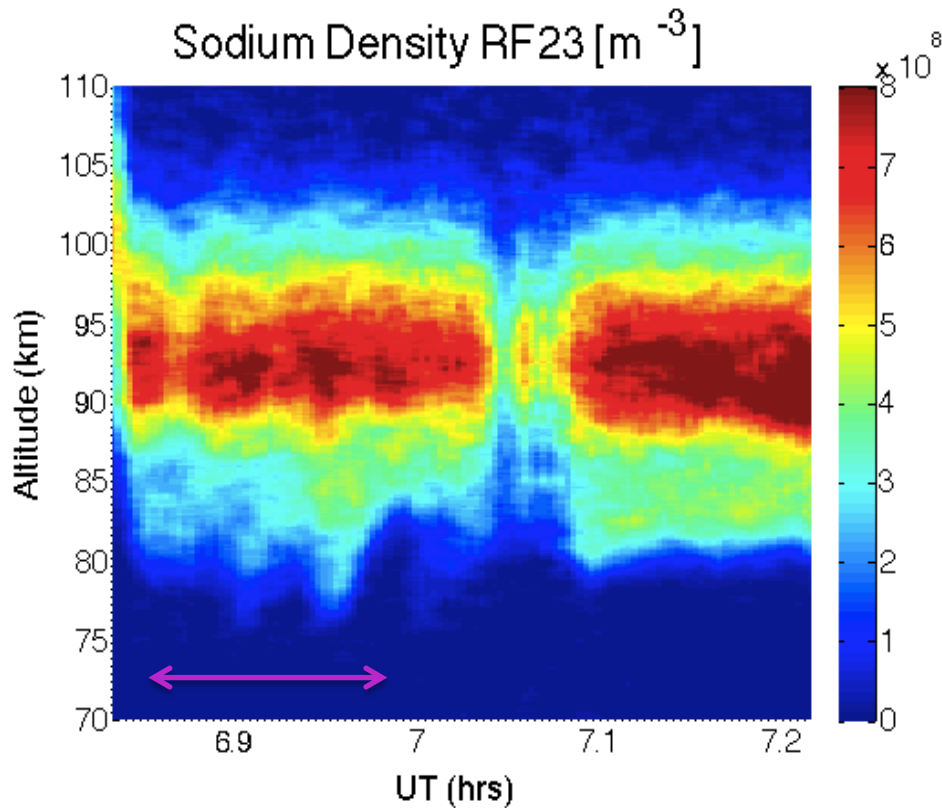


This wave was observed with approximately zero phase speed, but at 96km, the vertical wavelength suggests that it is propagating in the opposite direction of the ~ 240 km MW

RF 23

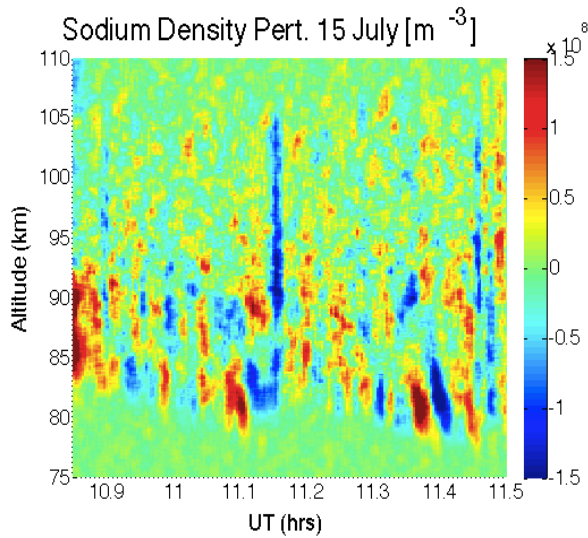
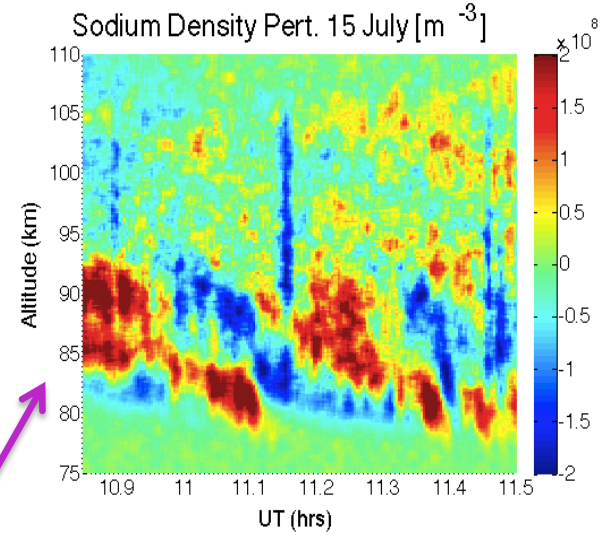
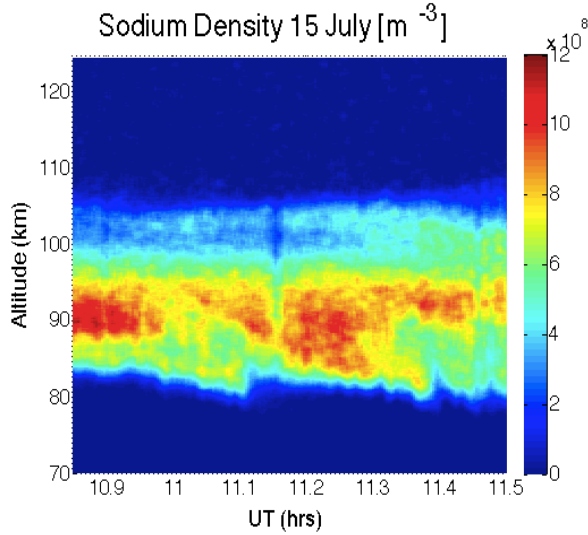
- Lidar off for most of flight due to flight altitude.

- One coincident measurement of large amplitude GW event can confirm MW T'

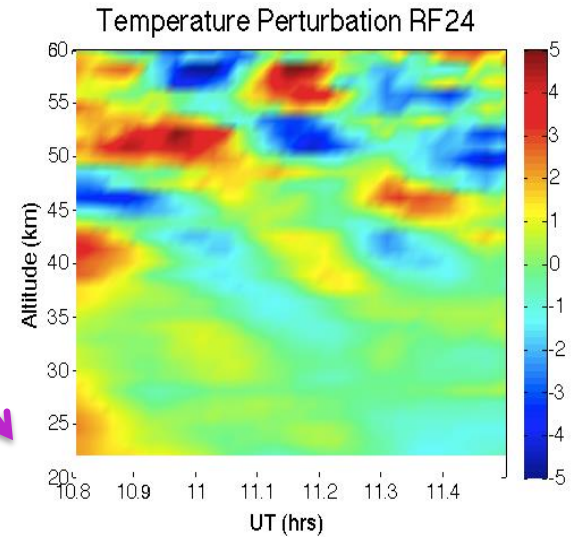


RF 24

Various scales of
density perturbations
observed
-5 minute
-15 minute

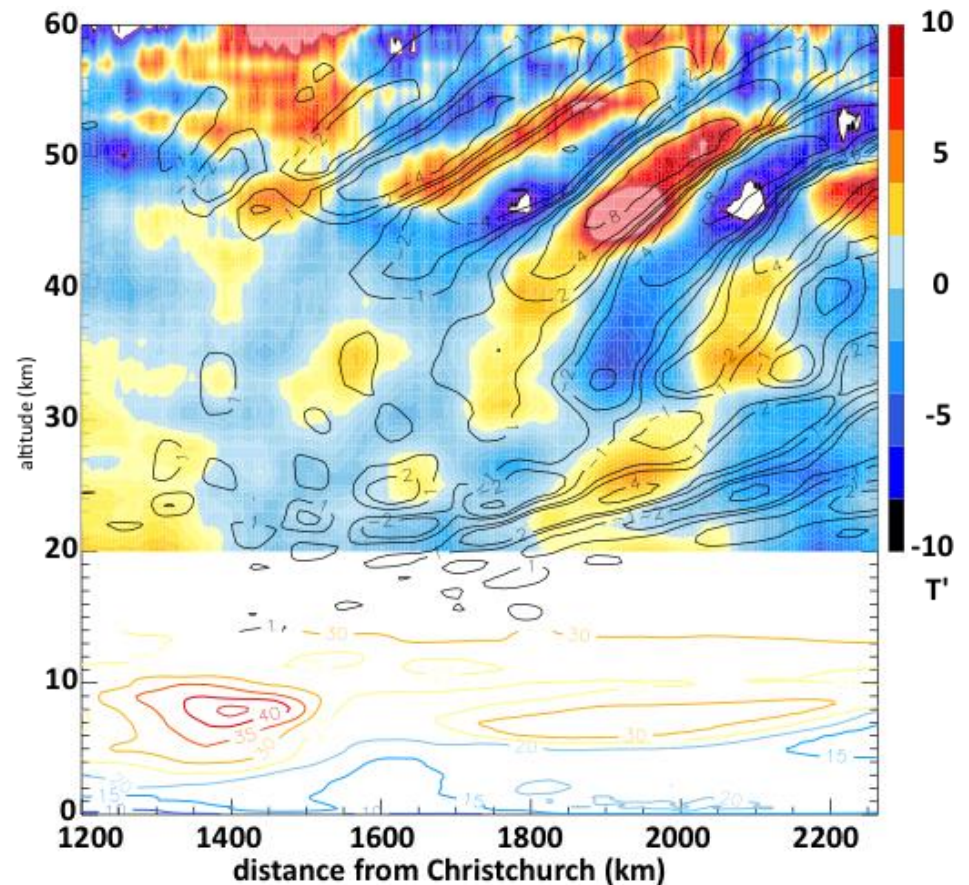


Larger
perturbations
appear to match
with Rayleigh lidar
temps lower down



RF 25

- define sources of large-scale GWs over the southern ocean
- RF25 confirms apparent jet stream Generation and strong growth with altitude
- T' fields are also predicted relatively well by global models having sufficient resolution



Lauder observations – 21 June (and others)

- strong T' , sawtooth MW patterns
- very large momentum fluxes
- strong MW breaking and instabilities

