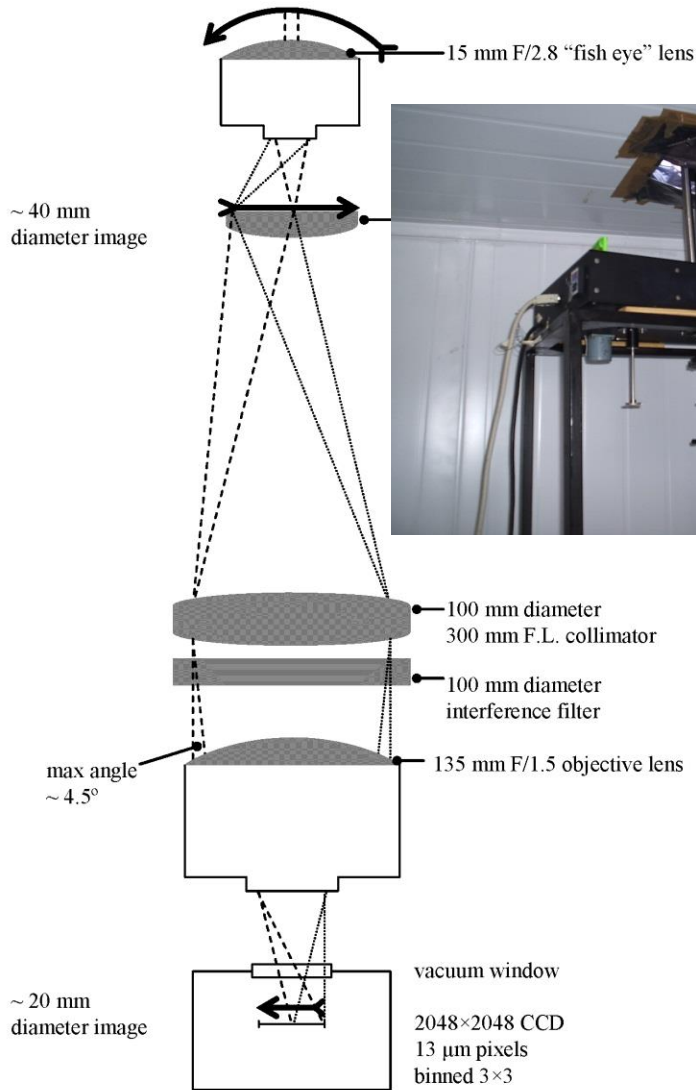


Steve Smith Boston University



Boston University multi-spectral all-sky imagers (ASI) at Mt John Obs., Lake Tekapo and Lauder, Otago
 Nightly mesospheric OH, Na, O₂, and OI (557.7 nm) emissions 87, 90, 94, & 97 km. Also OI (630.0 nm).
 Single wavelength time resolution: 30-90 s, depending on emission.
 Multi-wavelength time resolution: 3-8 minutes, depending on chosen observation profile.

All-sky Instrumentation



All-sky imagers (180° fov), imaging spectrographs (OH & O₂ temperatures), FPI.

Collimating system – also new telecentric systems.

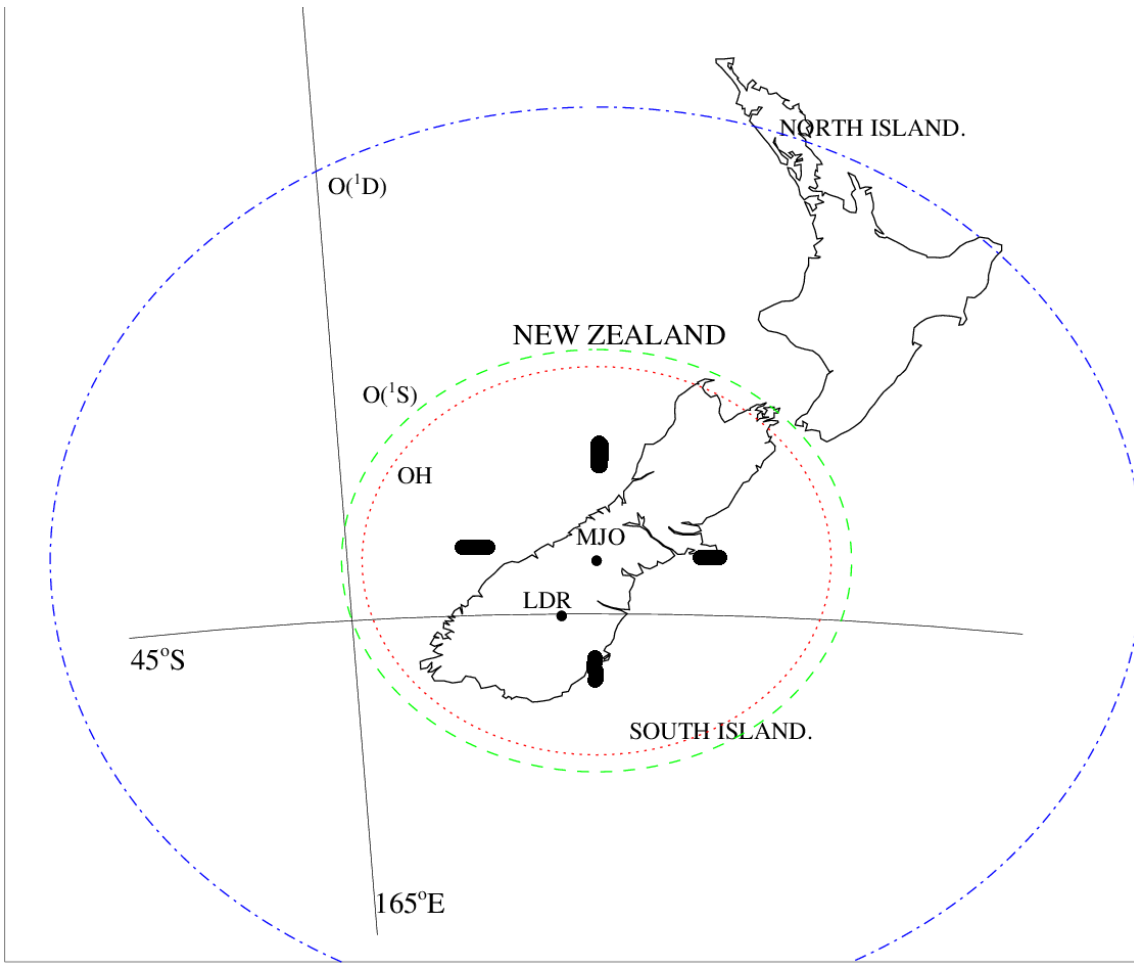
Filter-wheel housing six 4" interference filters.

1. OH 695 nm broadband red-NIR.
2. Na (589.0, 589.6 nm)
3. O₂(0-1) band 865.0 nm
4. O(¹S) 557.7 nm,
5. O(¹D) 630.0 nm FWHM (1.2 - 1.8 nm)
6. Offband: 572.9 nm (MJO) 605.0 nm (LDR) (1.4 nm)

Nominal integration times: 30–120 secs, can be altered.

Imagers operate nightly during moonless periods with filters being used in a repeating sequence throughout the night.

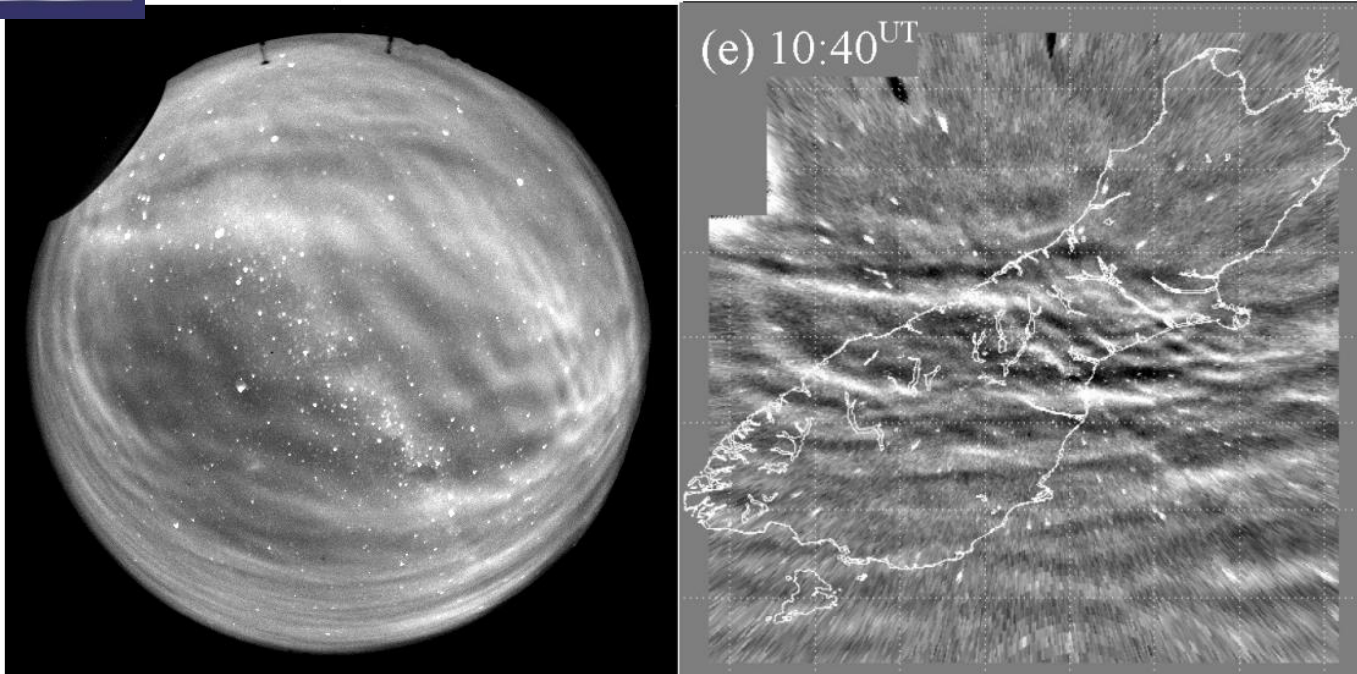
Images of a given emission every 6-8 minutes.



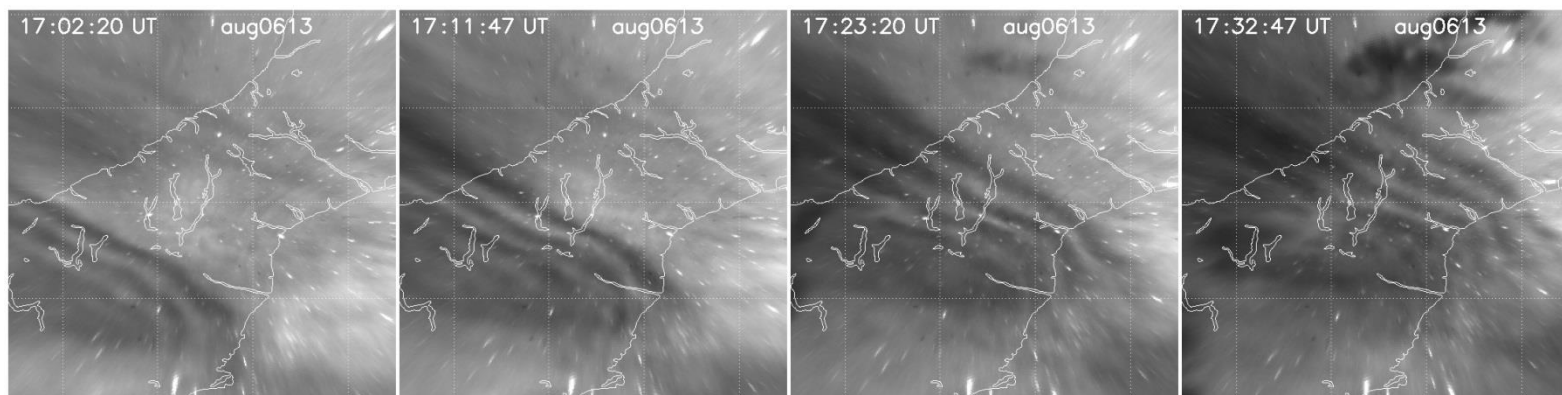
Locations of all-sky imagers at Mt John Obs. (MJO) and Lauder (LDR) (proposed).

Field of views for the OH, $O(^1S)$ & $O(^1D)$ emissions down to 10° elevation shown.

Sampling areas of OH emission by FPS.

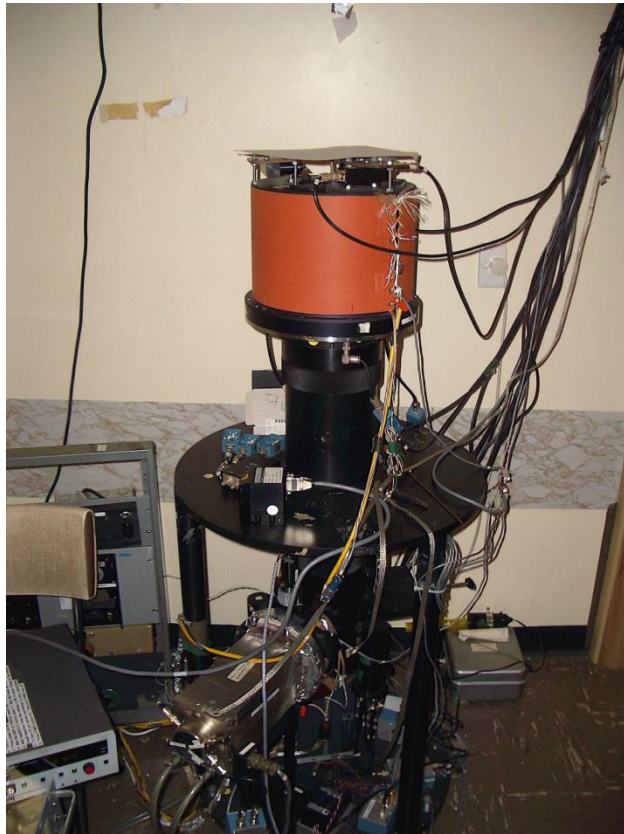


Example of raw and unwarped images in OI 557.7 nm emission at 97 km altitude. Mt John Observatory 4 March 2009.



Frontal gravity wave disturbance in OI 557.7 nm emission at Mt John Observatory on 6 August 2013.

U. of Washington Fabry-Perot Spectrometers



PI: Prof. Gonzalo Hernandez University of Washington

Two U. of Washington FPS at Mt John Observatory

MJO:

OH 840.0 nm 87 km

O(¹S) 557.7 nm 97 km

MKO:

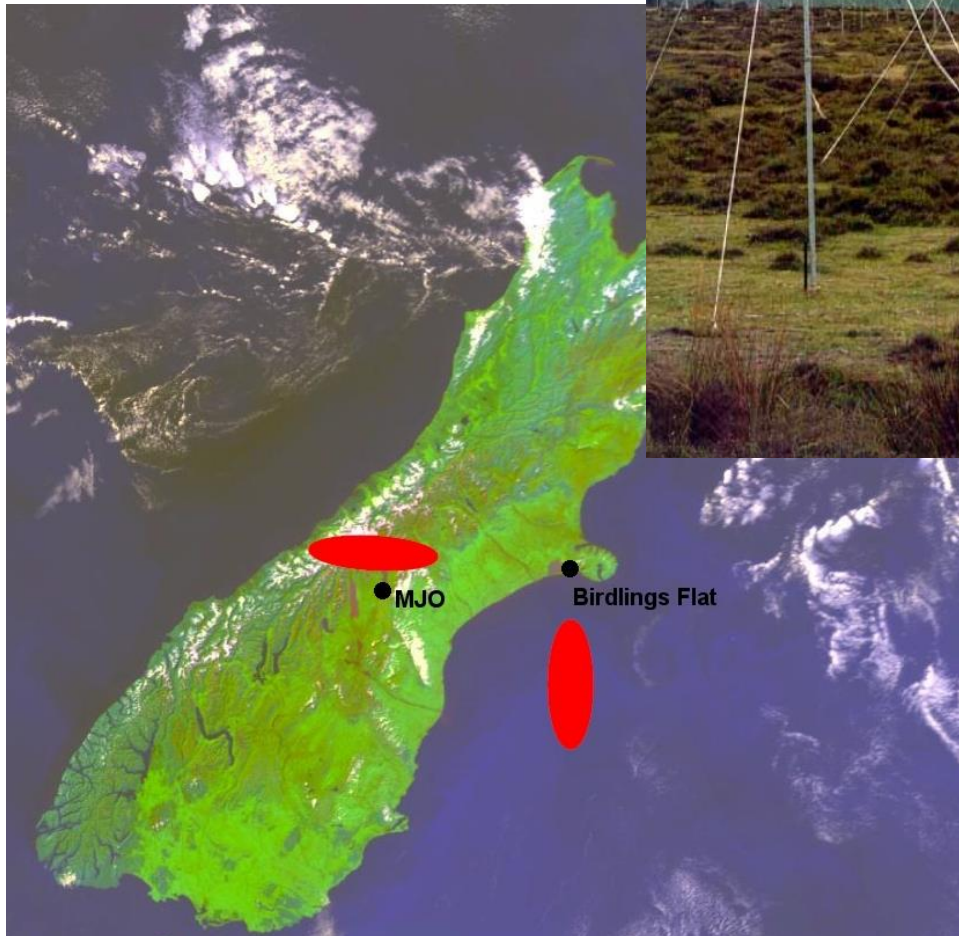
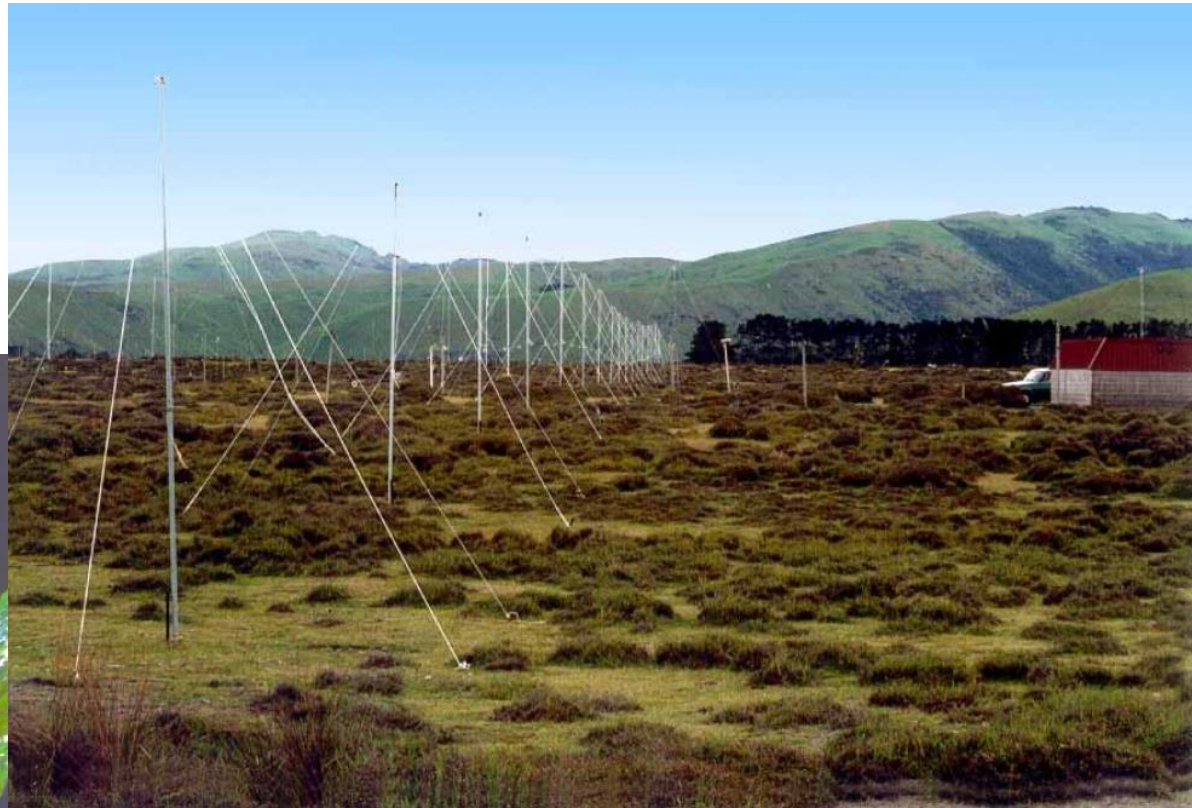
O₂(0-1) 865.0 nm 94 km

O(¹D) 630.0 nm 250 km

Samples N, E, S, W at 20° elevation and zenith in cyclic sequence during course of night.

Yields horizontal neutral winds, temperatures and emission radiance measurements to $\pm 1\%$ every 3-4 minutes in each direction.

PI: Prof. Jack Baggaley
University of Canterbury
TX 42.5 MHz (~7m)



~2000 returns per day at 80-120 km
Diurnal variation ~1 every 5s dawn at
~1 every 5 minutes at dusk.
<1 km height res.

During each night: The ASI will each yield ~80 images in each emission (~6pm – 7am NZST)

Start time: ~6UT (Boston 2am)

End Time: ~19UT (Boston 3pm)

Semi-real-time mode:

- Provide unwrapped images showing presence (or not) of GW's in MLT images)
- 2-D context, propagation direction, origin, speed, horizontal scale-sizes.

In conjunction with co-located meteor radar and FPS data:

- Propagation direction, mode, phase and group speeds, horizontal and vertical scale-sizes during each night
- Vertical flux of horizontal momentum estimates associated with GW's in OH, O₂, and O(¹S) emissions at 87, 94, 97 km.
- Emission radiance measurements.
- Tomographic sections of wave field.