Gravity Wave Characteristics from OH airglow imager at Andes Lidar Observatory, Chile(30S,71W) and Comparison with Maui

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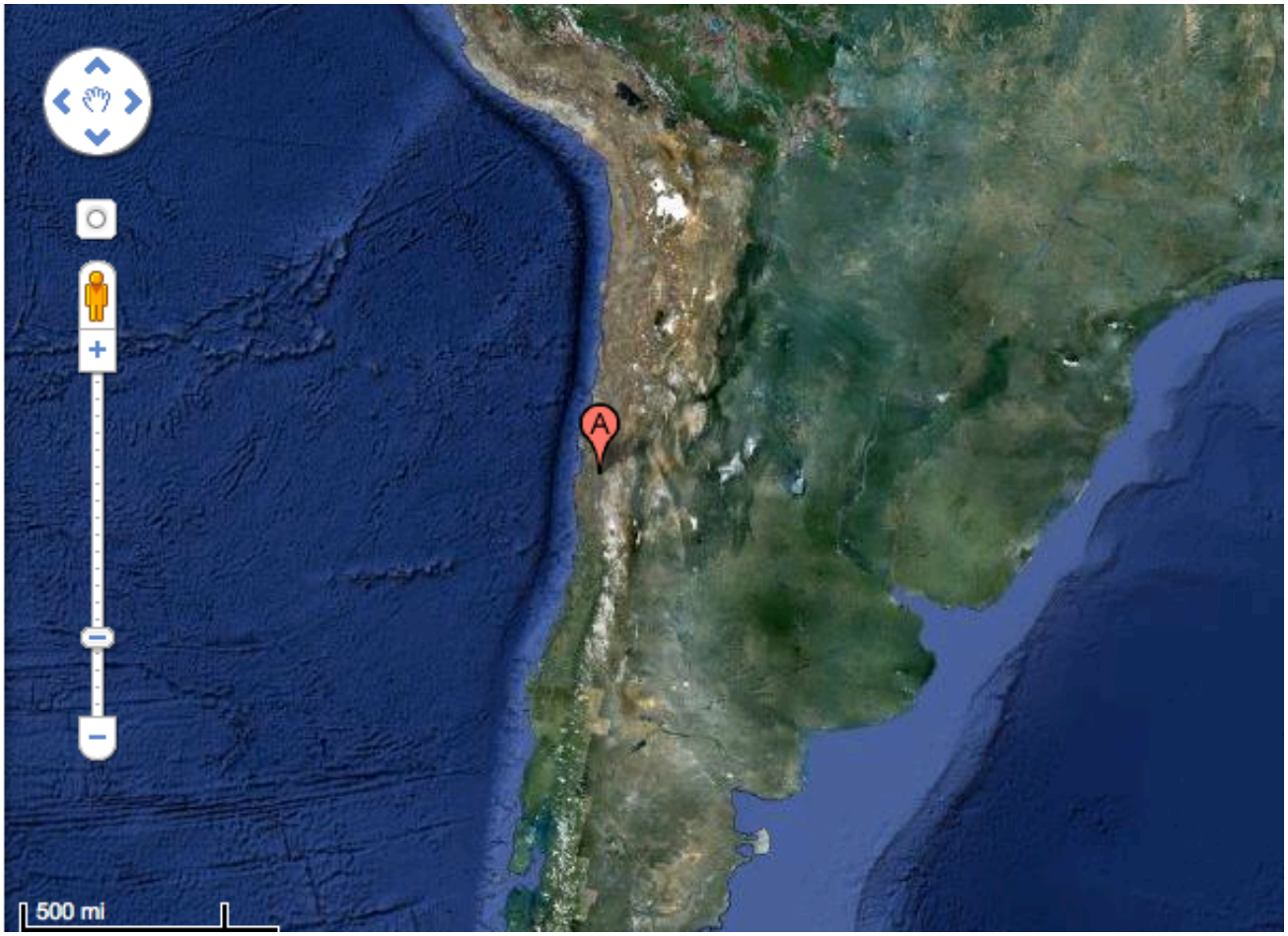
[1] University of Illinois at Urbana-Champaign

[2]Embry-Riddle Aeronautical University

Outline

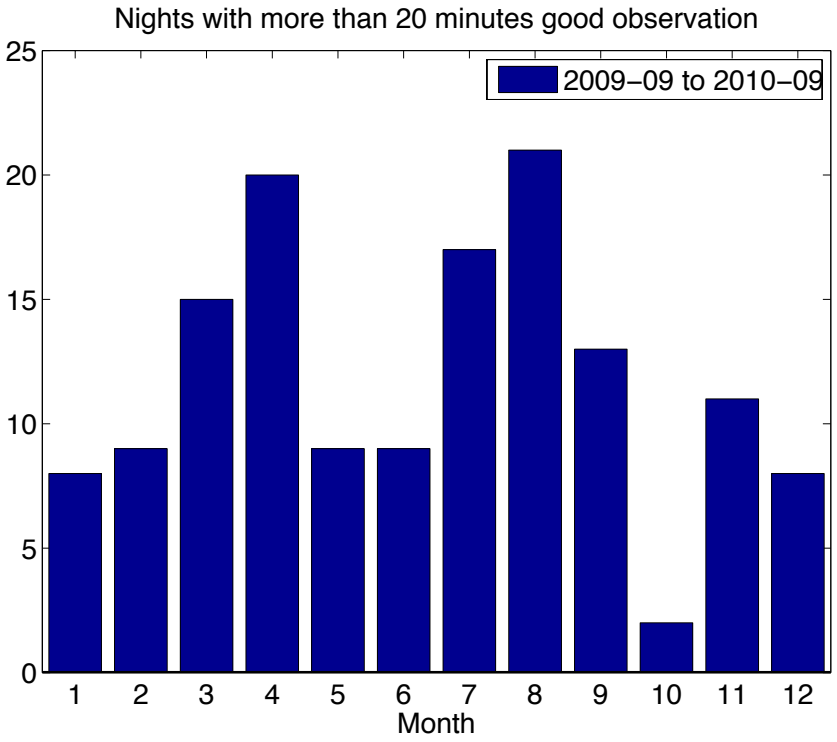
- Observation site and data
- Brief introduction on method
- Wave characteristics and comparison with Maui, Hawaii

ALO (30S, 70W)

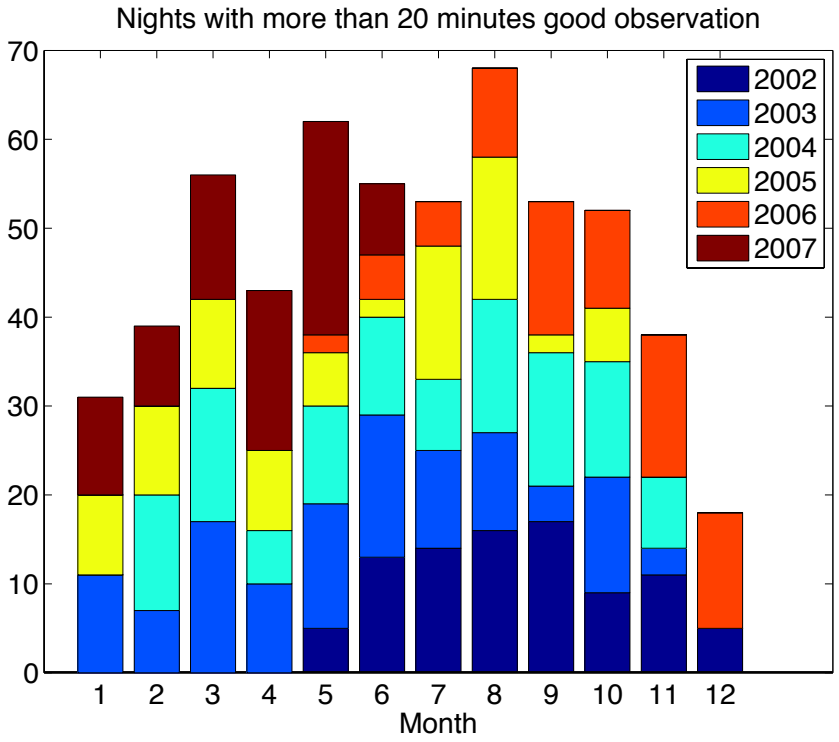


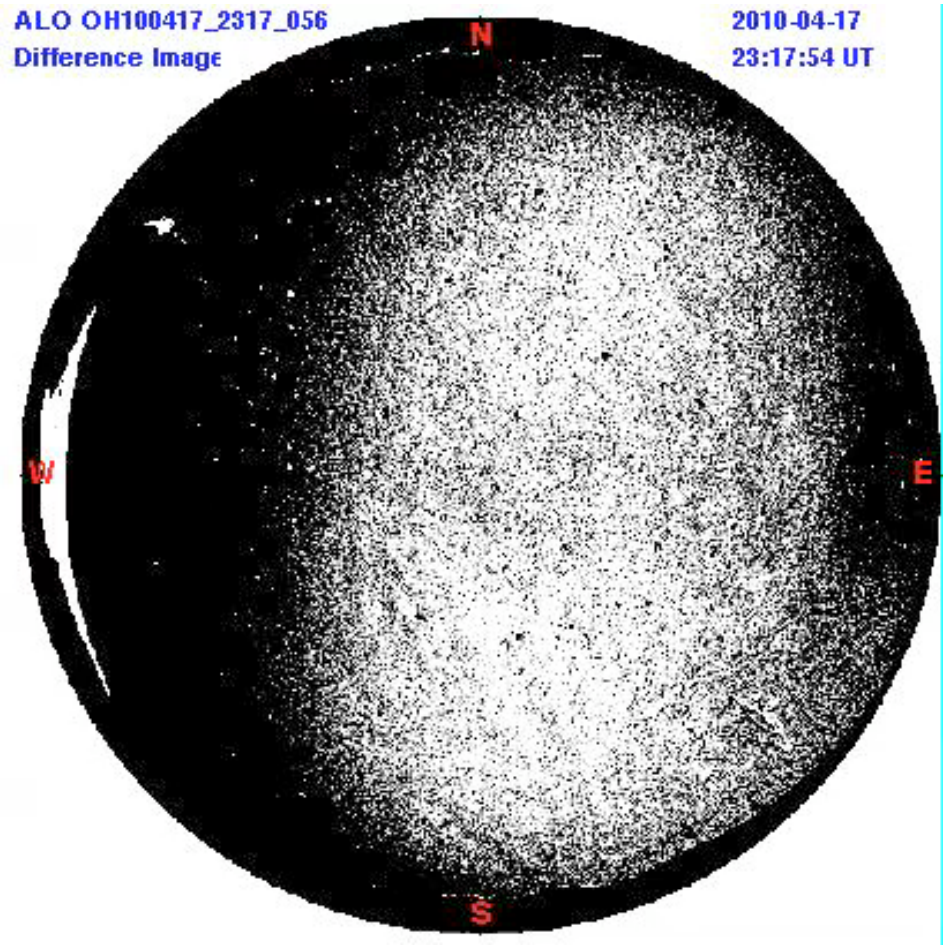
Total number of observation

ALO



Maui



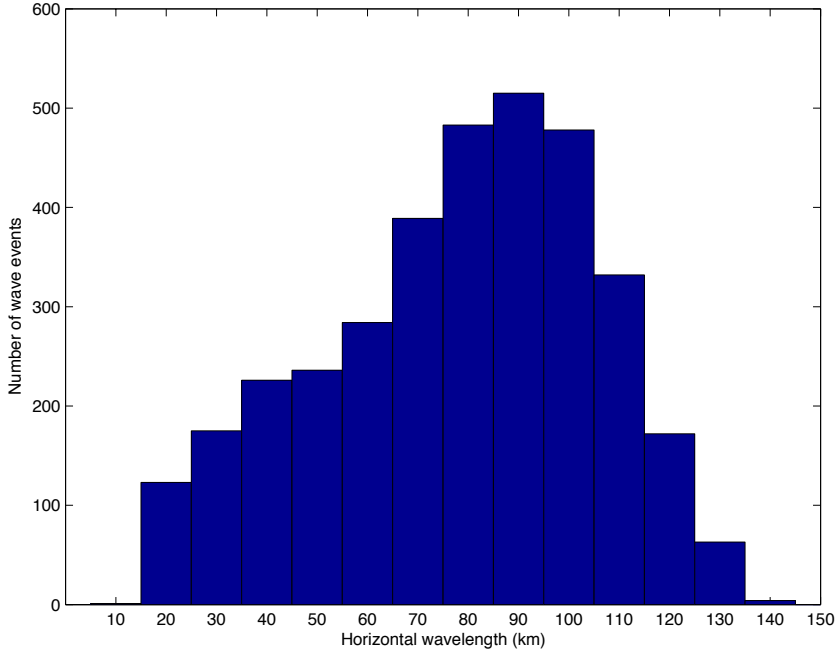

ALO OH100417_2317_056
Difference Image
2010-04-17
23:17:54 UT
N
W
E
S

Method

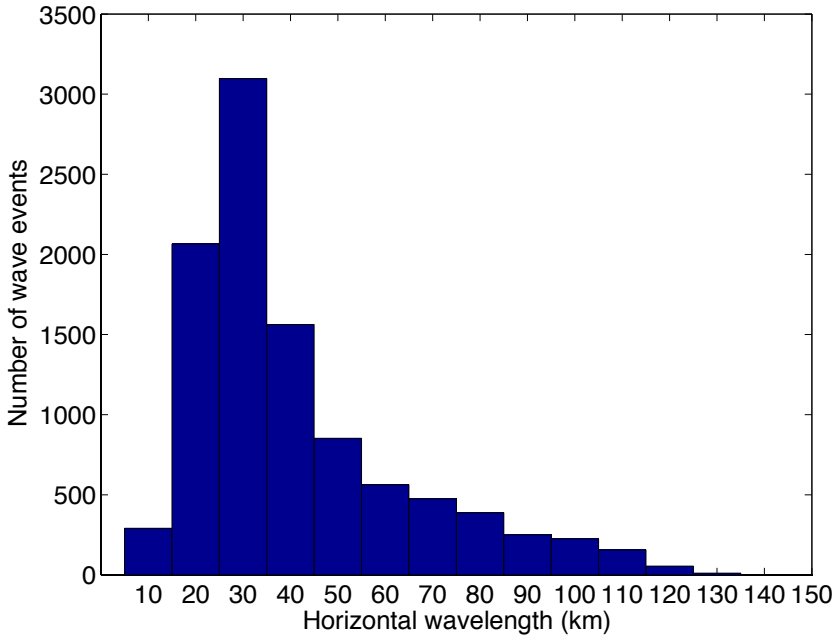
- Gravity wave spectra (horizontal wavelength and propagation directio)are identified through 2-D FFT on time-difference OH airglow images
- Phase speed and wave period are inferred from phase progression between consecutive images

Horizontal Wavelength

ALO

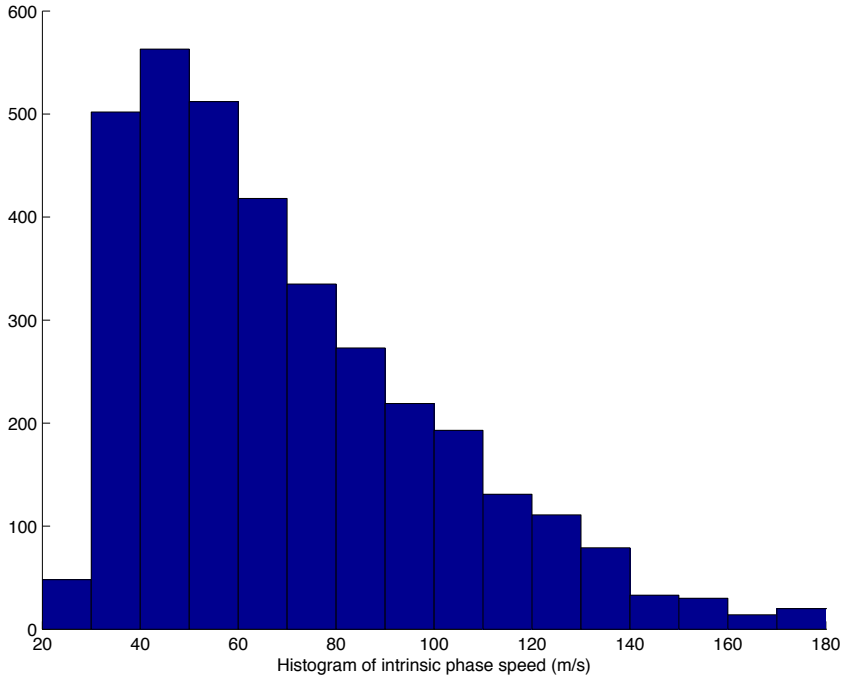


Maui

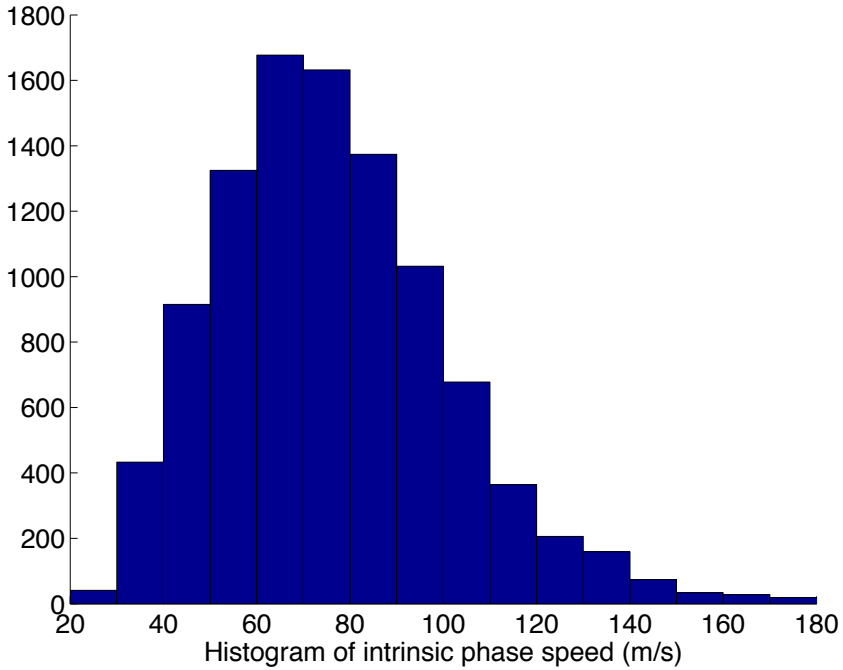


Intrinsic phase speed

ALO

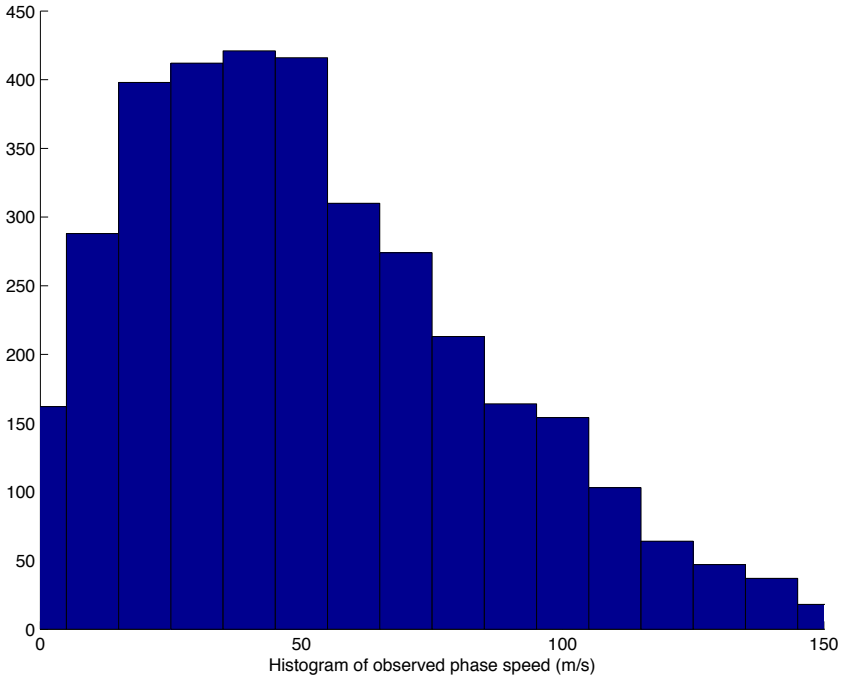


Maui

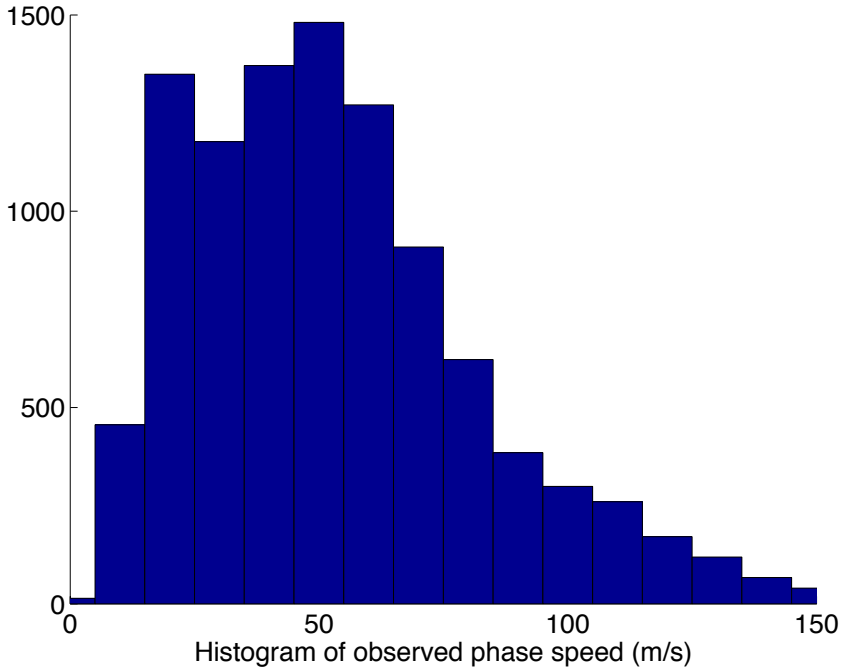


Observed phase speed

ALO

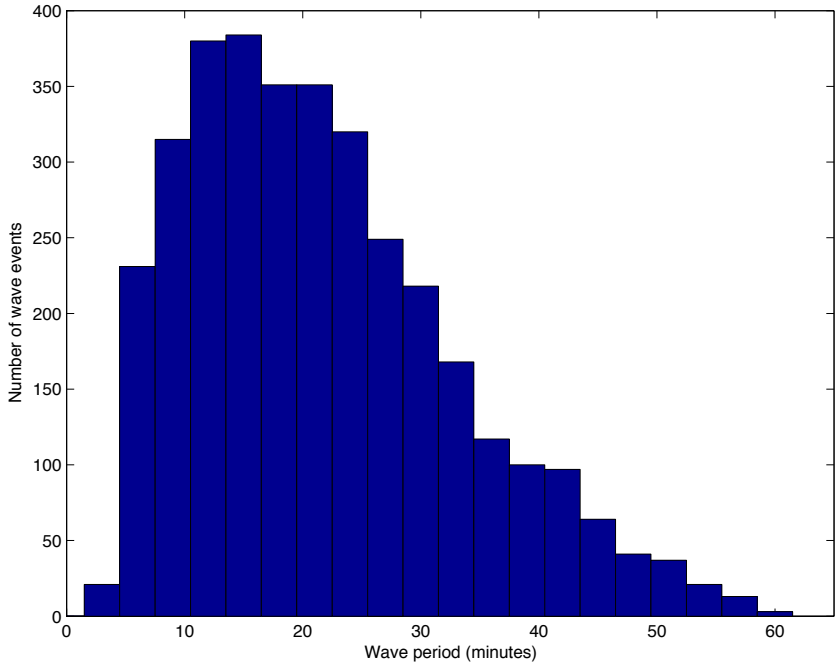


Maui

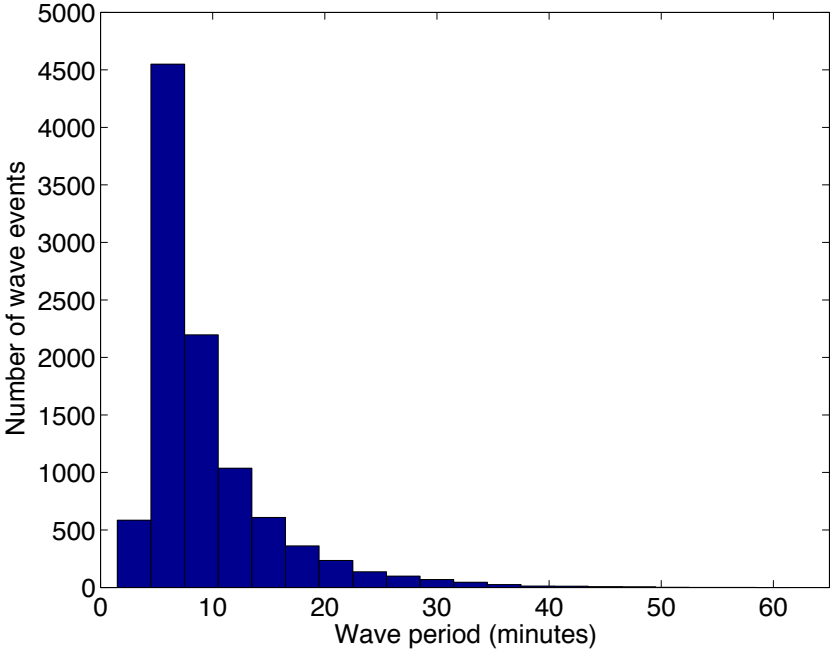


Intrinsic wave period

ALO

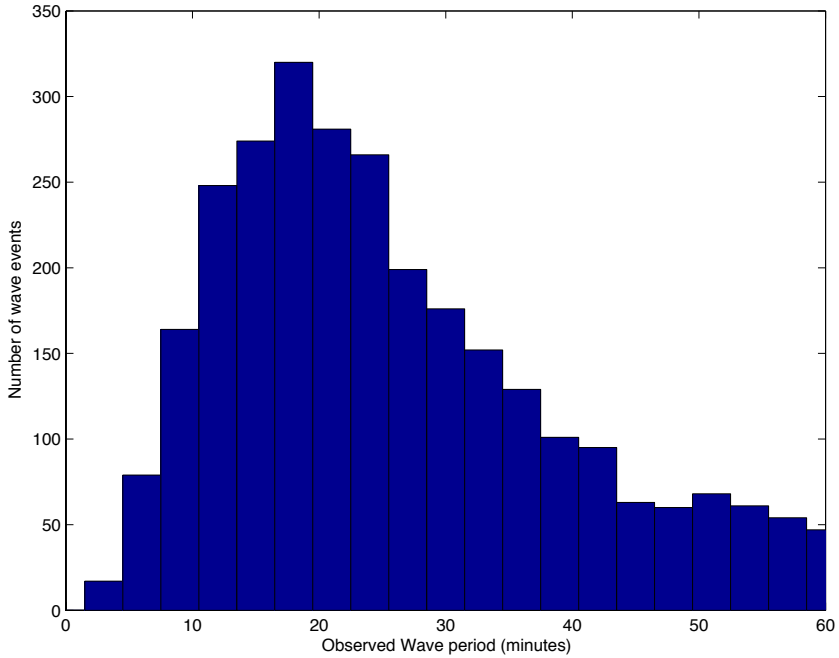


Maui

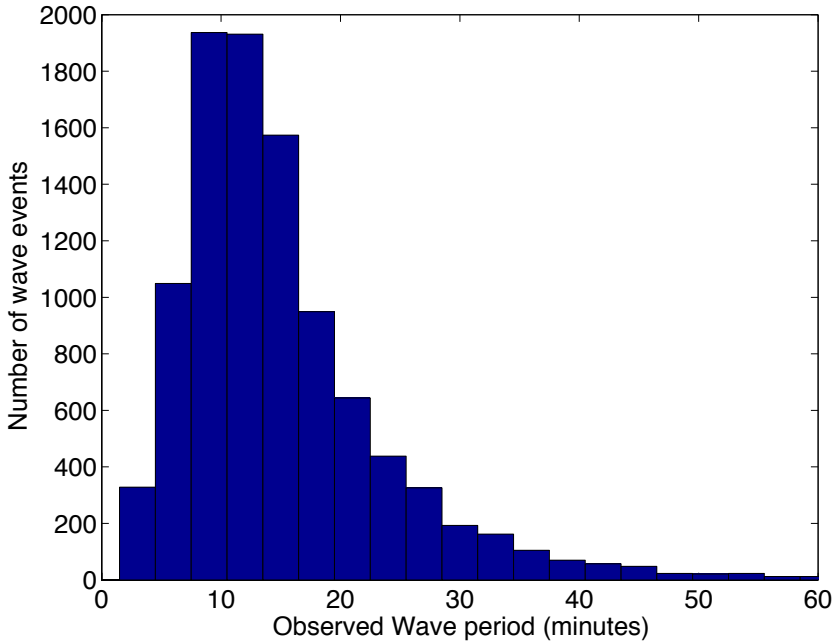


Observed wave period

ALO

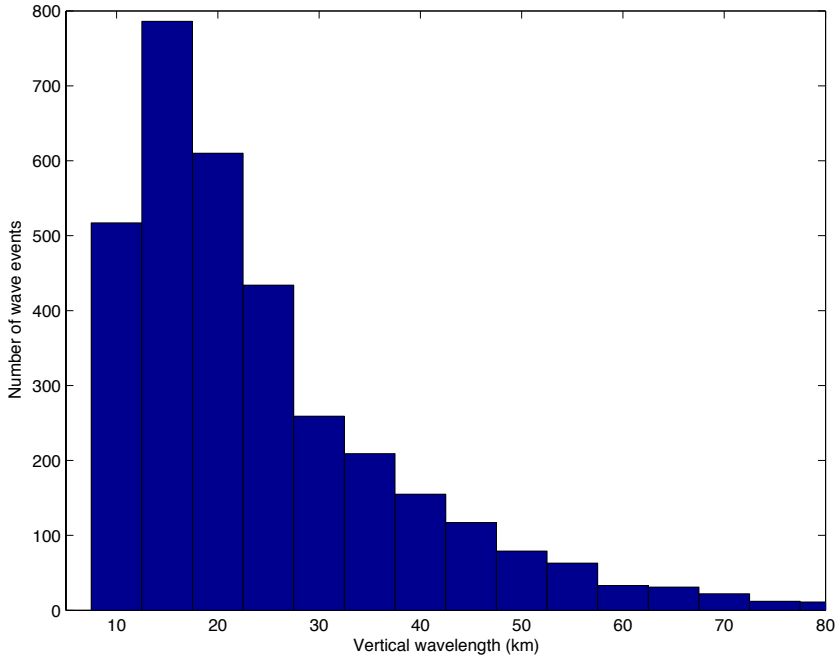


Maui

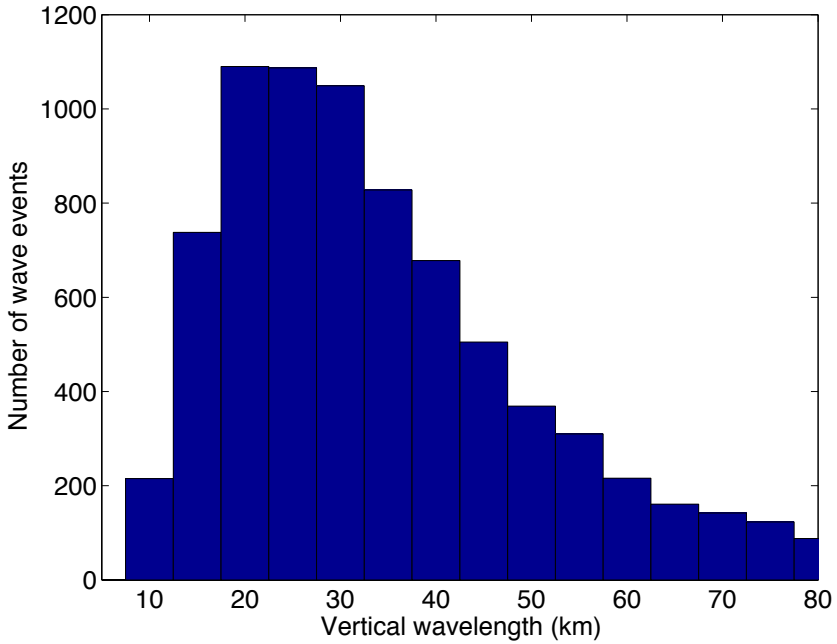


Vertical wavelength

ALO

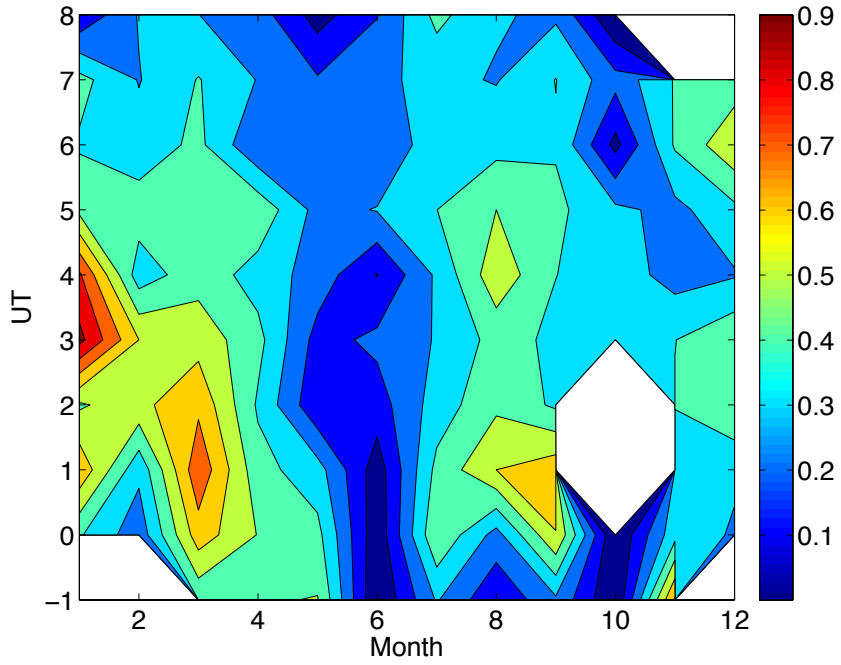


Maui

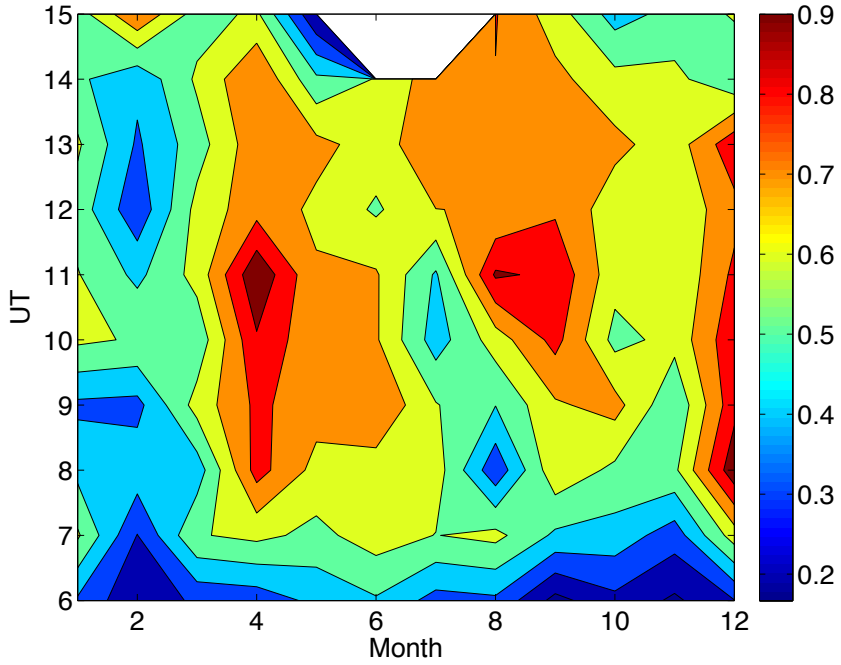


Wave occurrence frequency

ALO

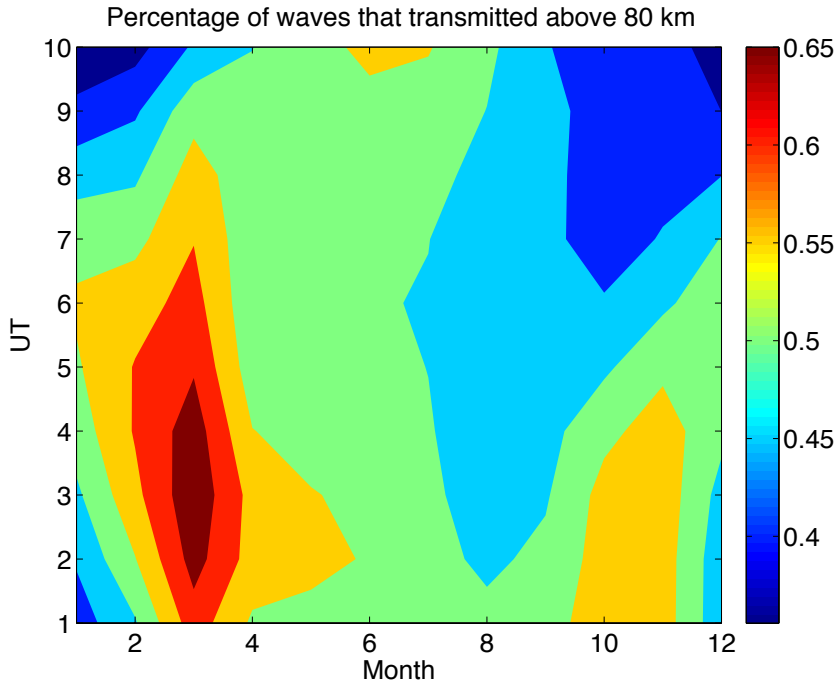


Maui

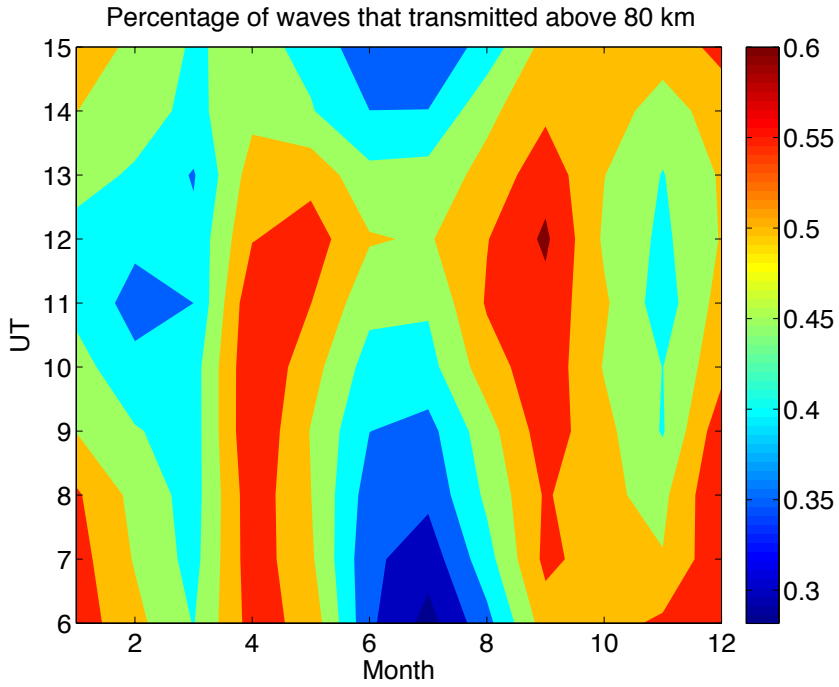


Gravity wave transmission through lower atmosphere

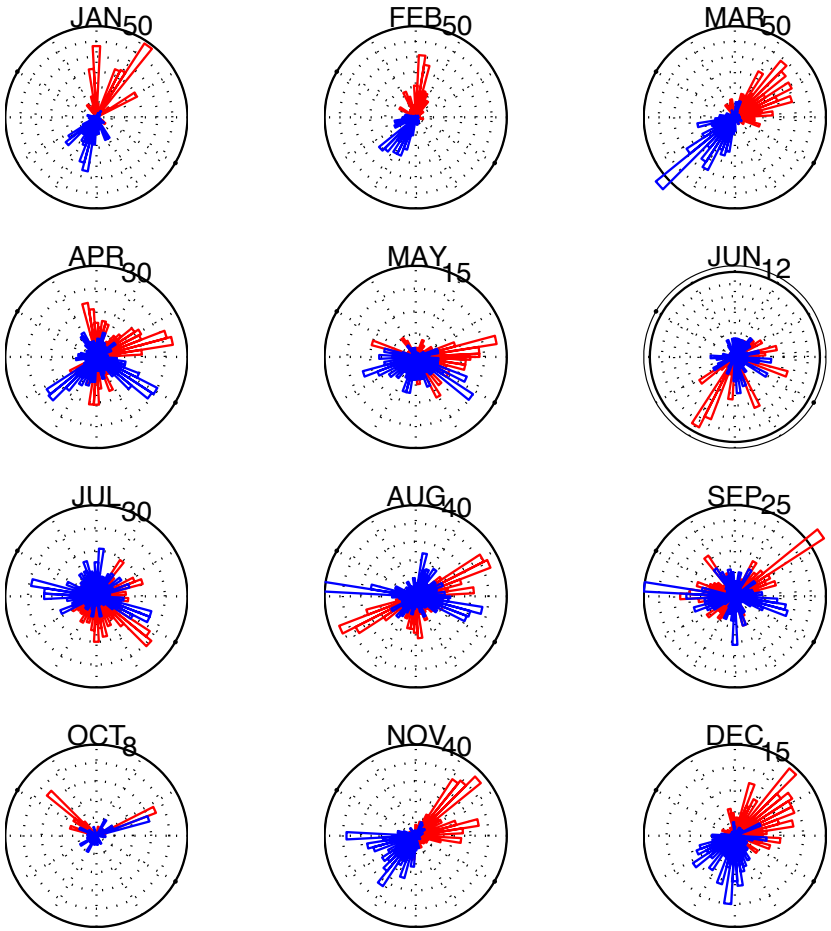
ALO



Maui



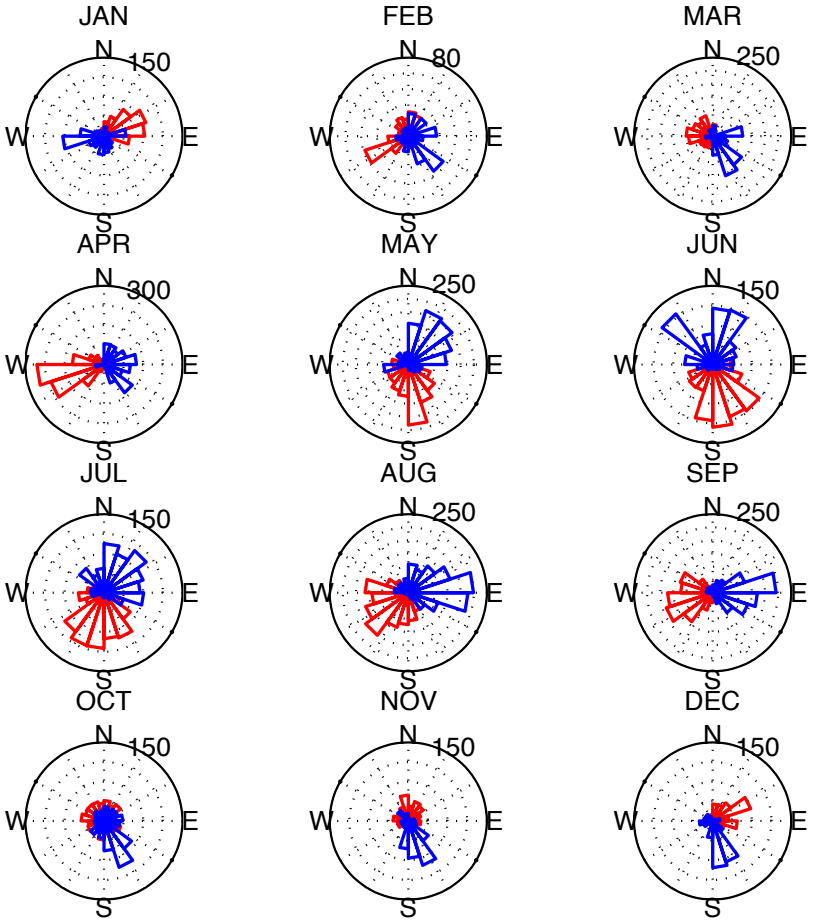
Wave propagation direction, ALO



Summer: dominantly toward summer Pole

Generally a preference toward SW thoughout the year.

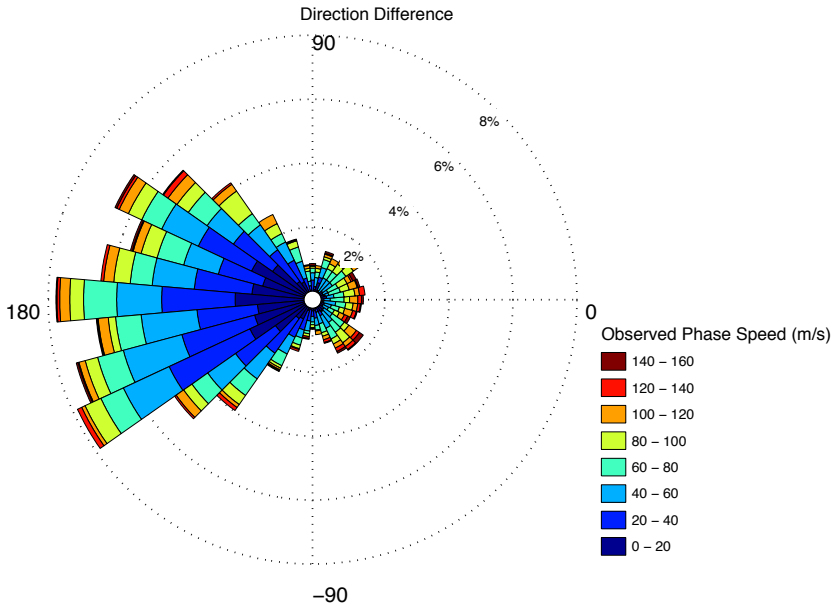
Maui, wave propagation direction



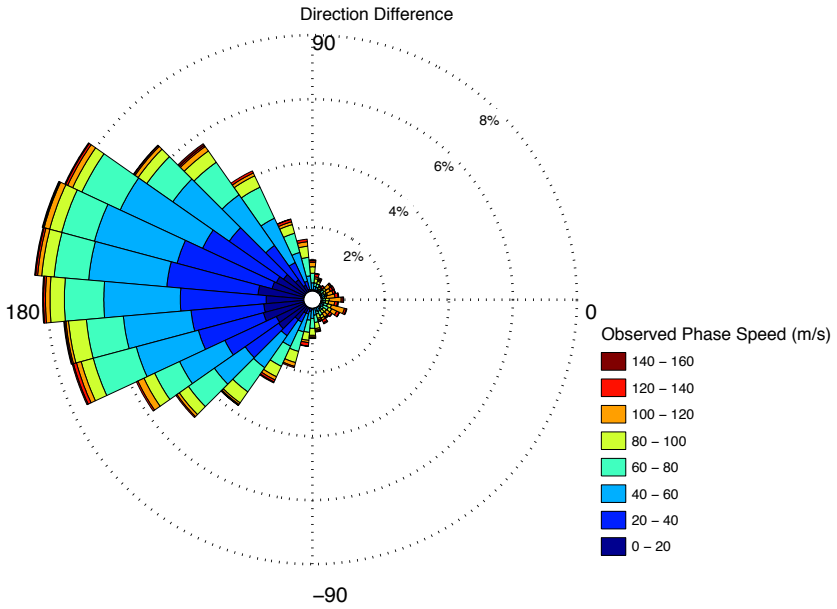
During winter/summer, preferentially propagation toward summer pole.

Wave propagation direction relative to local mean wind

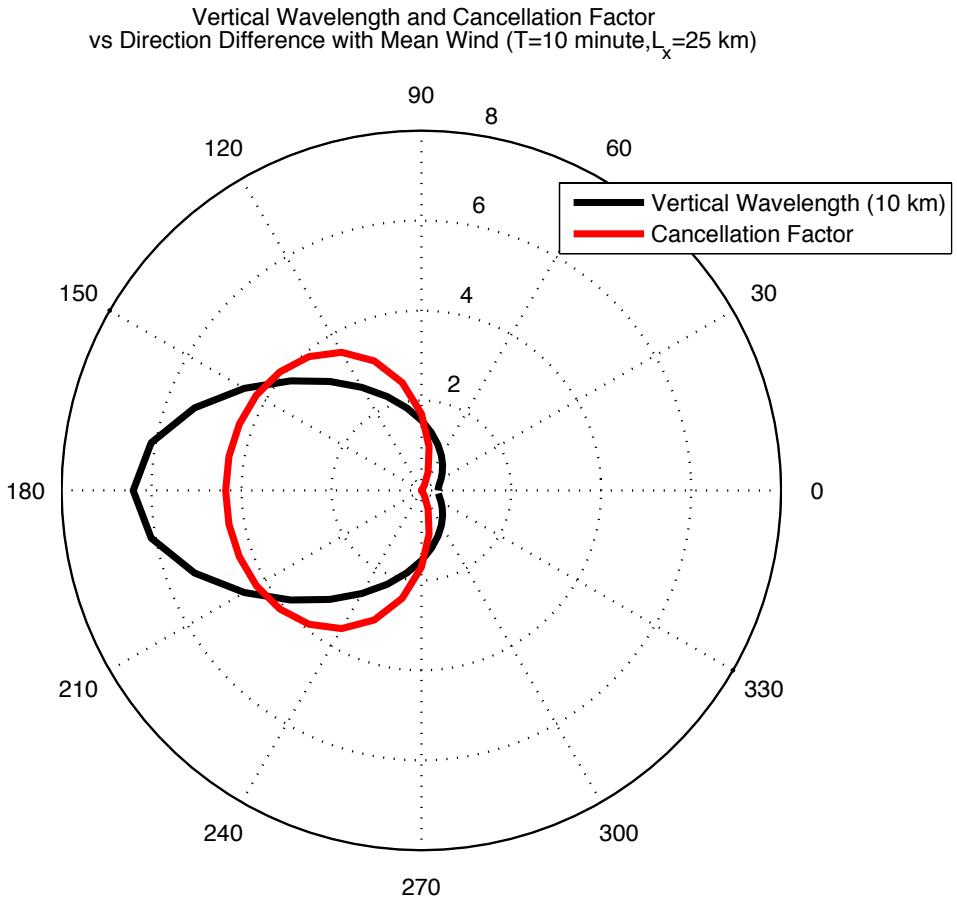
ALO



Maui



Doppler-shift effects



Summary

- Gravity waves observed over ALO, Chile have longer horizontal wavelength, longer wave period than those over Maui
- Waves at both sites tend to propagate against local mean wind demonstrating the effects of Doppler-shifting
- The difference in wave parameters in the two sites implies dominant wave sources for the two sites are different. Especially, for ALO, there seem to be a dominant source region in the NE direction.
- Wave occurrence frequencies at both sites match well with wave transmission through the mean flow.