Jicamarca All-Sky Imager: ESF observations

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All-Sky Imager Description

- Installed in March 2014
- Running every night except for a few days around full moon
- We have four filters for measuring airglow
  - 630.0 nm
  - 777.4 nm

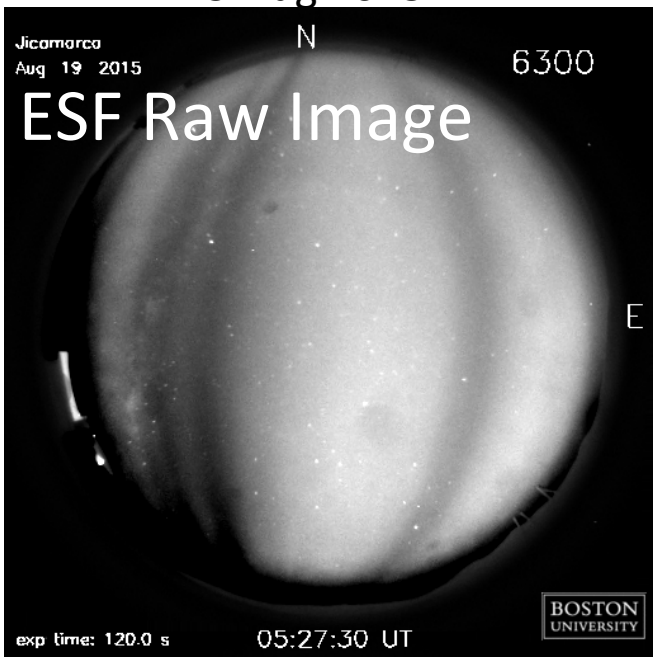
  } F Region: Equatorial Spread F

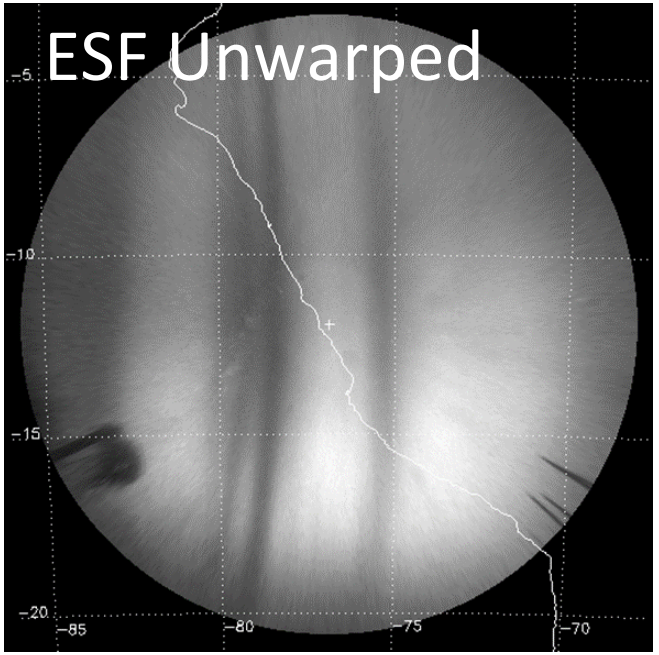
  - 557.7 nm
  - 695.0 nm

  } Mesosphere: Gravity Waves

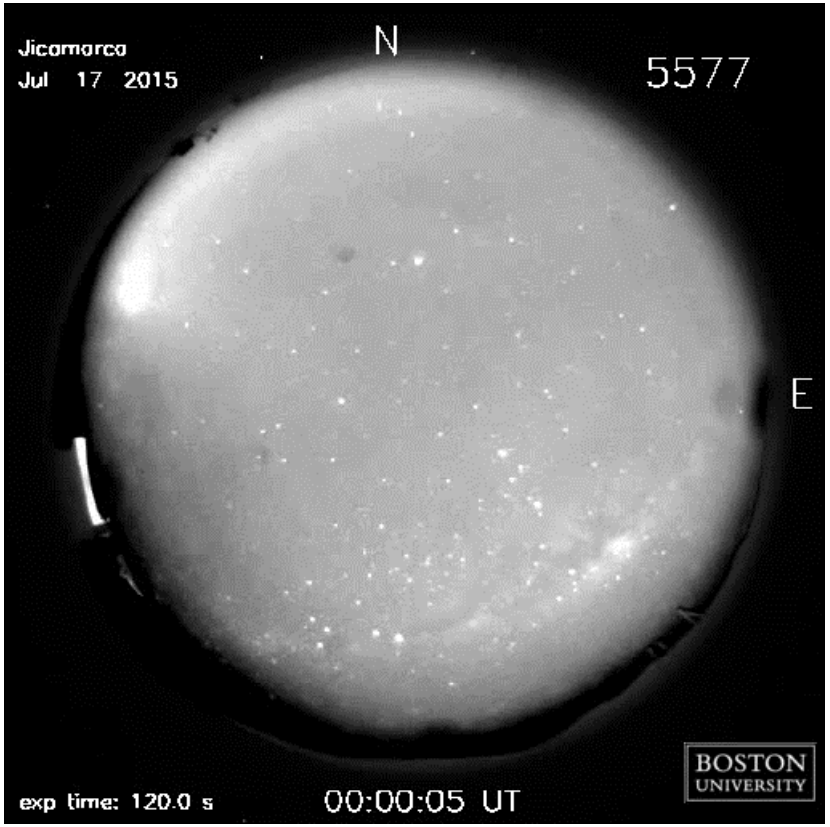
Examples

19 Aug 2015

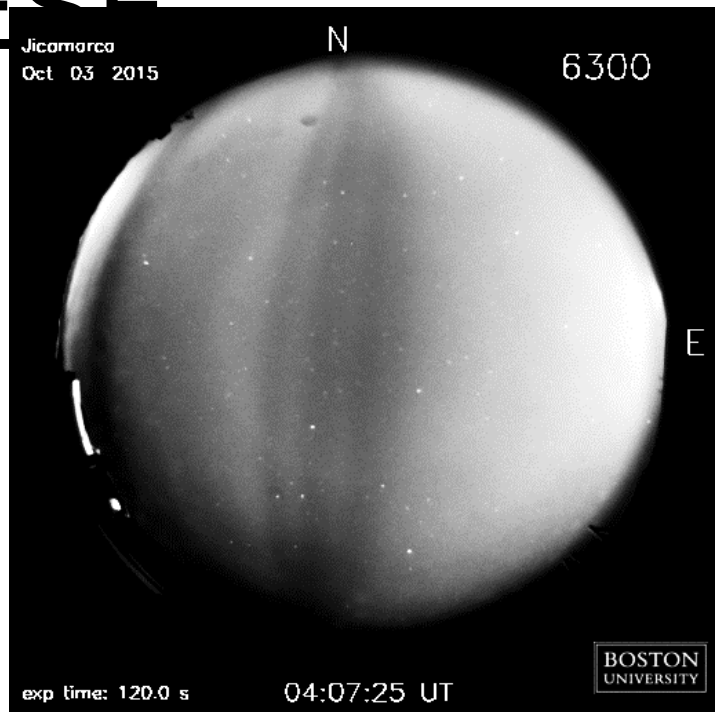




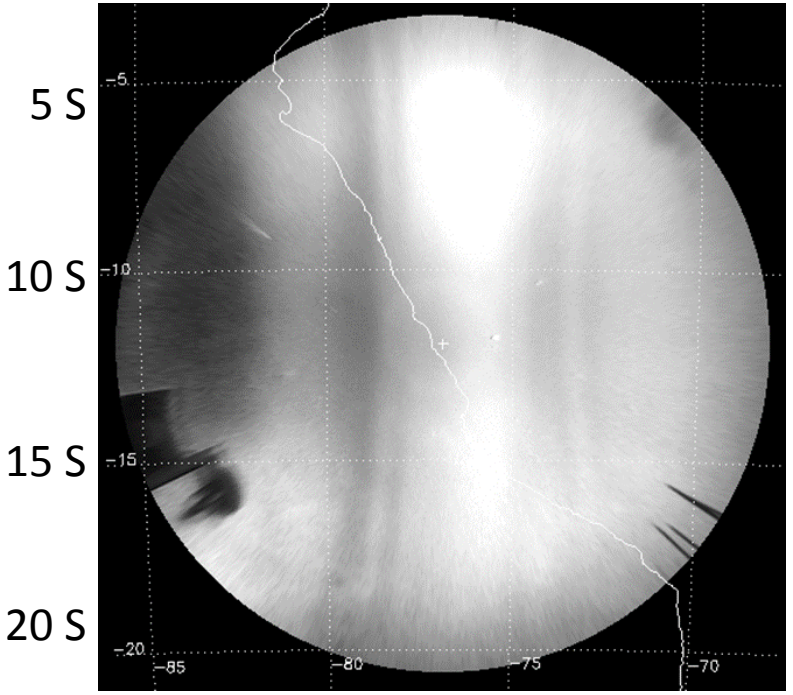
Gravity Waves



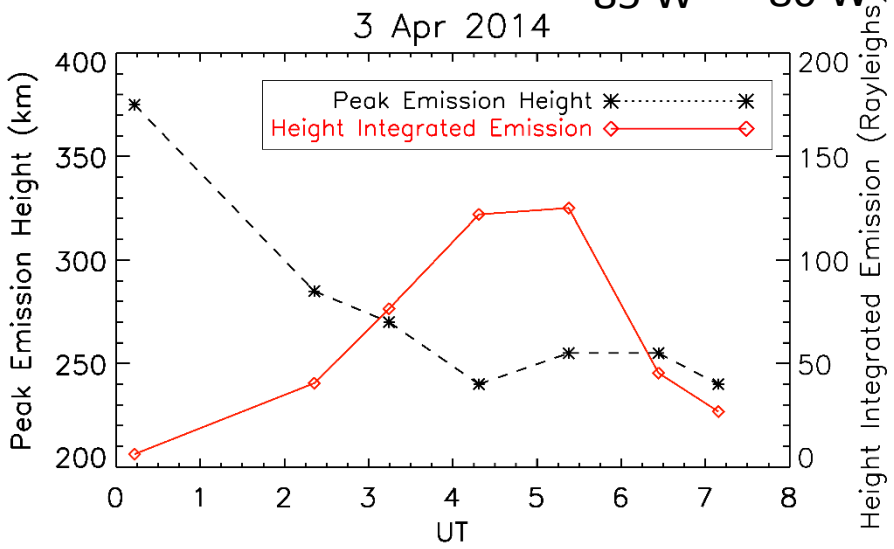
Depletions associated with ESF



3 October 2014



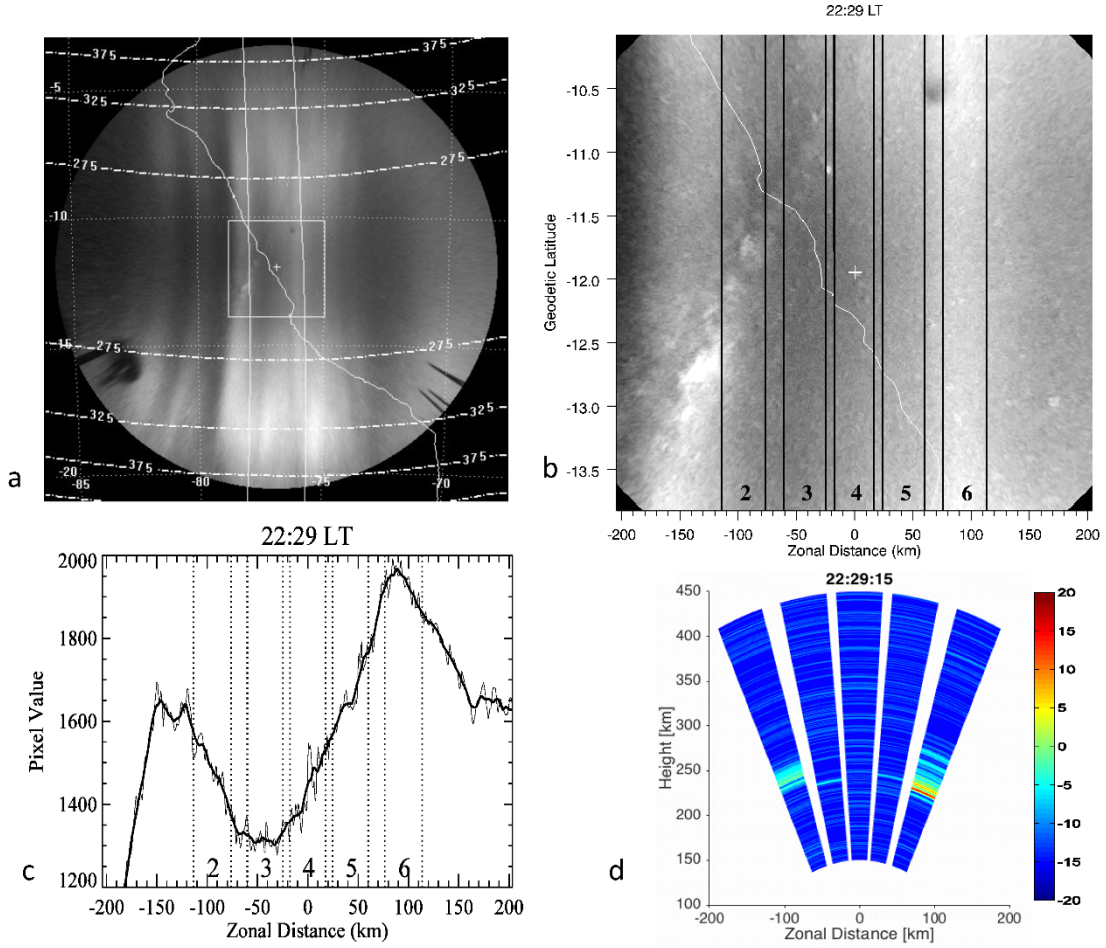
3 April 2014



Work with other instruments

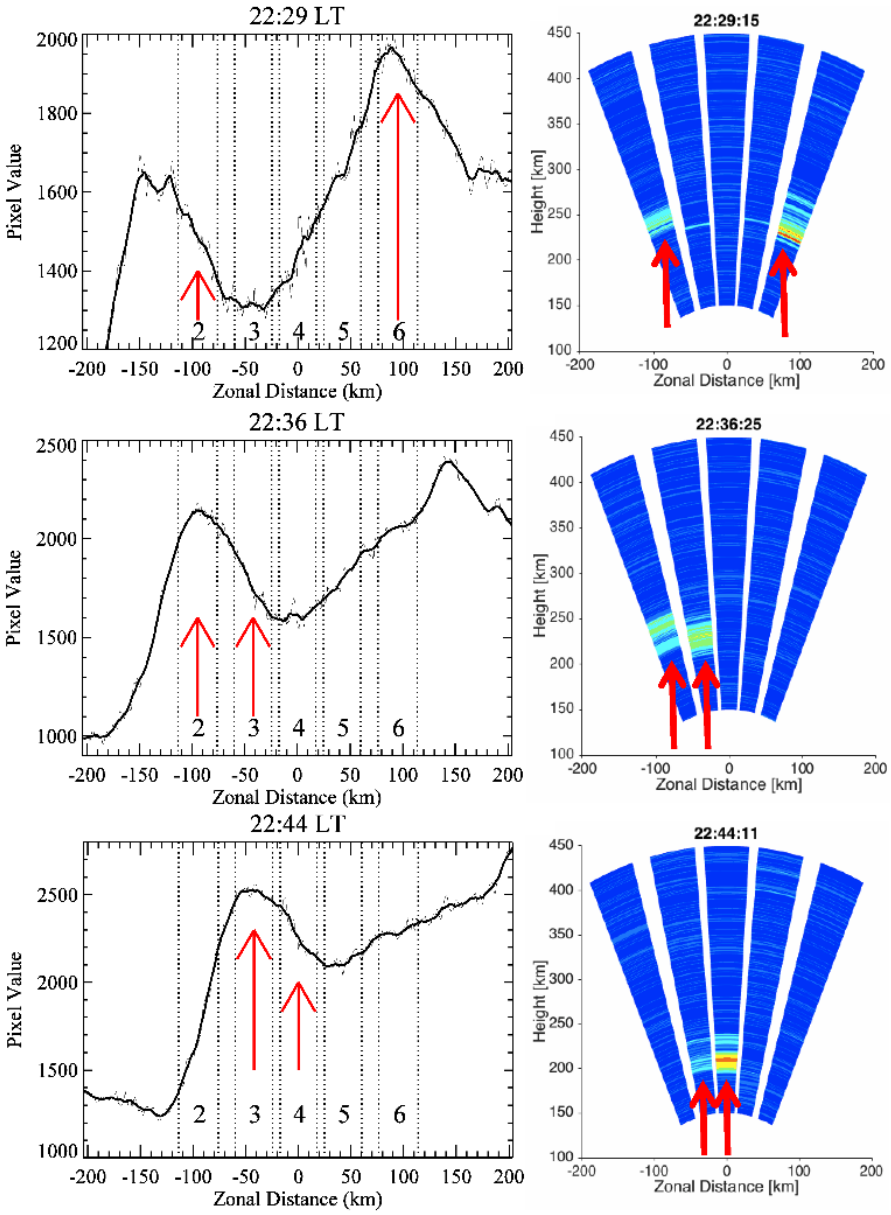
- At Jicamarca we have the advantage of being collocated with many complementary instruments
- ISR
  - Measure electron and ion densities to compare with the location of the depletions
- JULIA (50 MHz) and AMISR-14 (445 MHz)
  - Coherent backscatter from ESF
- Ionosonde
  - Ionosphere densities and heights
- FPI
  - Winds to compare with depletions
- Satellites

Concurrent Observations with AMISR



Hickey et al. 2015

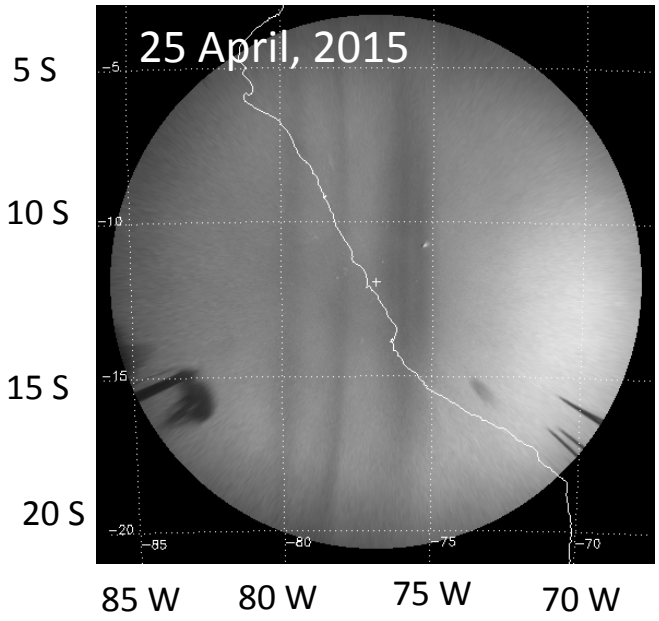
- Compare large scale structures (hundreds of km) with small scale irregularities (0.34 m)

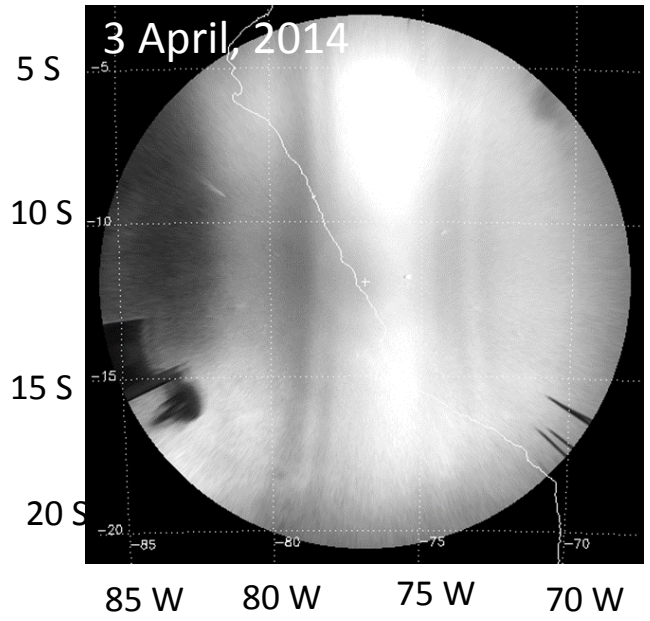


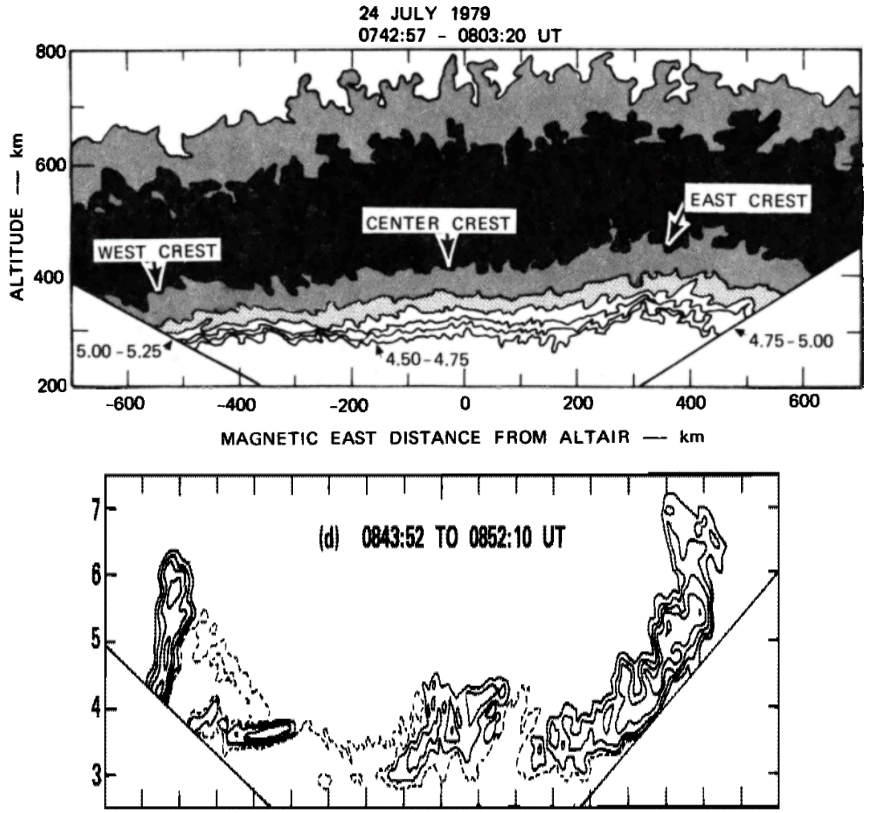
Hickey et al. 2015

- We found that on this night irregularities were more likely to be found on the western wall of the depletion
- These images show an example where the irregularities on the western wall move with the depletion

Bottomside ESF spacing



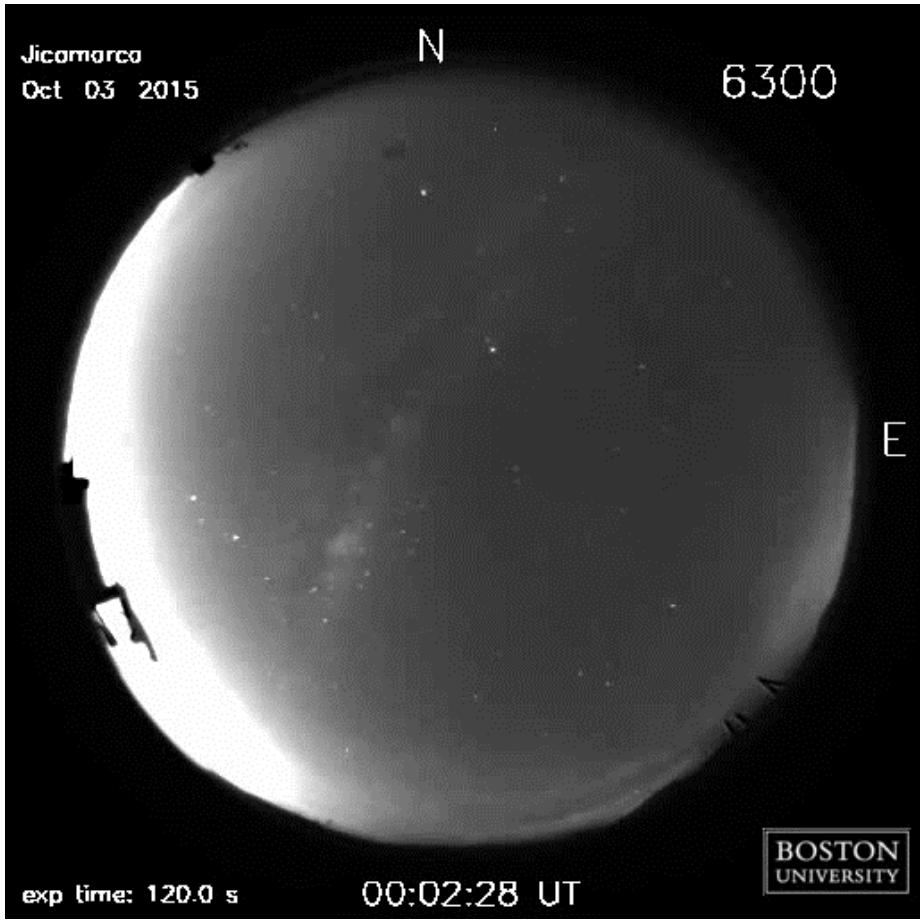


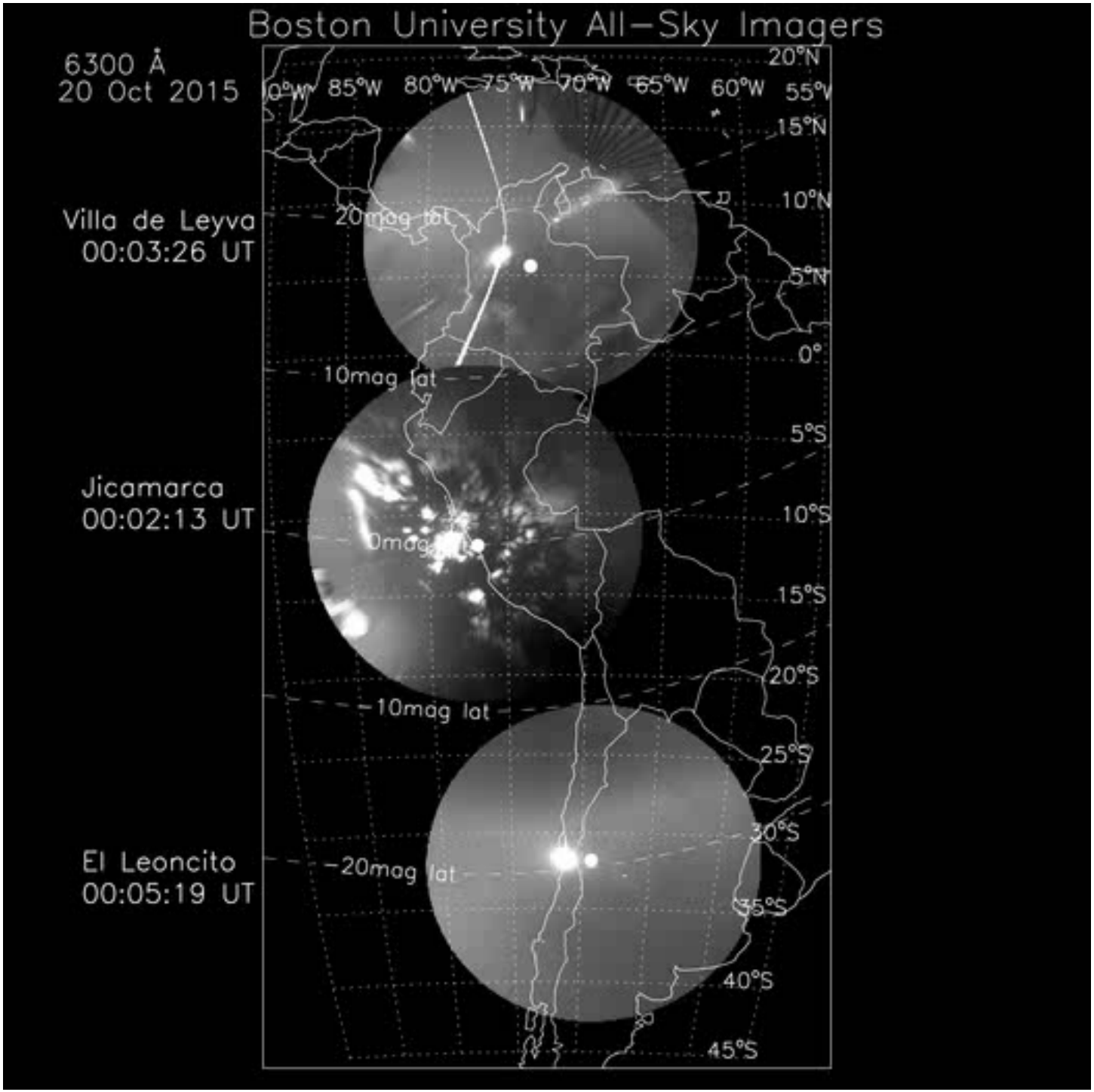


Tsunoda and White, 1981

- Grouping of depletions
- Separation within grouping 100-200 km
- Group to group separation 400-500 km

Unusual Poleward Brightening




Boston University All-Sky Imagers
6300 Å
20 Oct 2015
Villa de Leyva
00:03:26 UT
Jicamarca
00:02:13 UT
El Leoncito
00:05:19 UT
20mag lat
10mag lat
0mag lat
10mag lat
20mag lat
90°W
85°W
80°W
75°W
70°W
65°W
60°W
55°W
20°N
15°N
10°N
5°N
0°
5°S
10°S
15°S
20°S
25°S
30°S
35°S
40°S
45°S

Summary

- All sky-imager has been running at Jicamarca for over two years
- We compared large scale depletions with small scale irregularities and found that the western wall was favored for bottomside irregularities
- We are investigating the spacing and grouping of depletions and our results indicate that 400-500 km waves are important for the modulation of ESF depletions
- Quick look images can be found on buimaging.com