

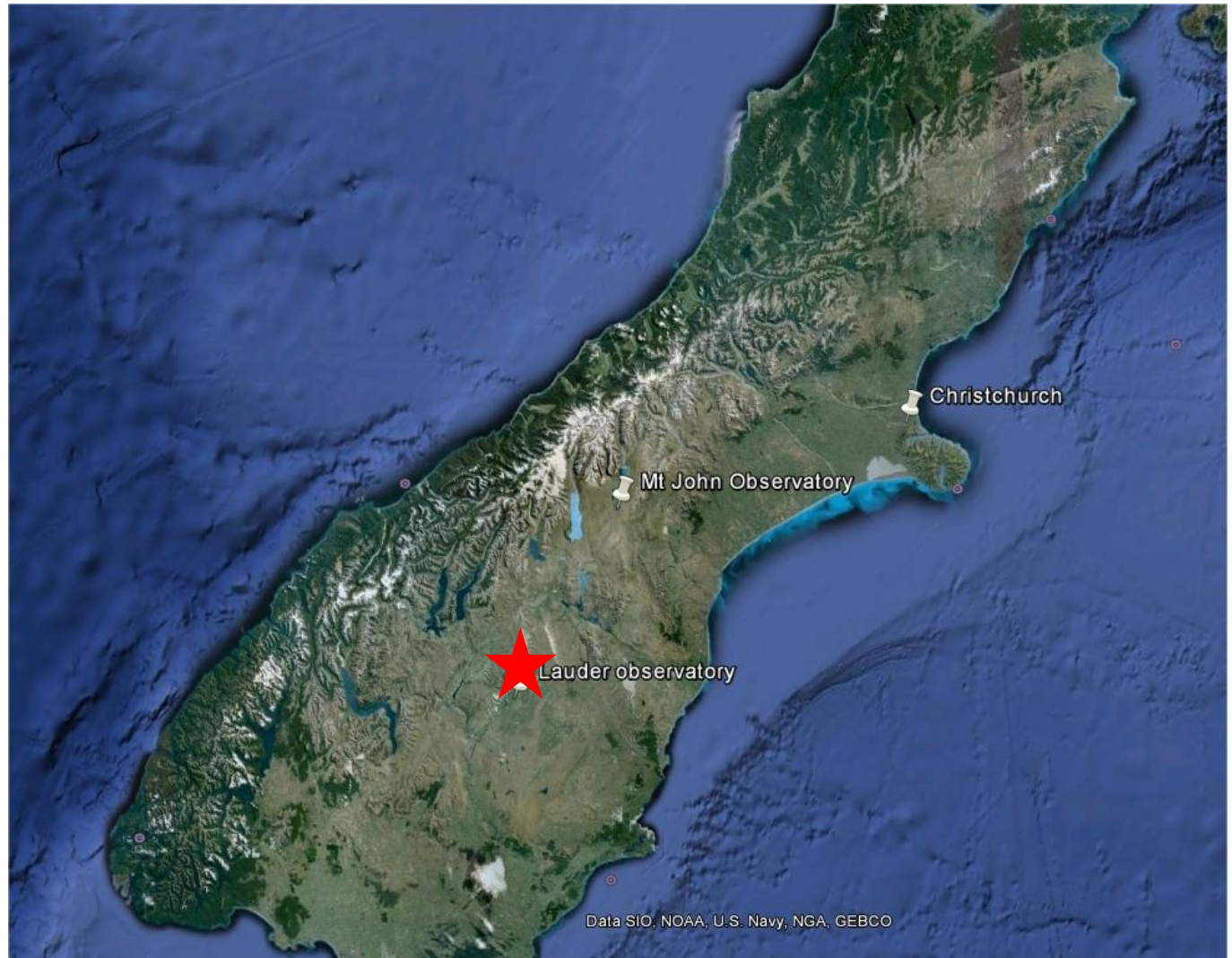
An aerial photograph of a research station in a dry, mountainous landscape. The station consists of several buildings, including a large white building with a blue roof, a smaller white building, and a house. There are trees and a paved road winding through the site. In the background, there are large, rugged mountains under a blue sky with scattered clouds. The foreground is a dry, brownish field.

Lauder AMTM Data

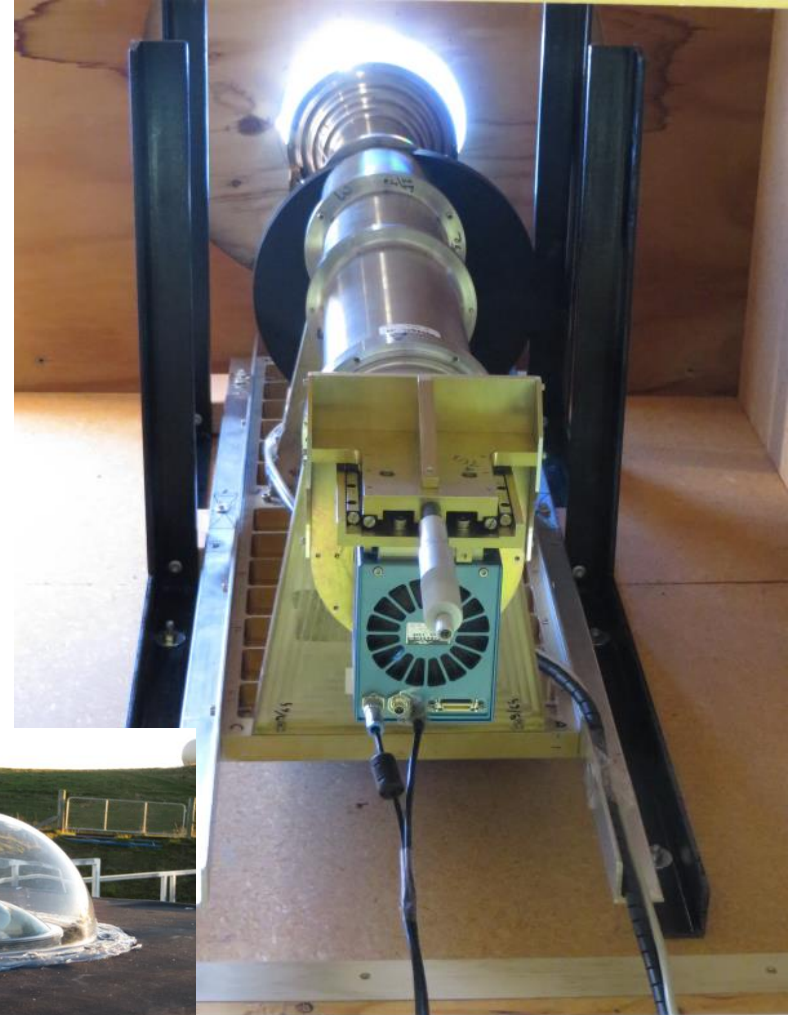
P-D Pautet, MJ Taylor, N Criddle and Y Zhao
CASS, Utah State University, Logan UT

Ground-Based Correlative Measurements at Lauder Observatory

Lauder is
~5hrs drive
from
Christchurch



Ground-Based AMTM Measurements, Lauder Observatory (45.0°S)



**One zenith-looking mesospheric
temperature mapper**

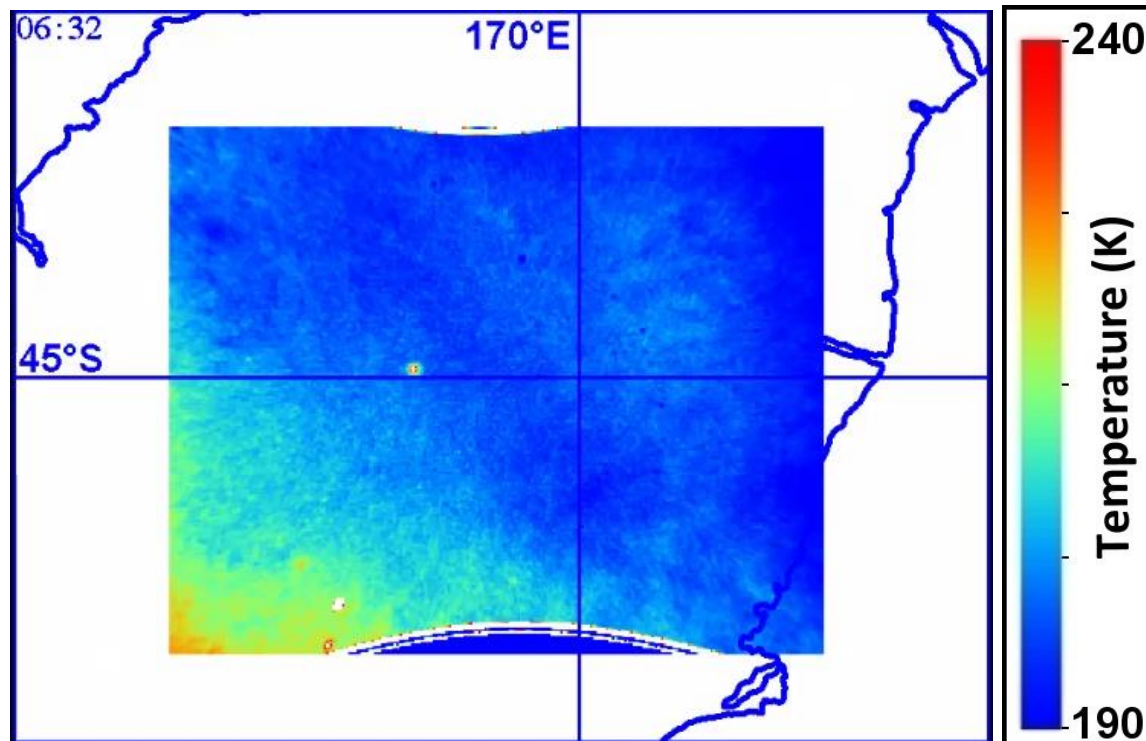
- **FOV 120°**
- **1 temperature map every ~30s**



Data Processing

Same as GV AMTM:

- Flat-fielding
- Combining $P_1(2)$, $P_1(4)$ and BG images to obtain temperature and intensity maps
- Projection on linear grid and possibly on a map



May 30-31

EOL Database (Upper-Air Products)

For each night (when the sky was not totally cloudy):

- 1 temperature keogram (NS+WE)
- 1 intensity keogram (NS+WE)

Movies are also available (temperature and intensity) upon request

The screenshot shows the EOL Field Catalog website interface. The 'Products' menu is open, showing options: Satellite, Radar, Surface, Upper-Air (highlighted), Aircraft, and Model. The main content area displays a table of products under the heading 'Lauder Advanced Mesospheric Temperature Mapper'. Two rows are highlighted with a red box:

Product Name	Date	Link 1	Link 2	Link 3
KEOGRAM INT	2014/07/21 00:00 UTC	Loop Last 6 Images	Loop Last 12 Images	Loop Last 24 Images
KEOGRAM TEMP	2014/07/21 06:00 UTC	Loop Last 6 Images	Loop Last 12 Images	Loop Last 24 Images

Other products listed include Sounding Products (Dropsonde, NSF/NCAR GV, Haast Sounding) and ISS 1 Upper-Air Sounding.

Summary Lauder AMTM Observations

51 consecutive nights of observations from May 30th to July 21th:

- **11 nights totally cloudy**
- **25 partially cloudy nights**
- **15 clear nights**

Amongst the clear/partially clear nights (40):

- **28 with standing waves (+ usually propagating GWs as well) with durations from ~1 to ~14 hours**
- **12 with only propagating GWs**

Predominant GWs over Lauder - June

UT Date	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20						
30-May	Propagating GW					Standing GW			Propagating GW		Standing GW									
31-May	Propagating GW																			
1-Jun				Standing GW			Propagating GW		Standing GW				Propagating GW							
2-Jun				Standing GW					Cloudy											
3-Jun	Cloudy																			
4-Jun												Standing GW								
5-Jun	Propagating GW			Cloudy																
6-Jun	Cloudy													RF01						
7-Jun					Standing GW		Cloudy													
8-Jun	Cloudy																			
9-Jun	Cloudy																			
10-Jun					Propagating GW		Cloudy													
11-Jun	Propagating GW													RF02						
12-Jun	Propagating GW																			
13-Jun	Standing GW			Propagating GW					Cloudy			Propagating GW		Cloudy			RF03			
14-Jun	Cloudy													RF04						
15-Jun	Propagating GW																			
16-Jun	Cloudy			Propagating GW		Cloudy			Propagating GW		Cloudy			Cloudy			RF05			
17-Jun	Cloudy				Standing GW					Propagating GW		Cloudy								
18-Jun	Standing GW													RF06						
19-Jun	Propagating GW							Standing GW			Cloudy			Propagating GW			RF07			
20-Jun	Propagating GW		Cloudy													RF08				
21-Jun	Standing GW			Propagating GW		Standing GW					Propagating GW		Propagating GW							
22-Jun	Propagating GW			Standing GW		Propagating GW			Standing GW					Propagating GW						
23-Jun	Propagating GW																			
24-Jun	Cloudy													RF09						
25-Jun	Propagating GW		Cloudy													RF10				
26-Jun	Standing GW		Propagating GW					Standing GW								Propagating GW				
27-Jun	Standing GW			Cloudy																
28-Jun	Standing GW			Cloudy					Standing GW				Propagating GW			RF11				
29-Jun	Cloudy													RF12						
30-Jun						Standing GW		Propagating GW		Cloudy			Propagating GW			RF13				



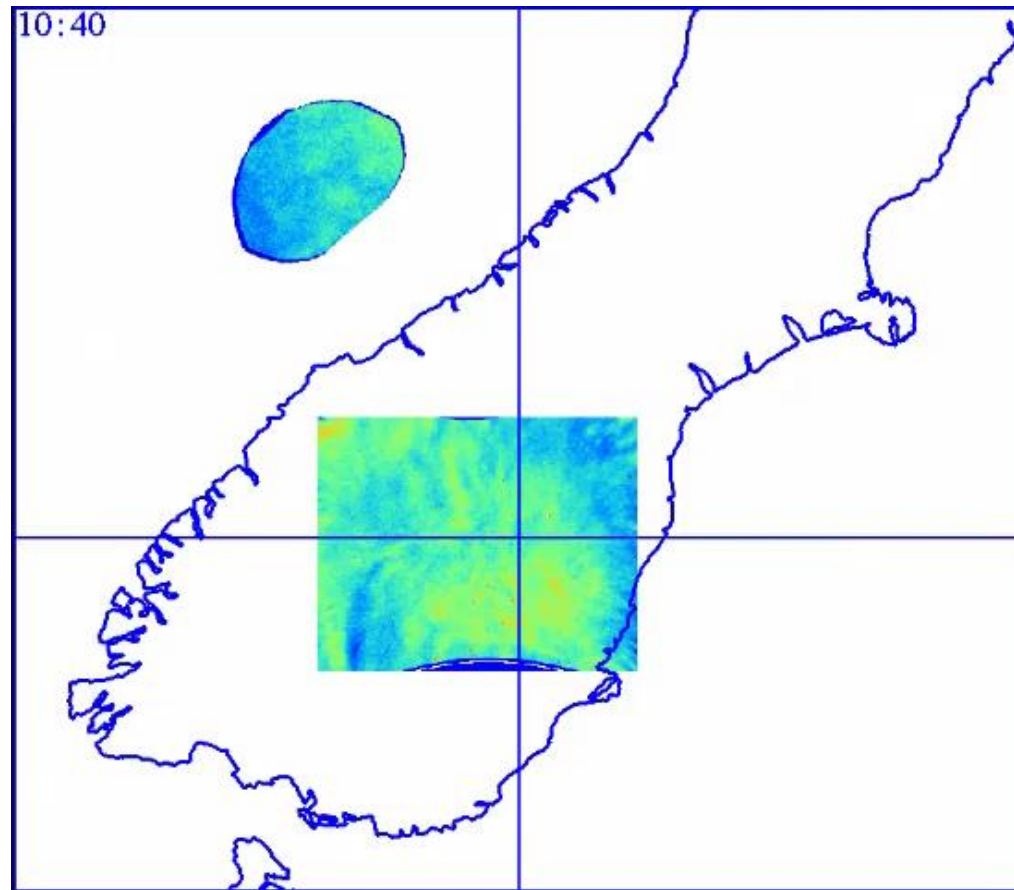
Predominant GWs over Lauder - July

UT Date	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20				
1-Jul	Cloudy							Standing GW		Propagating GW				Cloudy	RF14			
2-Jul	Cloudy																	
3-Jul	Cloudy																	
4-Jul	Propagating GW		Cloudy	Propagating GW		Standing GW			Propagating GW		Cloudy		Propagating GW		RF16			
5-Jul	Cloudy			Propagating GW		Standing GW	Cloudy				Propagating GW		Cloudy		RF17			
6-Jul	Propagating GW							Standing GW		Propagating GW								
7-Jul	Propagating GW													RF18				
8-Jul	Propagating GW			Cloudy													RF19	
9-Jul	Cloudy																	
10-Jul	Cloudy																	
10-Jul	Cloudy							Standing GW				Propagating GW				RF20		
11-Jul	Cloudy													RF21				
12-Jul	Propagating GW		Propagating GW		Cloudy													
12-Jul	Cloudy							Standing GW		Cloudy								
13-Jul	Cloudy													RF22				
14-Jul	Standing GW														RF23			
15-Jul	Standing GW		Cloudy							Propagating GW		Cloudy			RF24			
16-Jul	Propagating GW			Standing GW										Propagating GW				
17-Jul	Standing GW																	
18-Jul	Standing GW					Cloudy									RF25			
19-Jul	Cloudy																	
20-Jul	Cloudy													RF26				
20-Jul	Cloudy							Standing GW		Cloudy								
21-Jul	Cloudy				Propagating GW		Cloudy											

Cloudy	Propagating GW
Standing GW	RF over the South Island

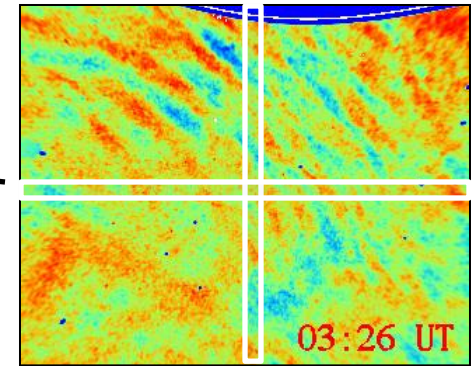
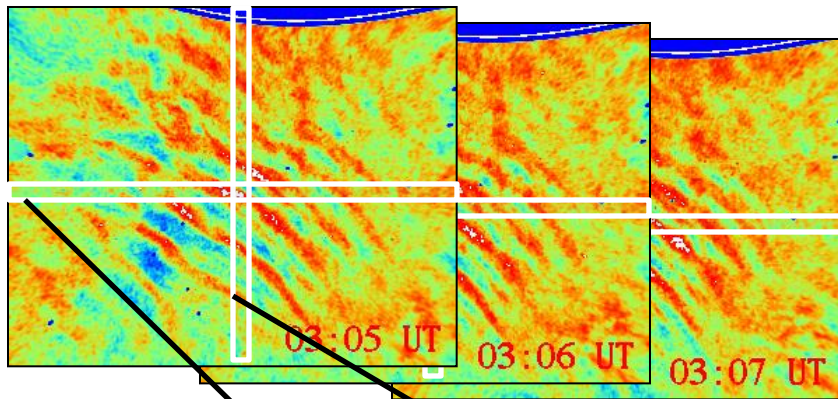
Common Data with the GV

- Mostly during one South Island flight: RF13

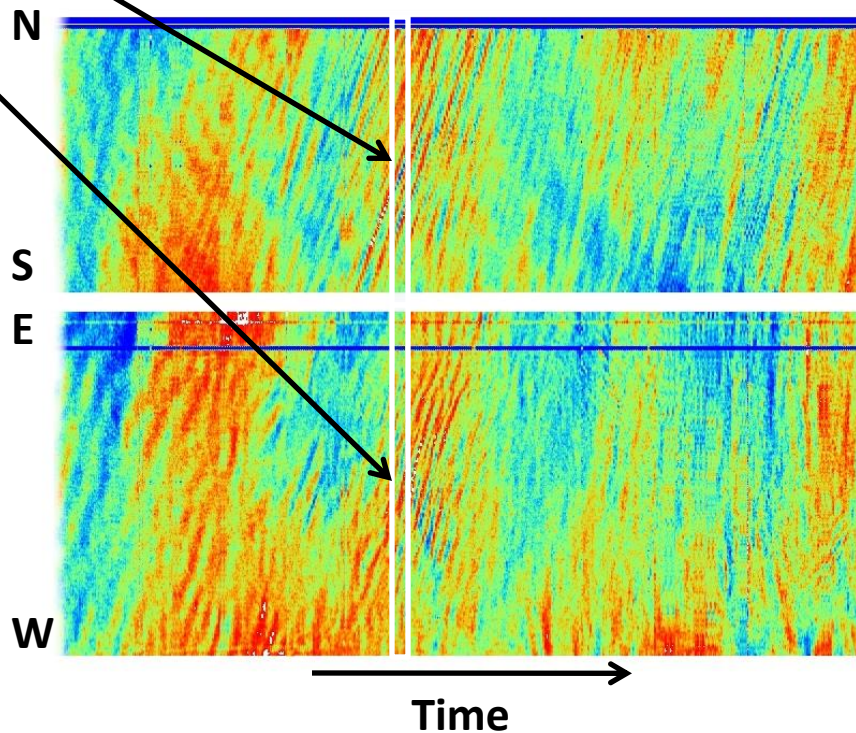


- Some more coincident data during RF03, 06, 07, 23

The Keogram Representation

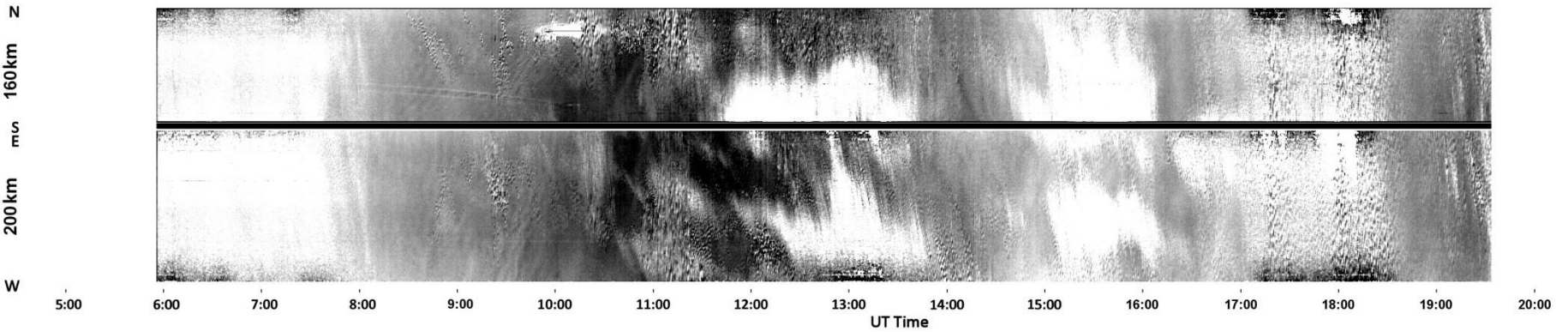


Two keograms:
summarizing N-S
and E-W wave
activity vs. time.

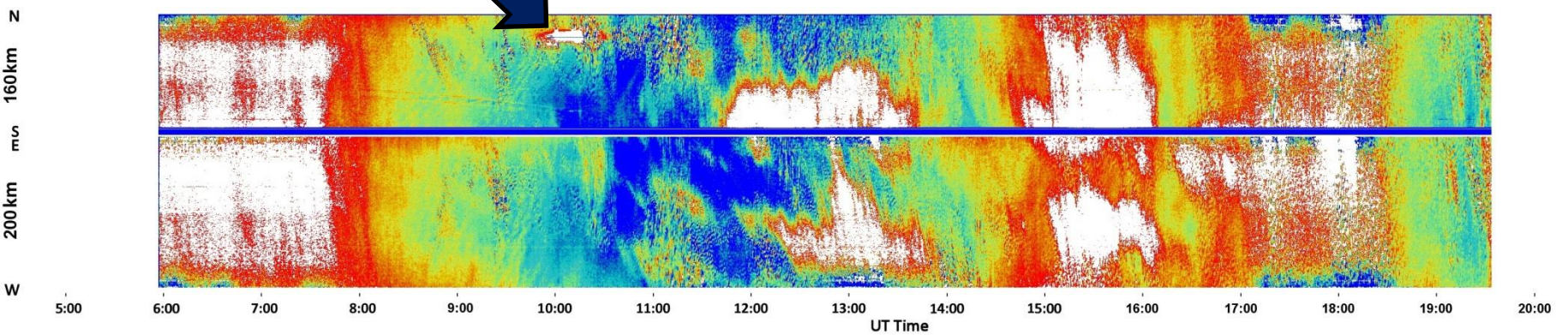


Uses a sequence
of images

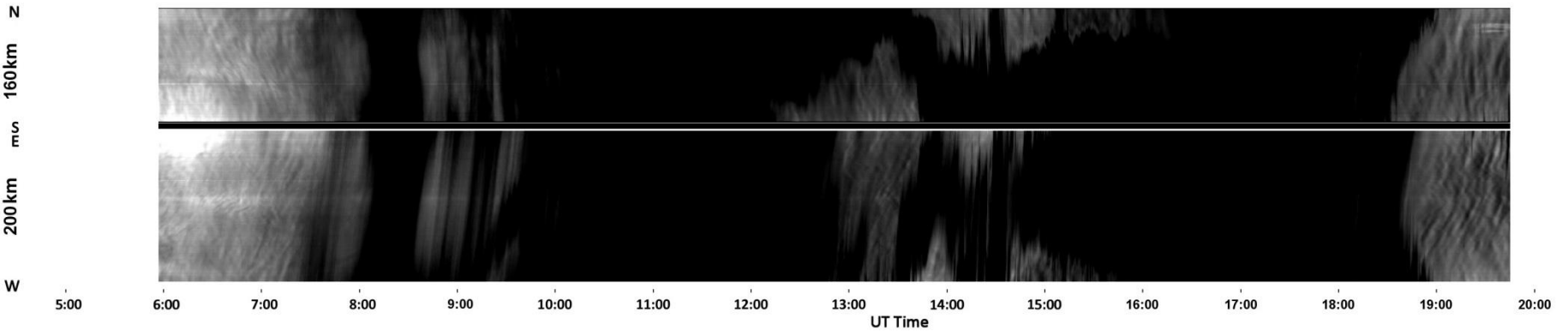
Jun 10-11 = Cloudy



← Tropospheric cloud Moon → Tropospheric cloud

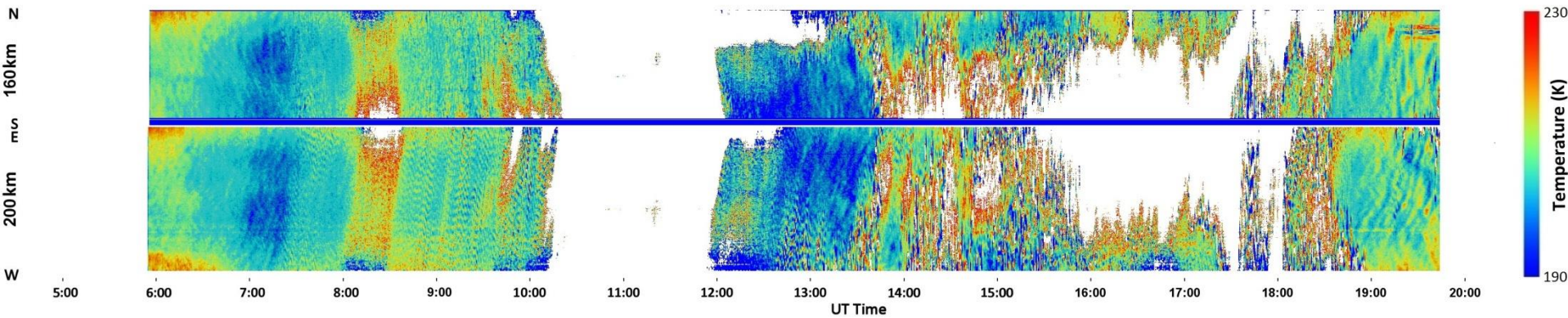


Jun 20-21 = Very Cloudy

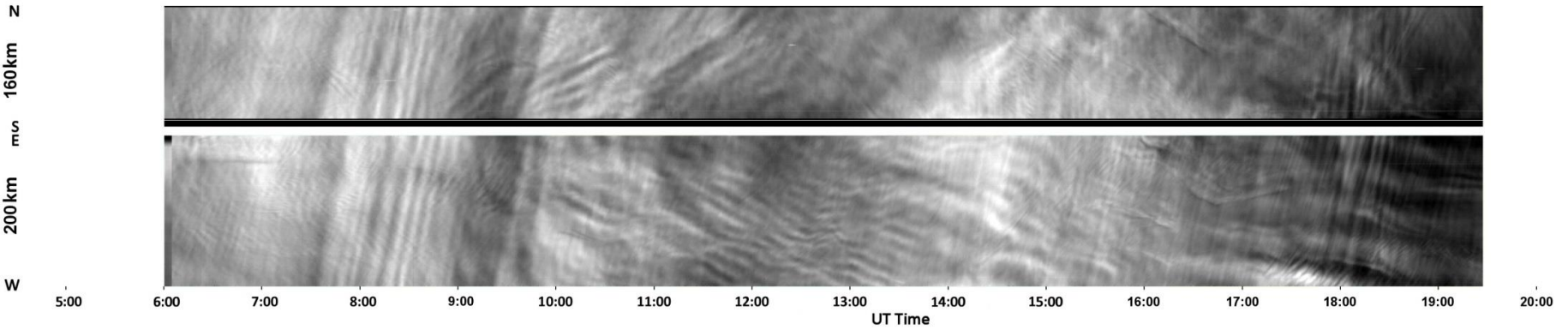


→ Clouds

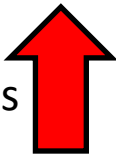
← Clouds



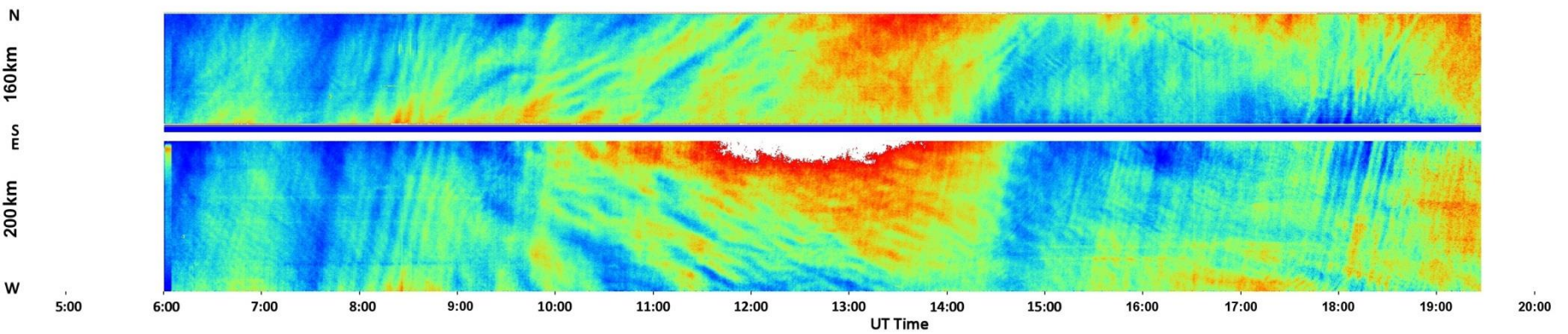
May 30-31



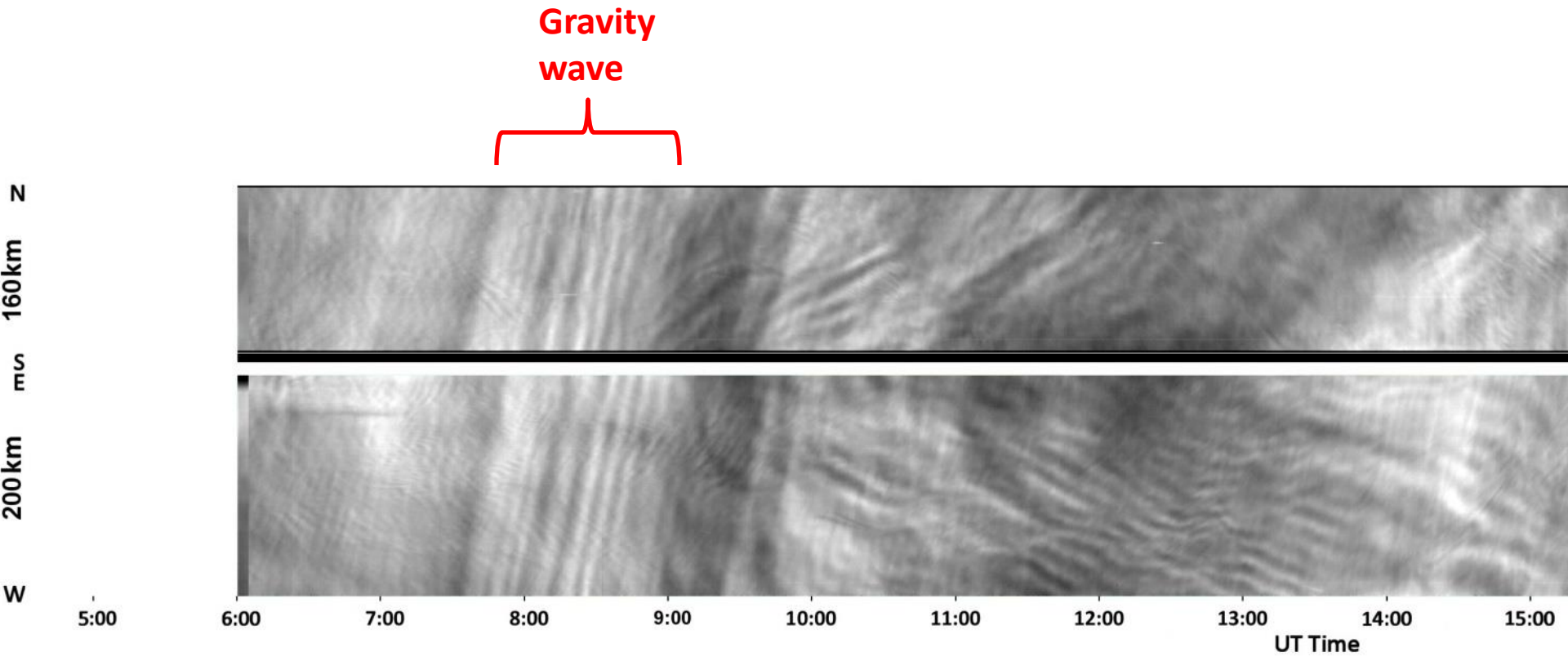
Bands



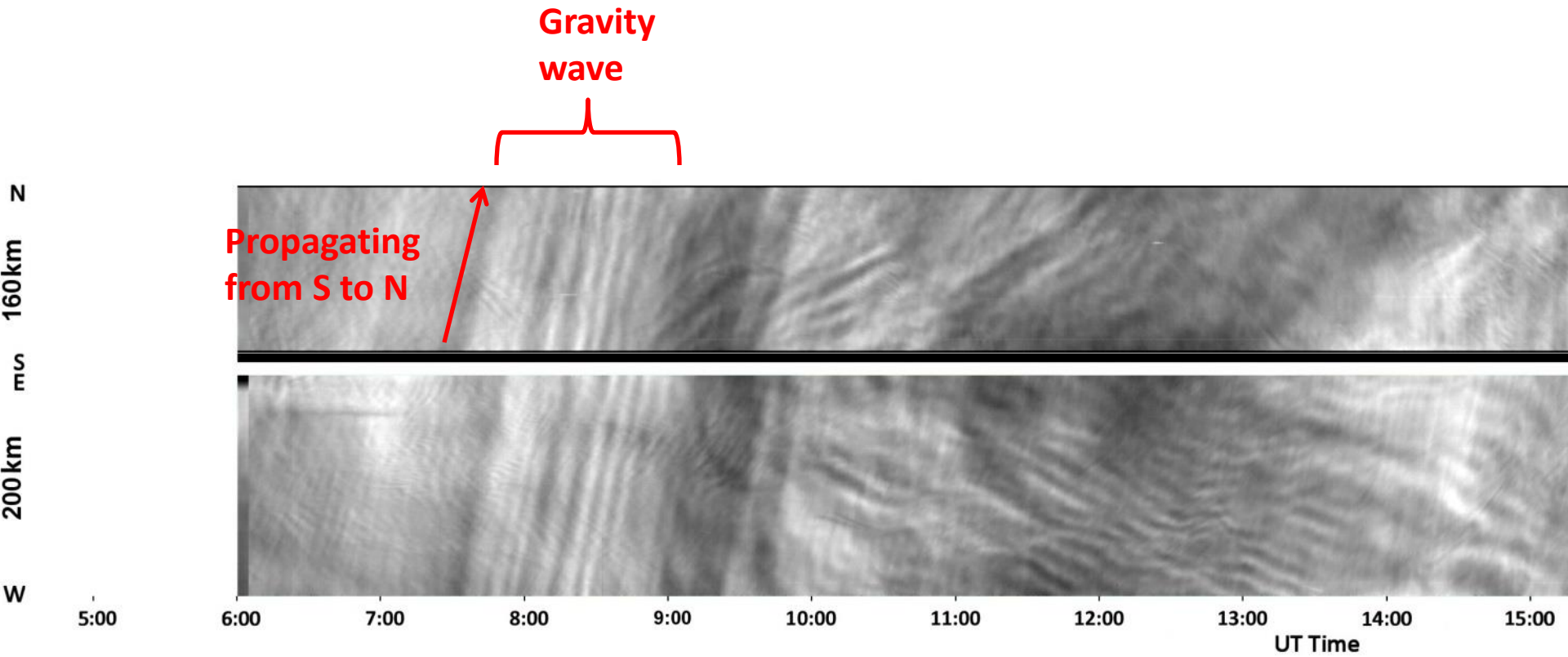
Low
velocity
(MWs)



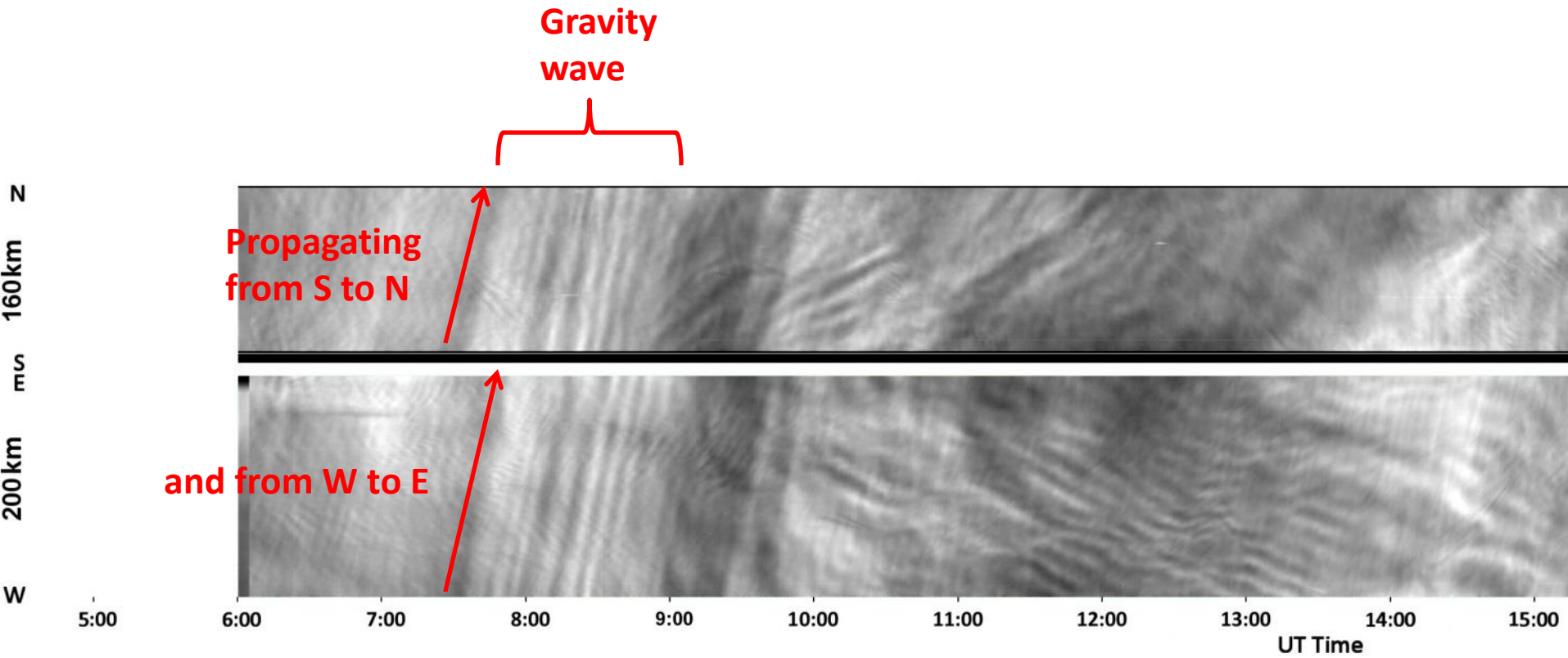
Quick Interpretation



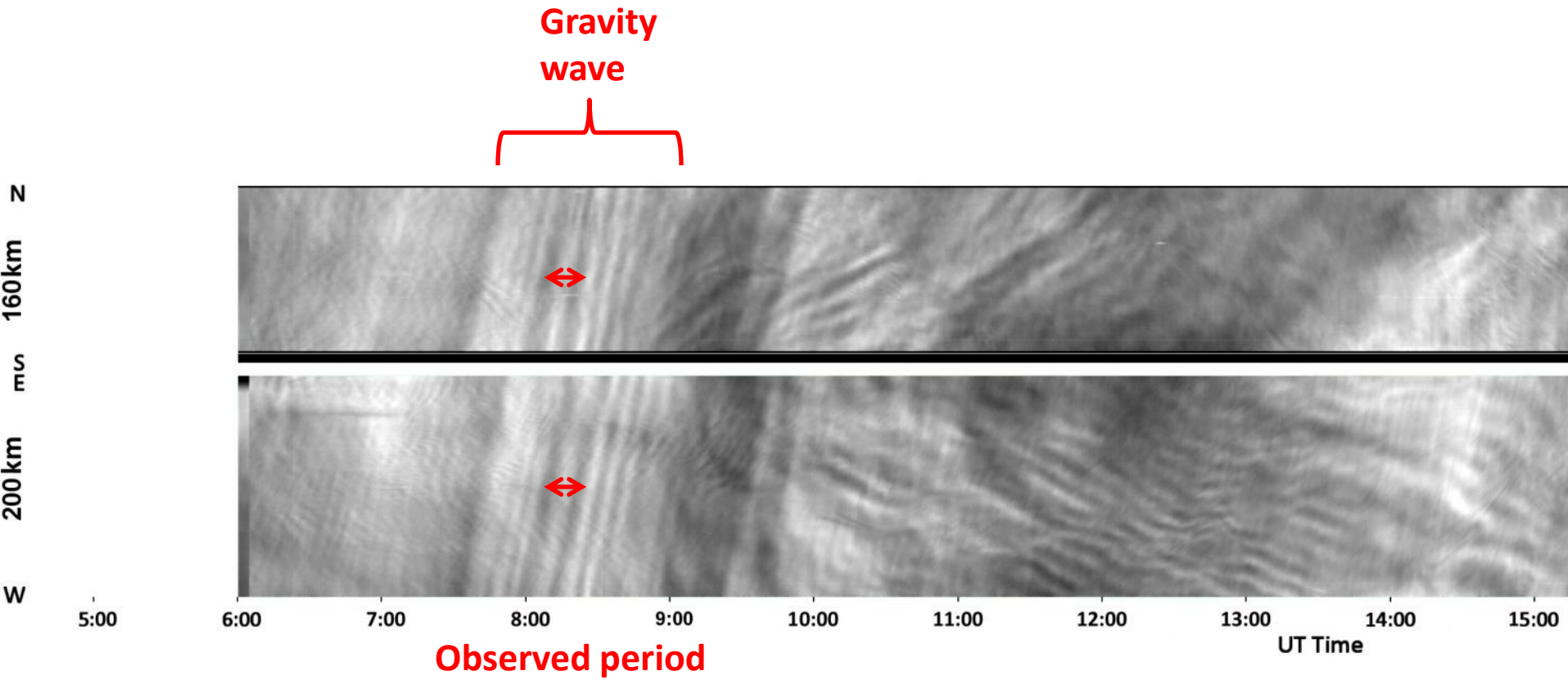
Quick Interpretation



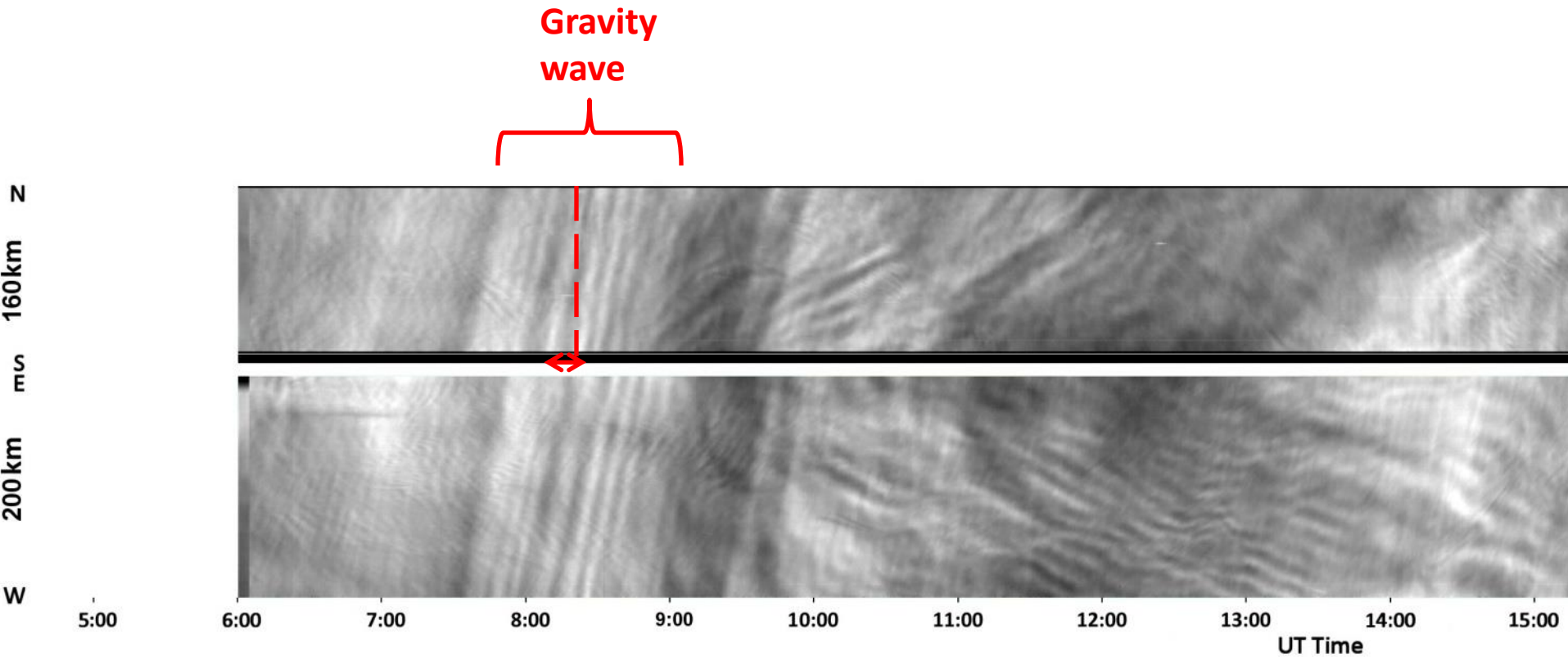
Quick Interpretation



Quick Interpretation

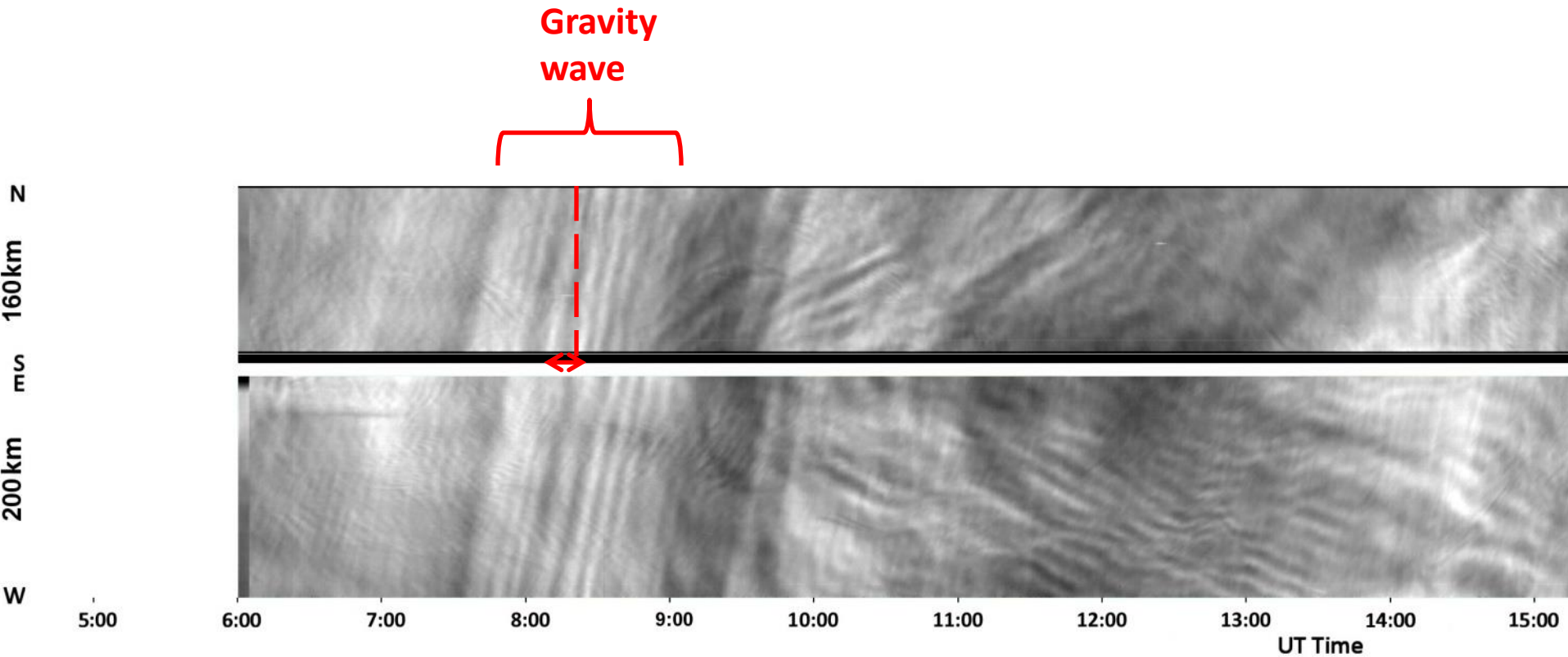


Quick Interpretation



**Time to propagate
160km in the S->N
direction**

Quick Interpretation

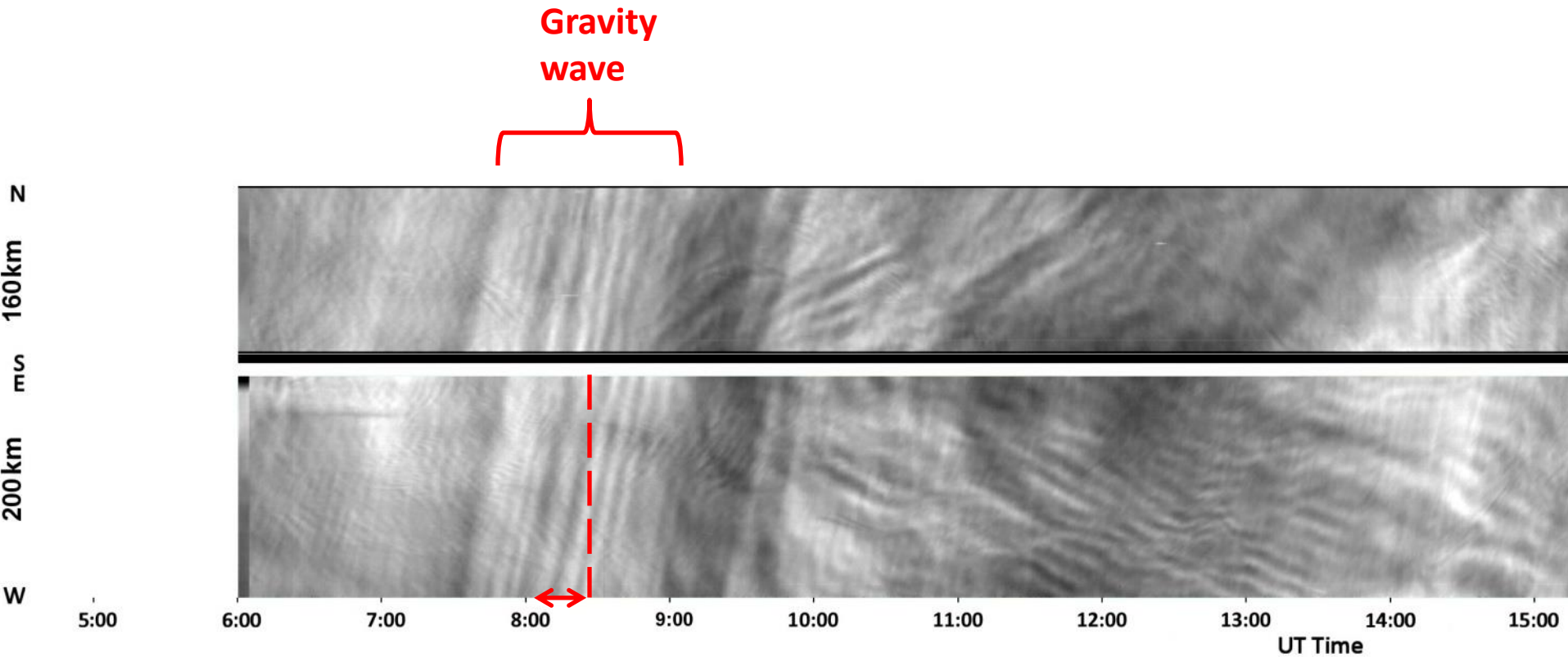


Time to propagate
160km in the S->N
direction

Meridional observed
phase speed



Quick Interpretation



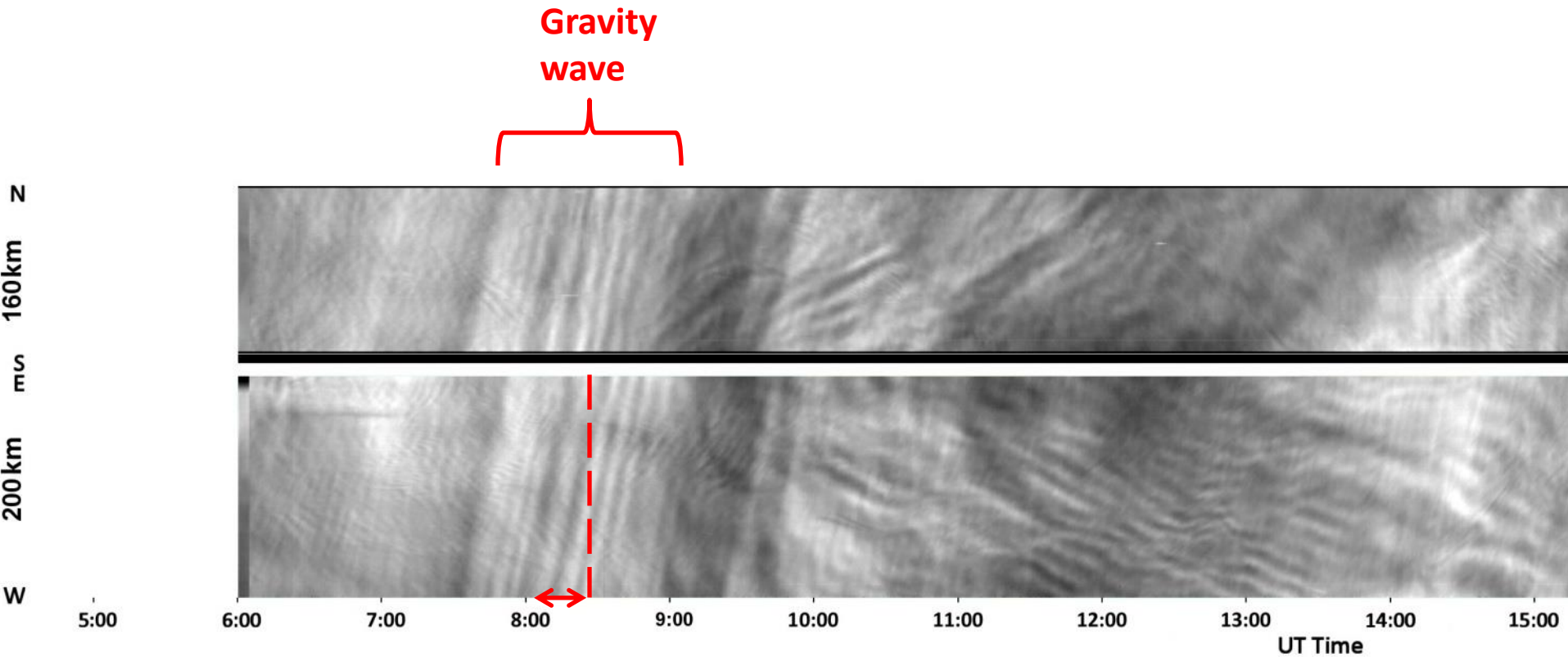
Time to propagate
160km in the S->N
direction

Time to propagate
200km in the W->E
direction

Meridional observed
phase speed



Quick Interpretation



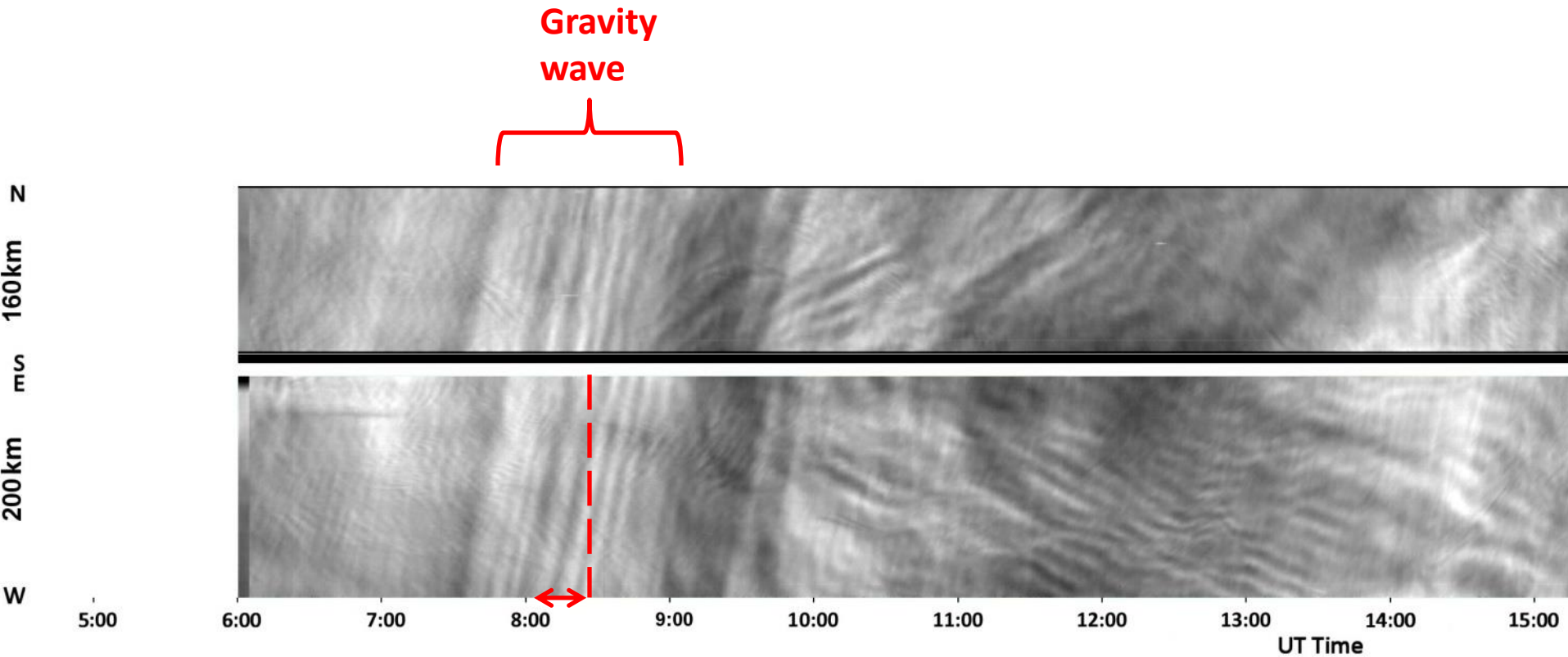
Time to propagate
160km in the S->N
direction

Time to propagate
200km in the W->E
direction

Meridional observed
phase speed

Zonal observed
phase speed

Quick Interpretation



Time to propagate
160km in the S->N
direction

Time to propagate
200km in the W->E
direction

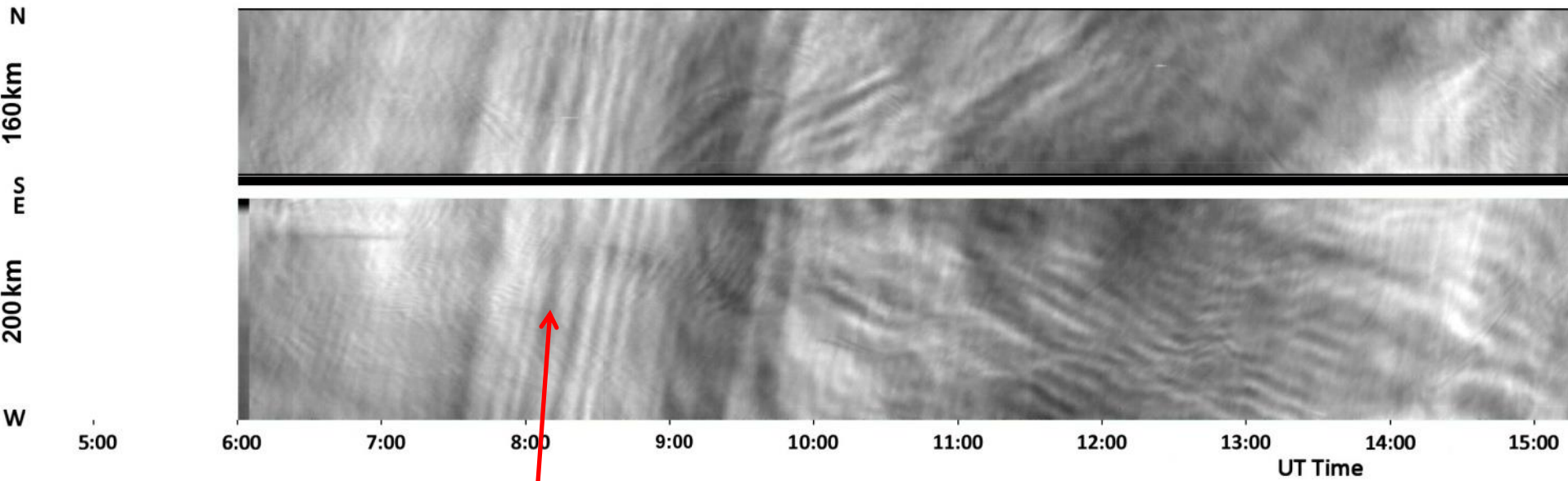
GW observed
horizontal phase
speed

Meridional observed
phase speed

Zonal observed
phase speed

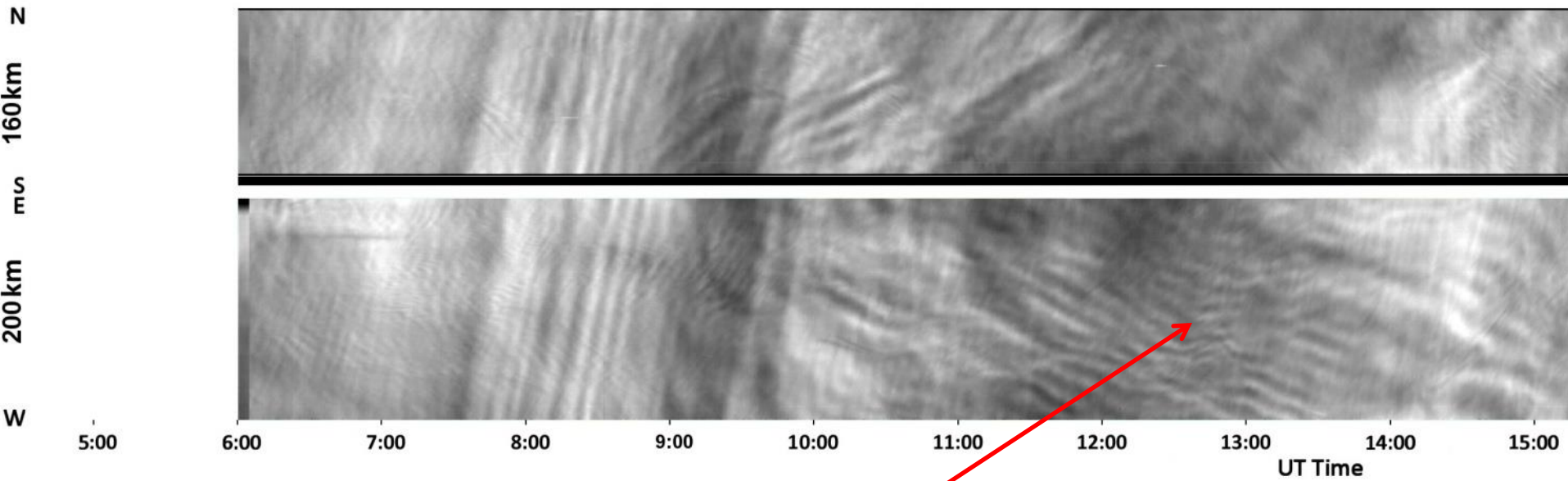


Quick Interpretation



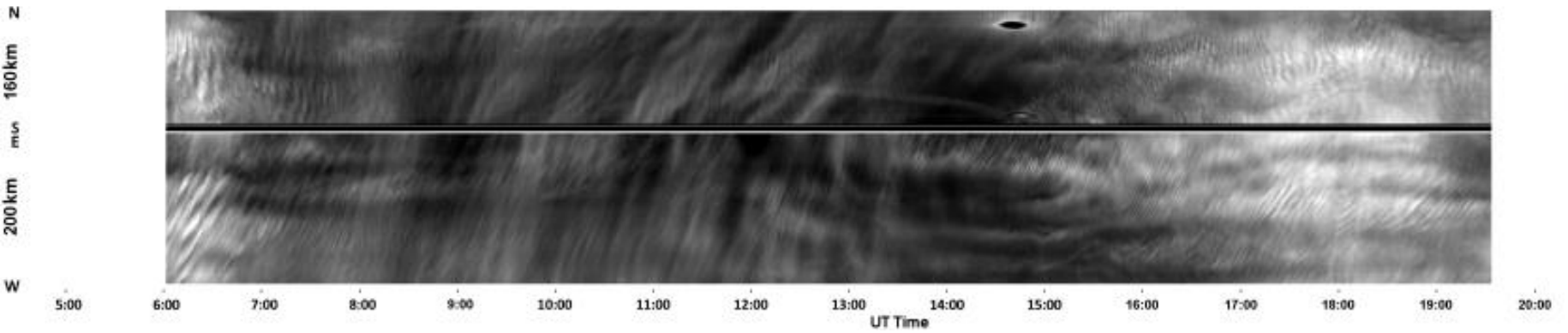
➔ “Steep” wave = fast wave

Quick Interpretation



➔ “Horizontal” wave = slow wave

Jul 14-15



MWs!

