

# Suomi NPP VIIRS Day/Night Band Nightglow Sensitivity

Steve Miller (CIRA)

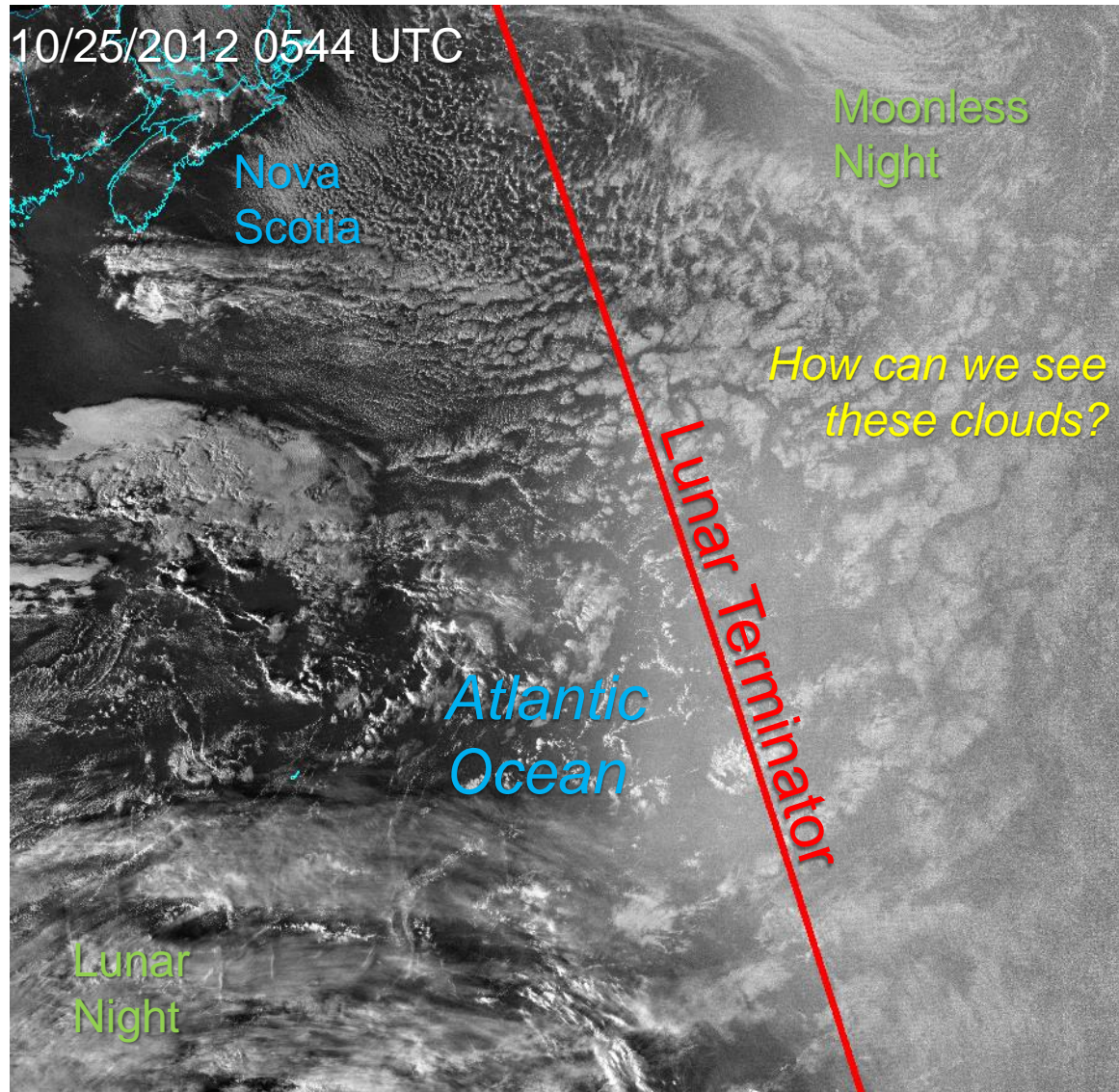
Jia Yue (Hampton Univ.)

William Straka (CIMSS)



Cooperative Institute for Research in the Atmosphere

# Light Beyond the Moonset



# Nightglow

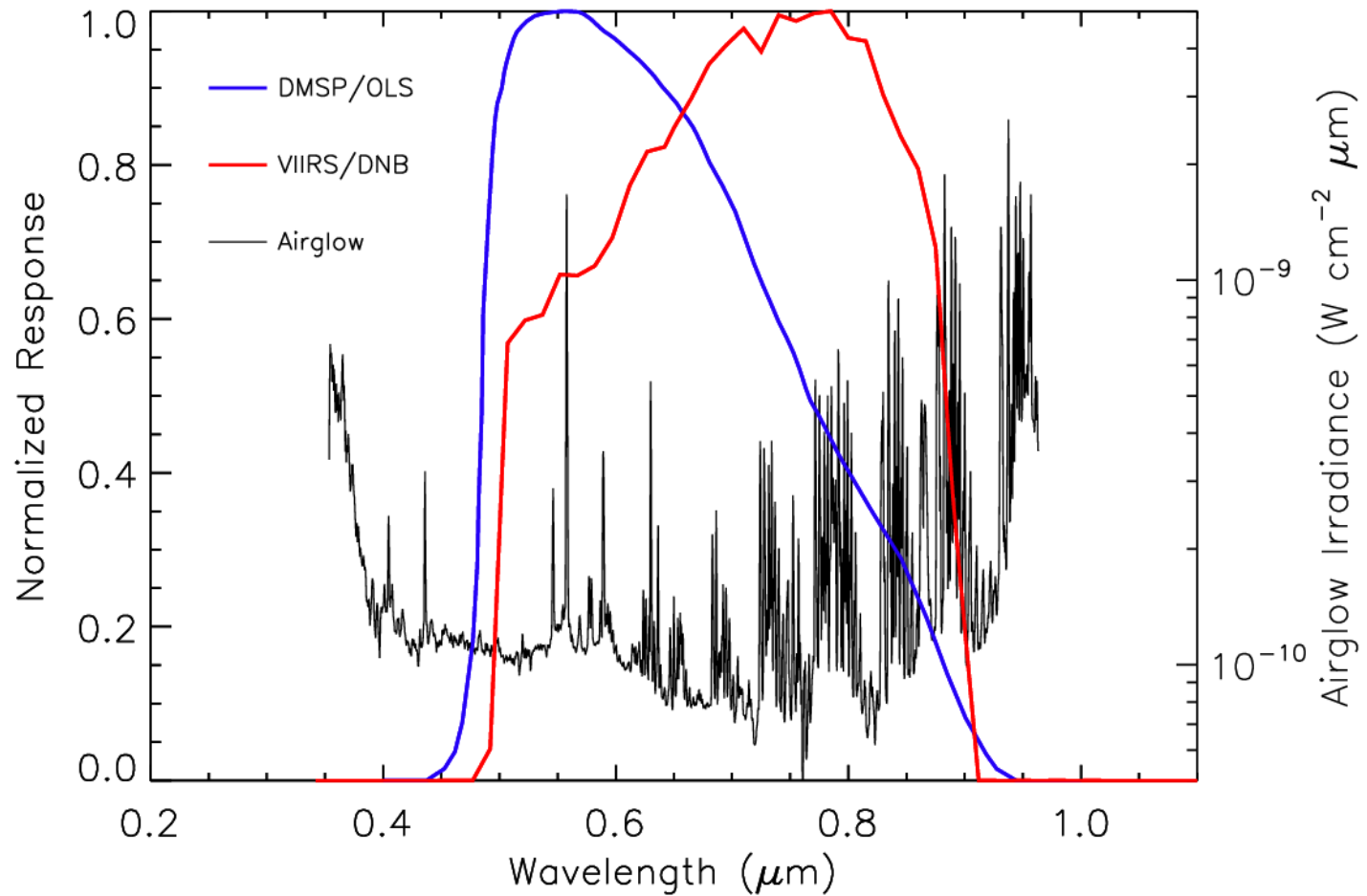
## The Milky Way and Storms over Africa

Videos produced by the Crew Earth Observations group at  
NASA Johnson Space Center

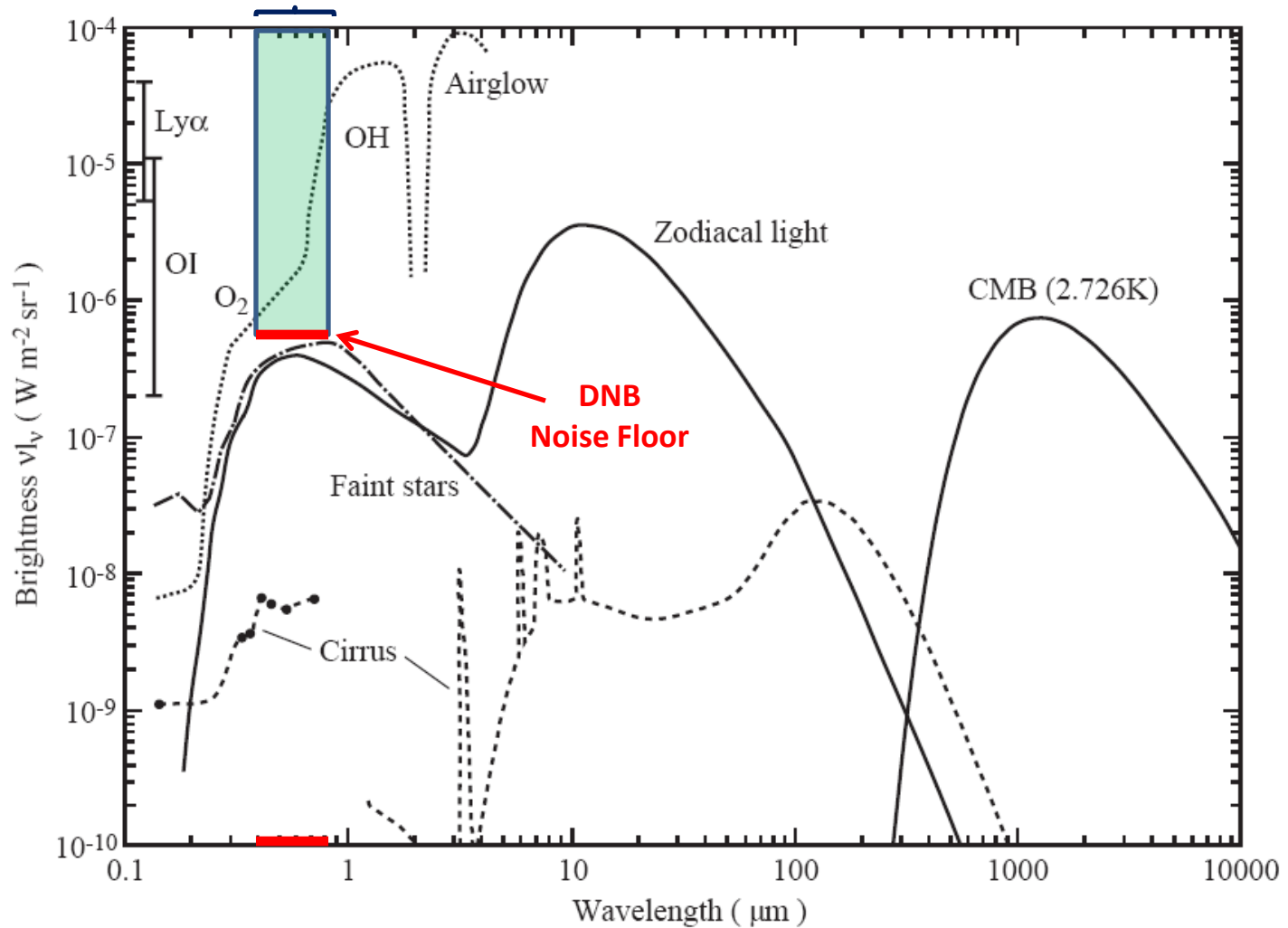
For replication and crediting information, please see our guidelines  
on our main video page.

→ *Entirely unanticipated capability—the atmosphere as a source of illumination, provides a form of visible imagery on moonless nights!*

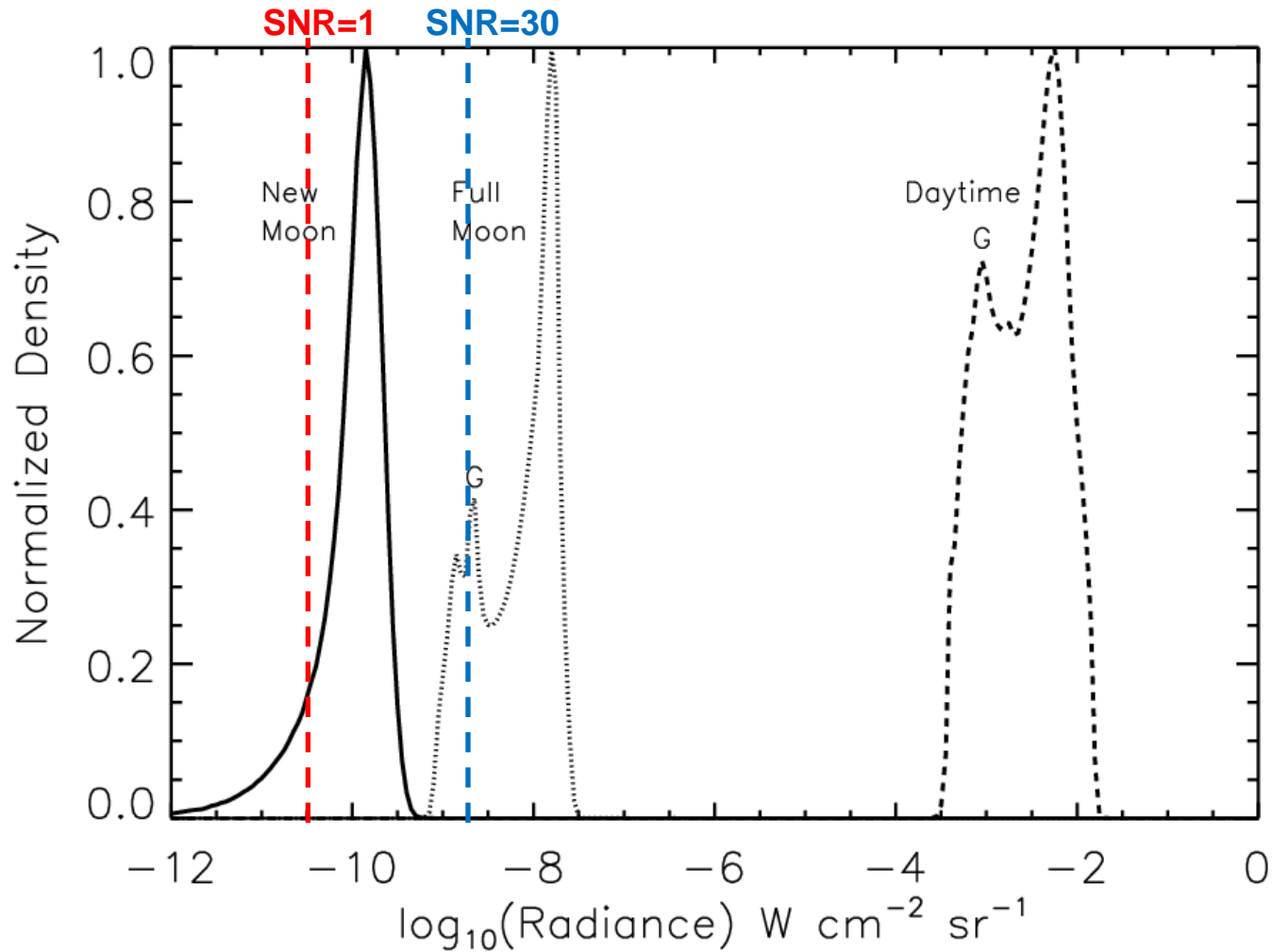
# Sensor Response



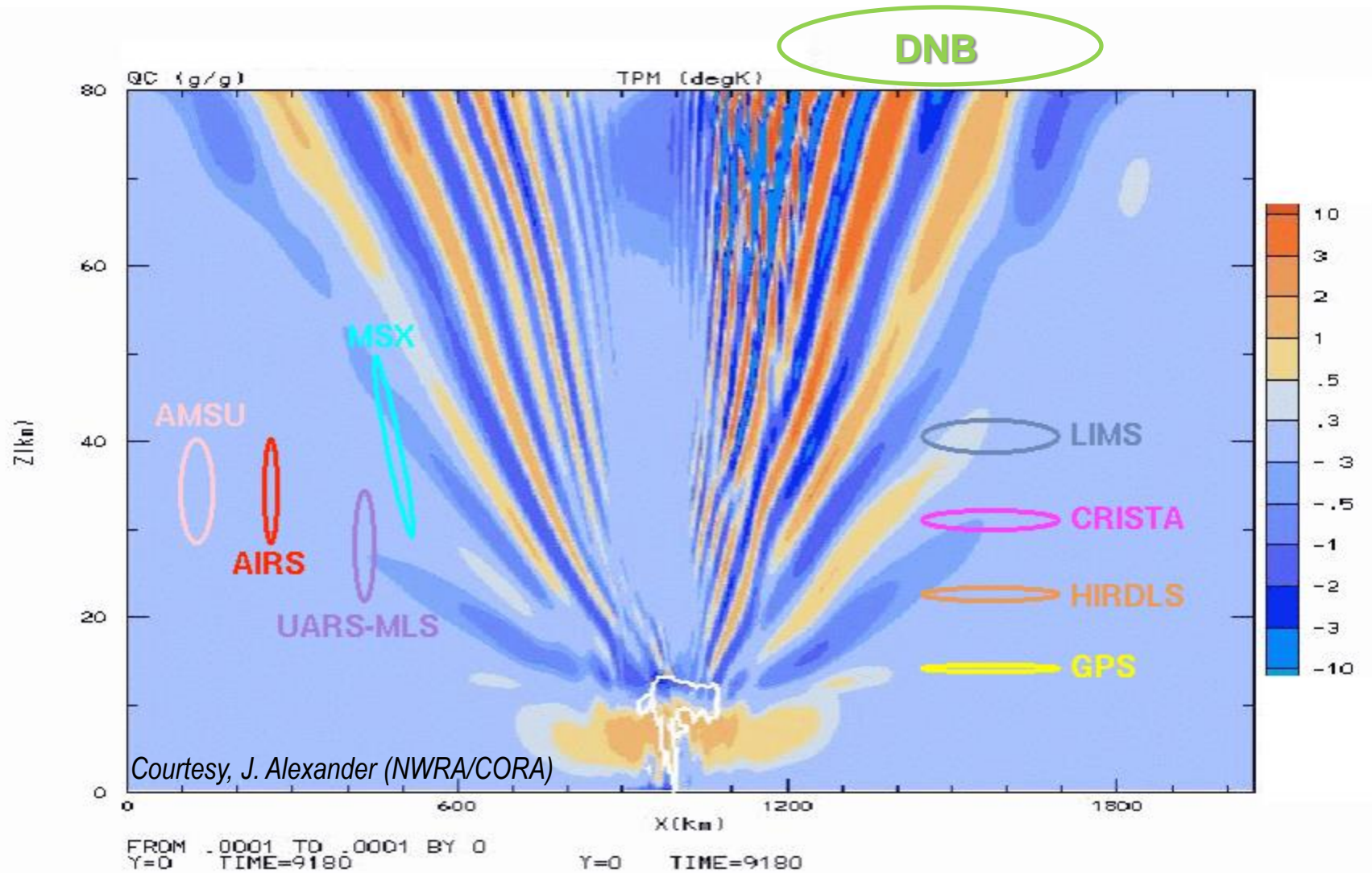
# Illumination Sources



# Radiance Distributions



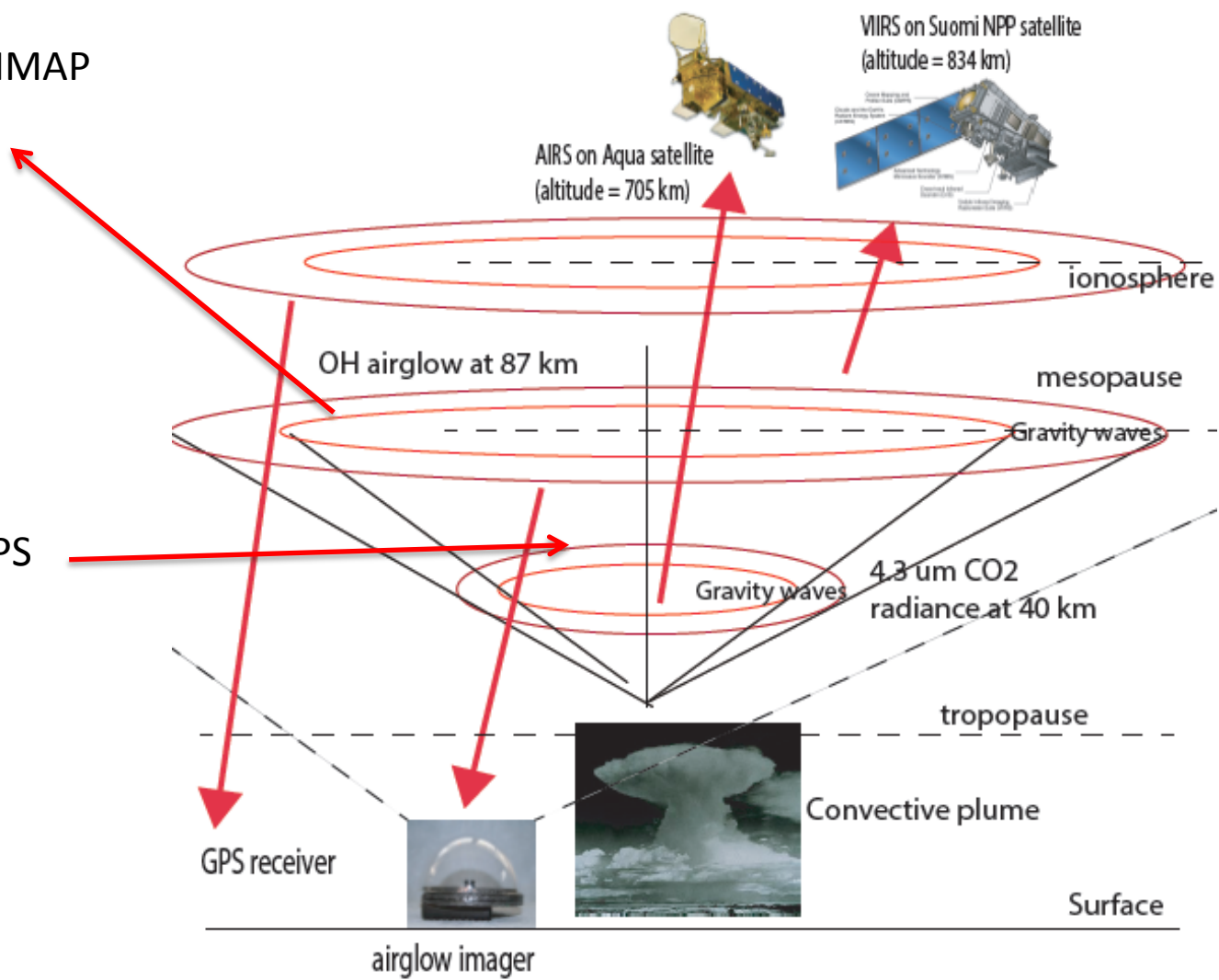
# A New Level of Information



→ New information about gravity waves in the upper atmosphere may help improve parameterizations relevant to seasonal and climate forecasting.

ISS/IMAP

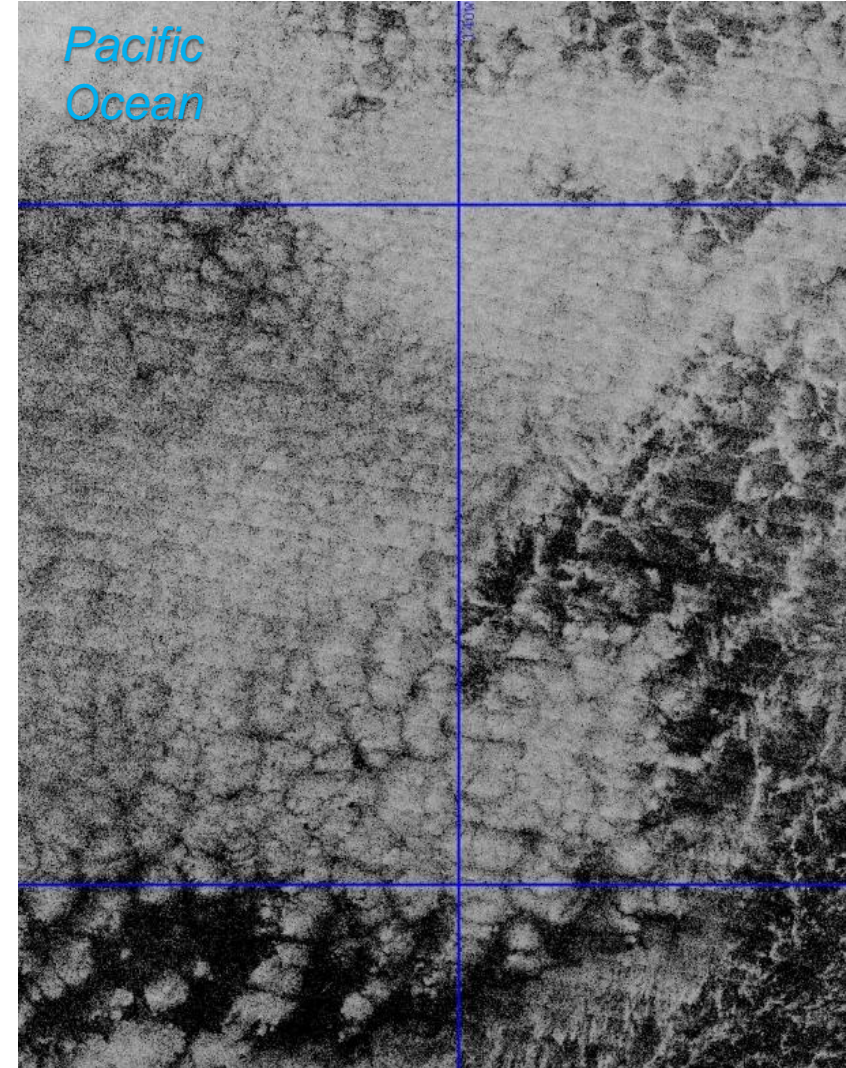
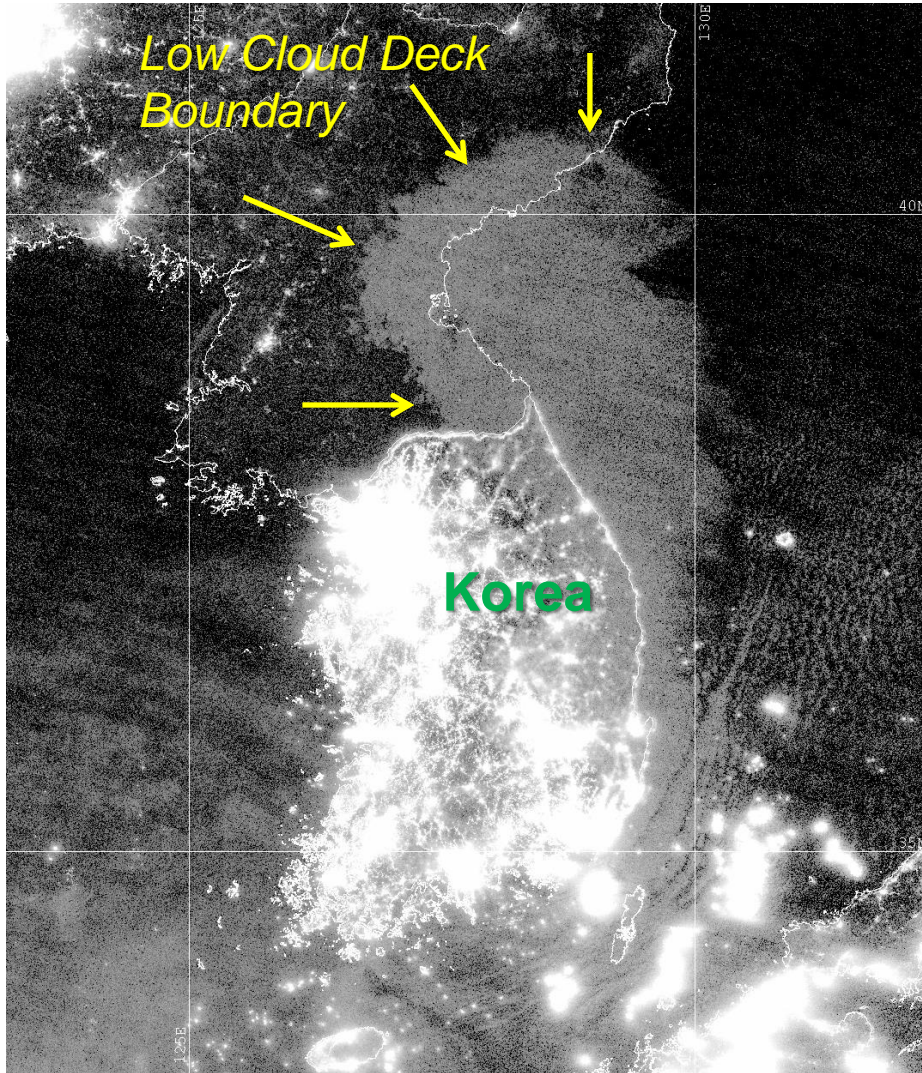
CIPS



Yue, Hoffmann  
and Alexander,  
JGR  
2013



# Reflected Nightglow: Low Cloud Sensitivity

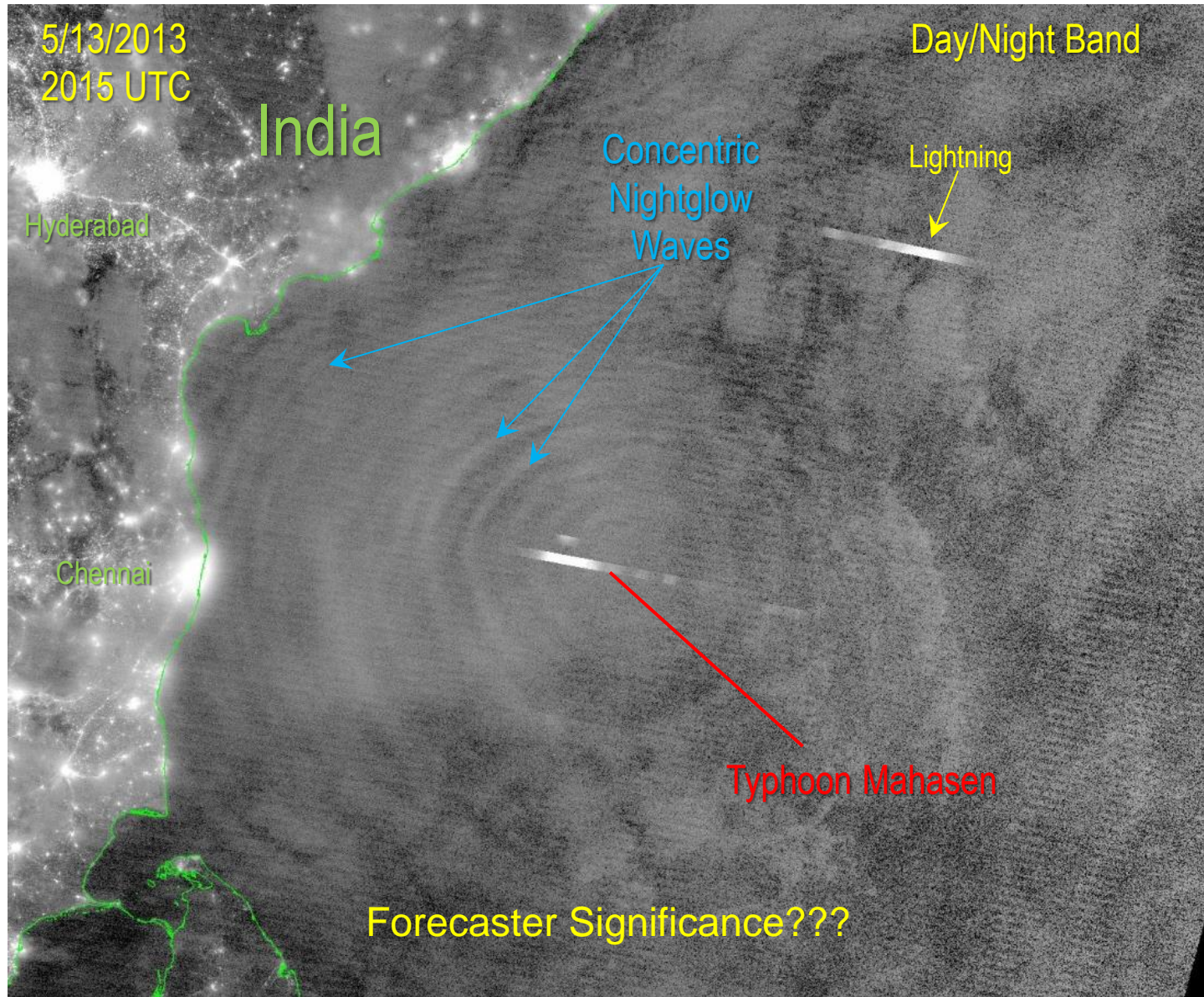


# Gravity Waves in Nightglow

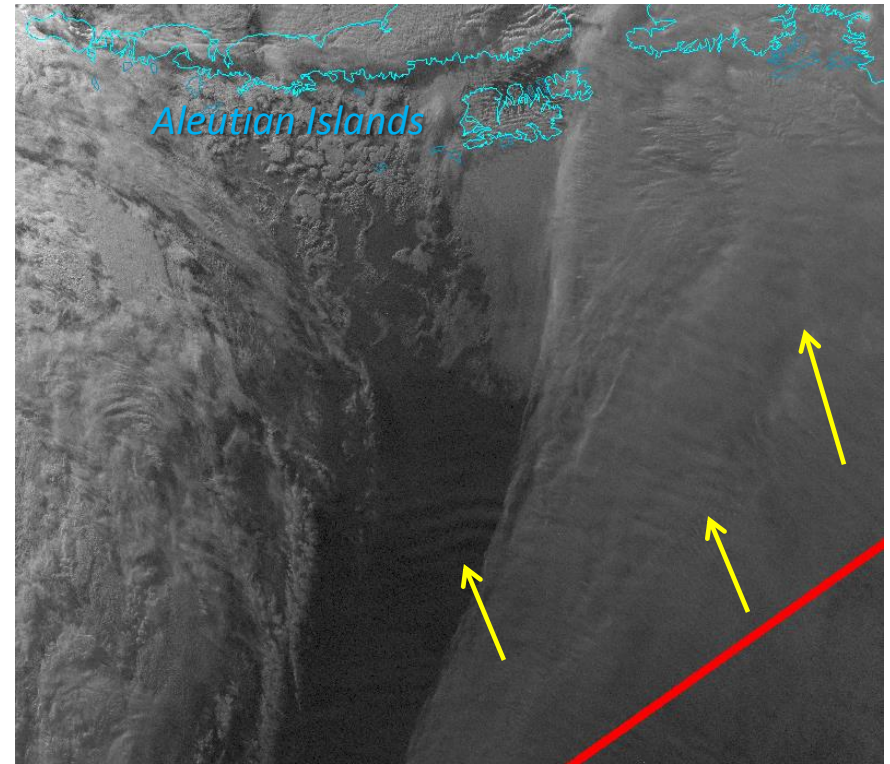
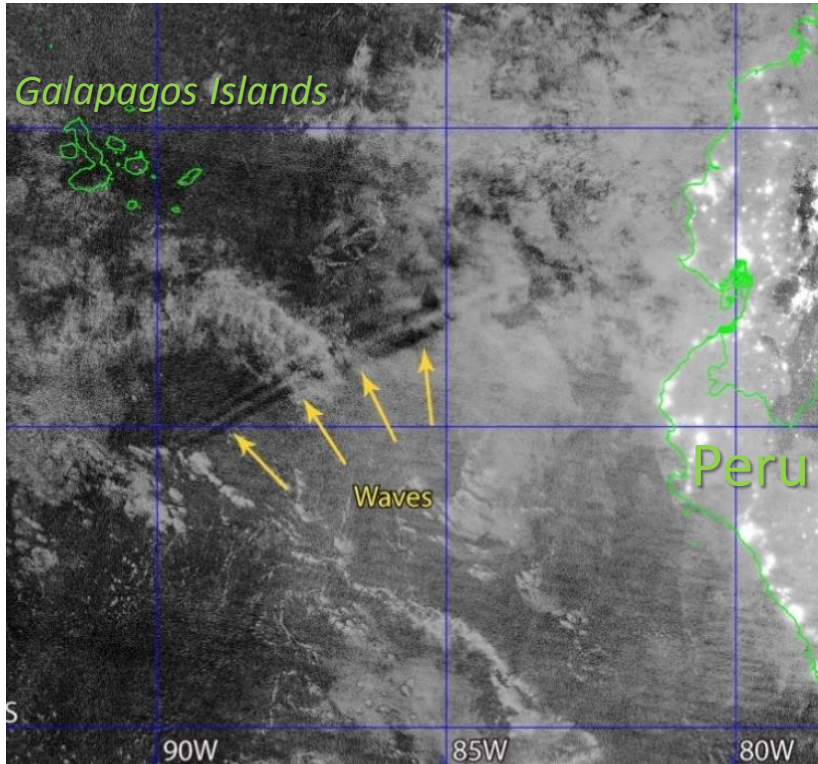


*Courtesy: T. Ashcraft & W. Lyons*

# TC-Generated Waves



# Glowing Waves are Everywhere...



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- 
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# Nightglow Gravity Waves Associated with Tsunamis

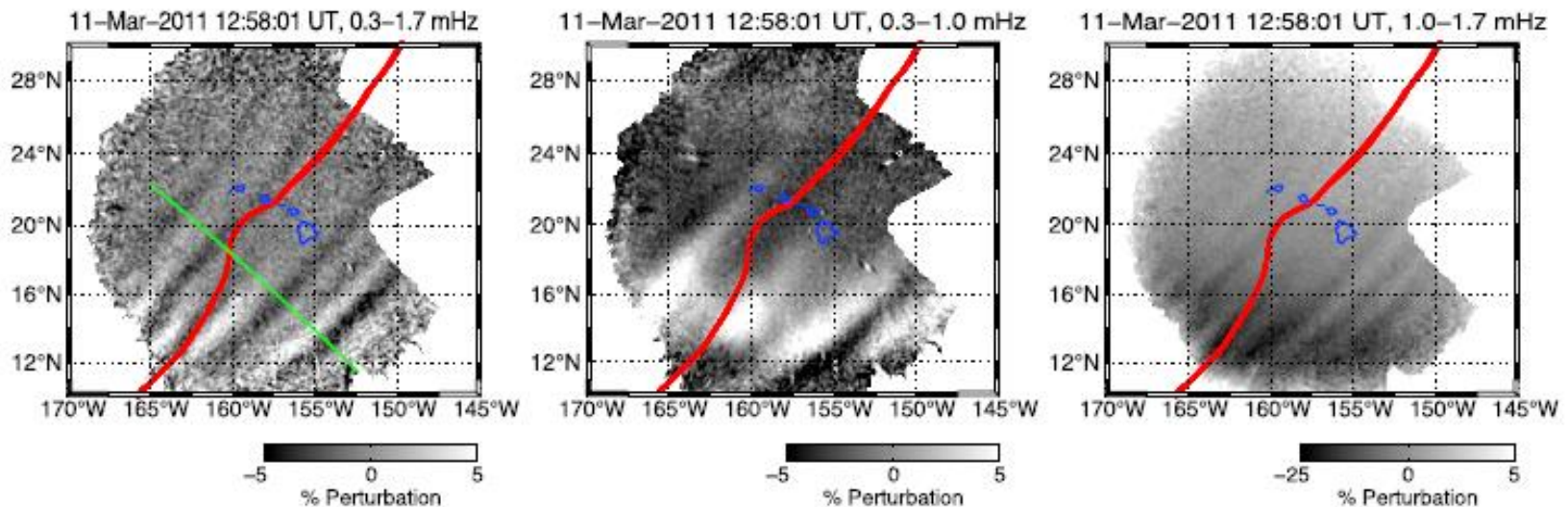
2011 Tohoku Earthquake/Tsunami

GRL, Vol. 38, doi:10.1029/2011GL047860

L13305

MAKELA ET AL.: IONOSPHERIC AIRGLOW TSUNAMI SIGNATURE

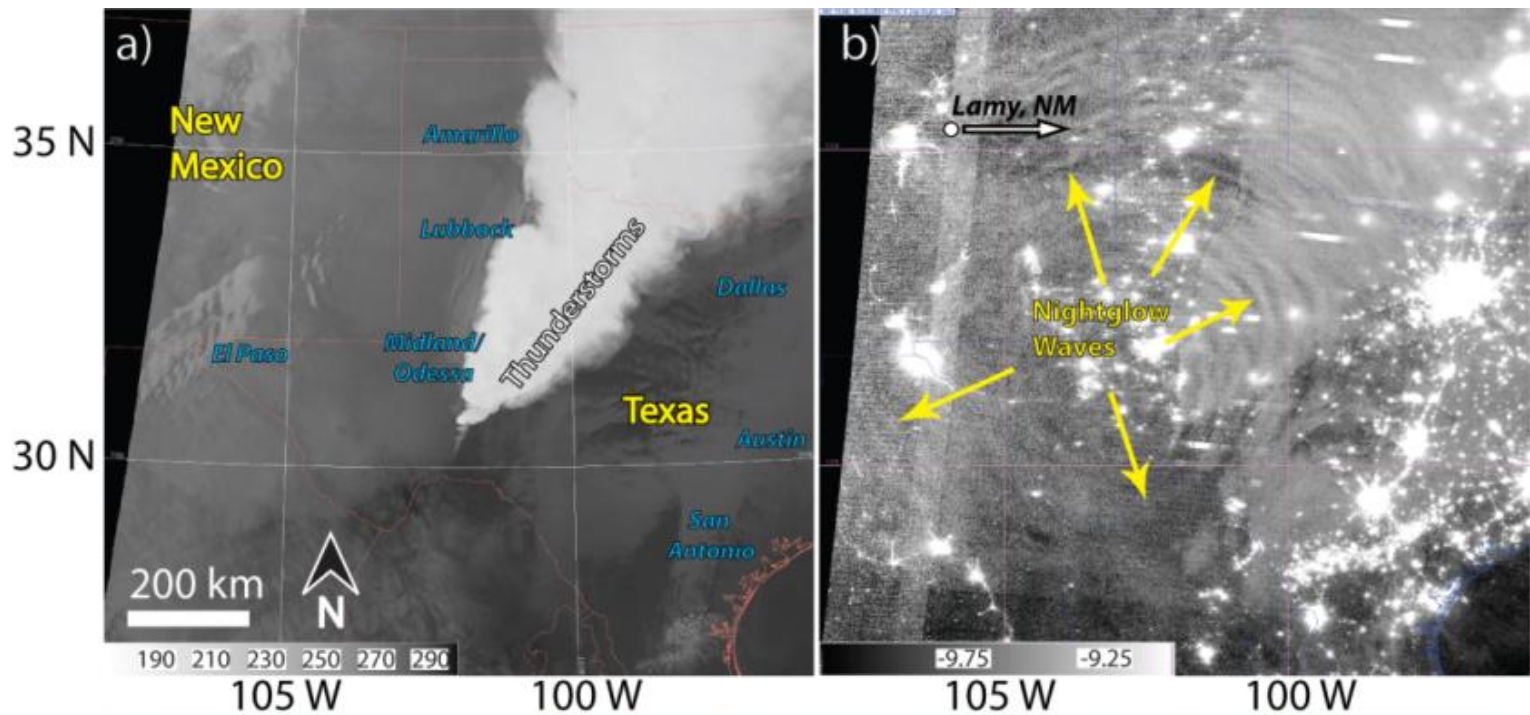
L13305

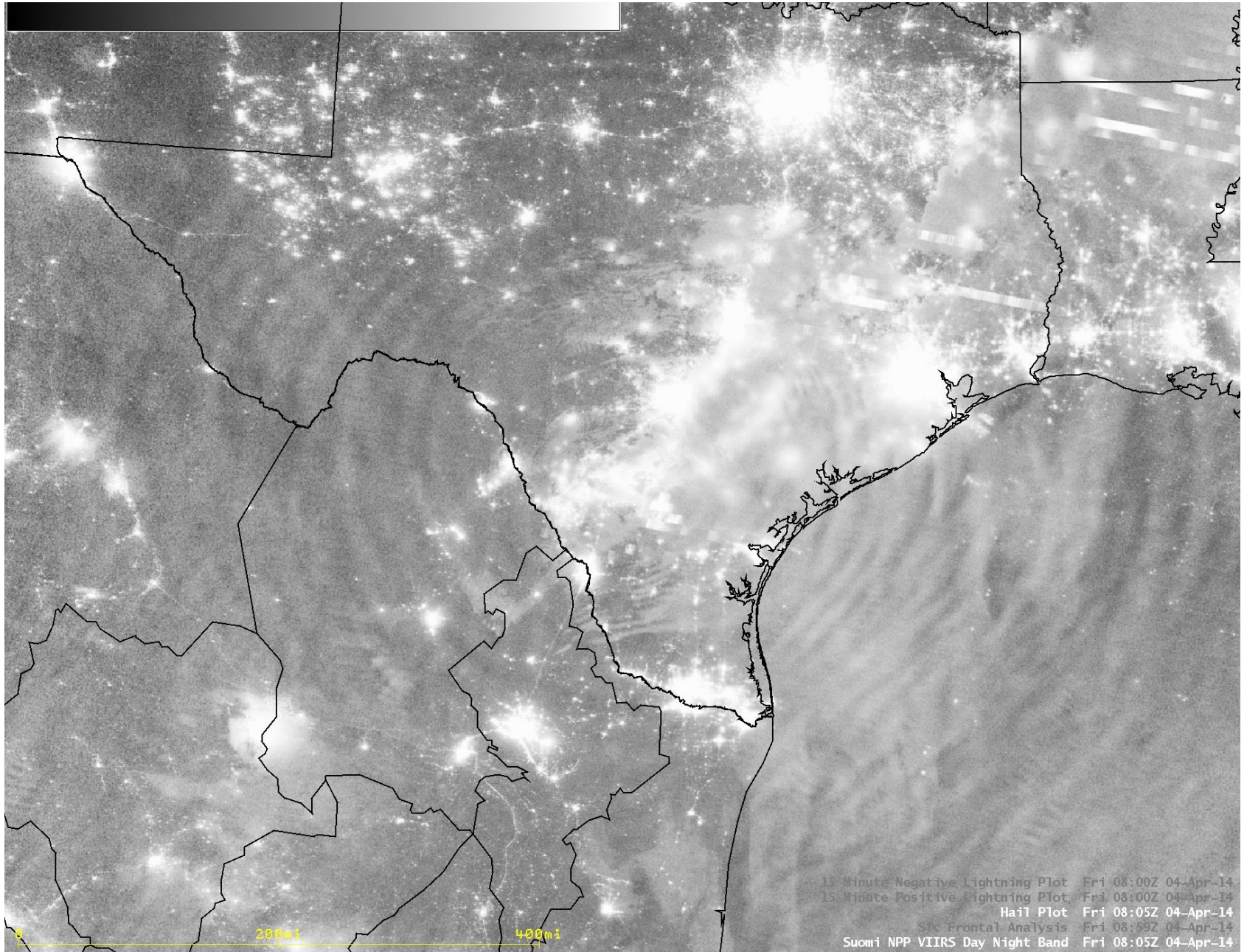


“ (...) these types of systems are constrained to land-based locations making monitoring the entire Pacific Ocean, for example, impossible. However, an imaging system *on a space-based platform* would not suffer from these limitations.

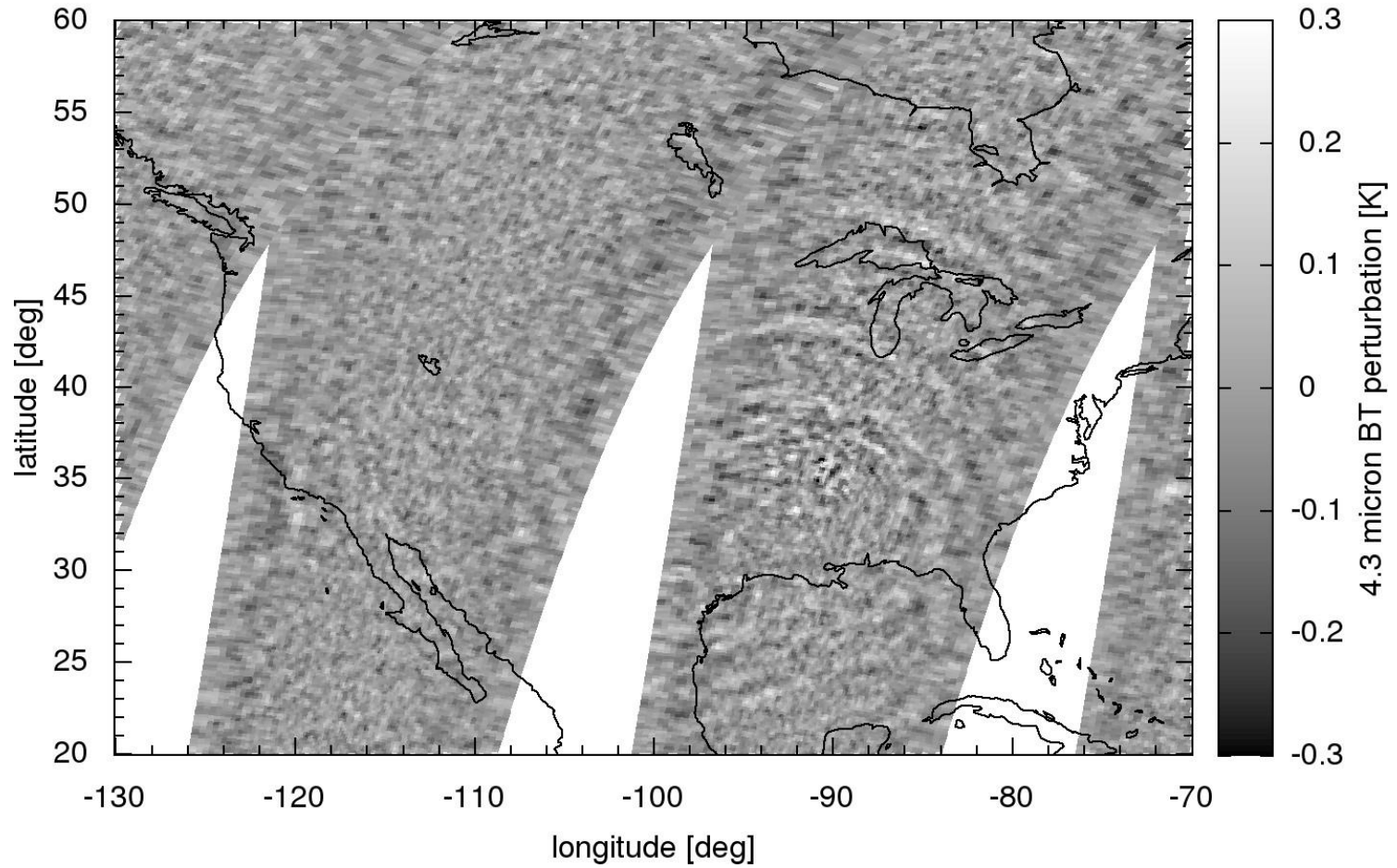
(...)

*A geostationary platform* would allow for continual monitoring of large regions of the Earth and usher in a new era of tsunami monitoring. ”

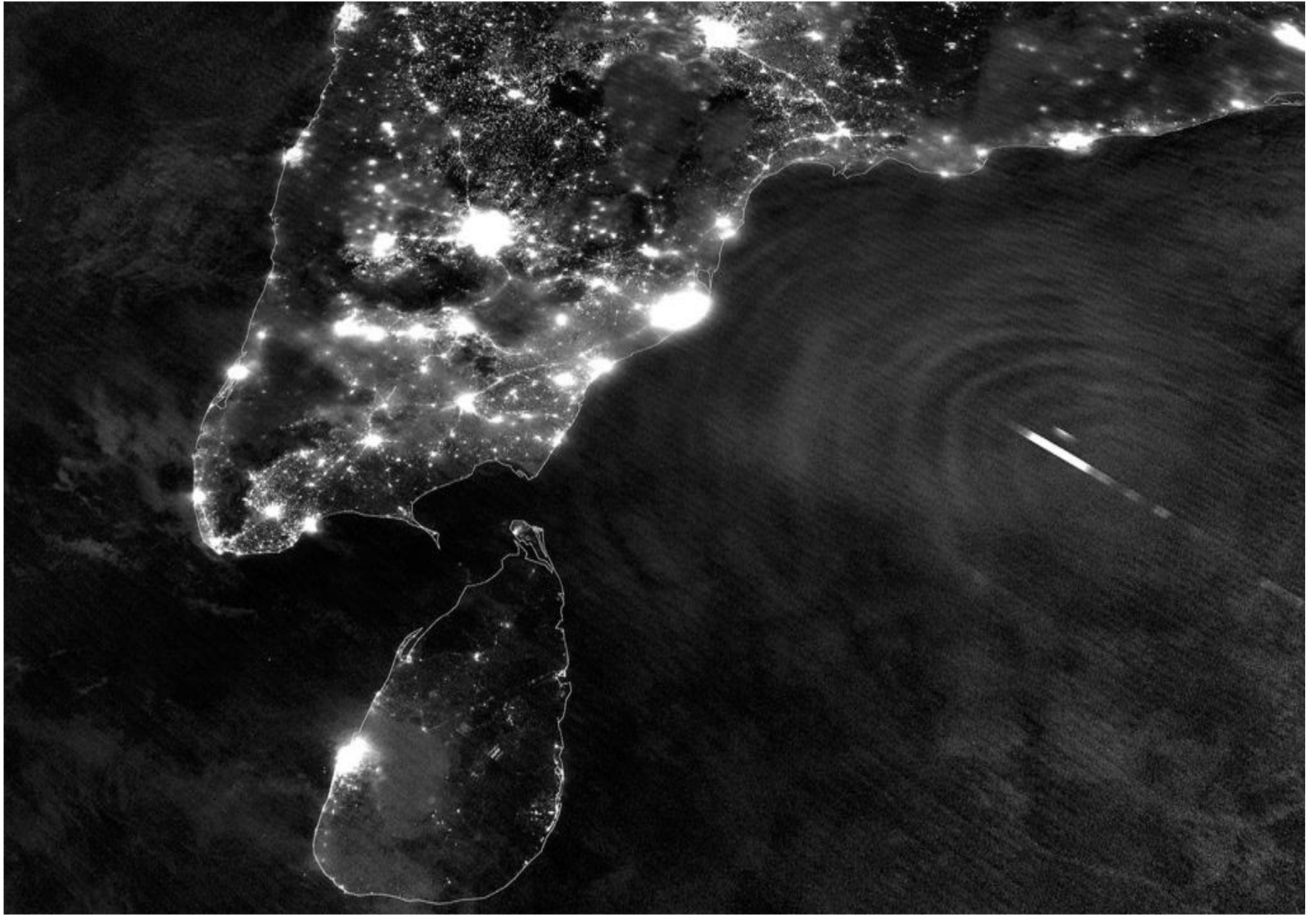




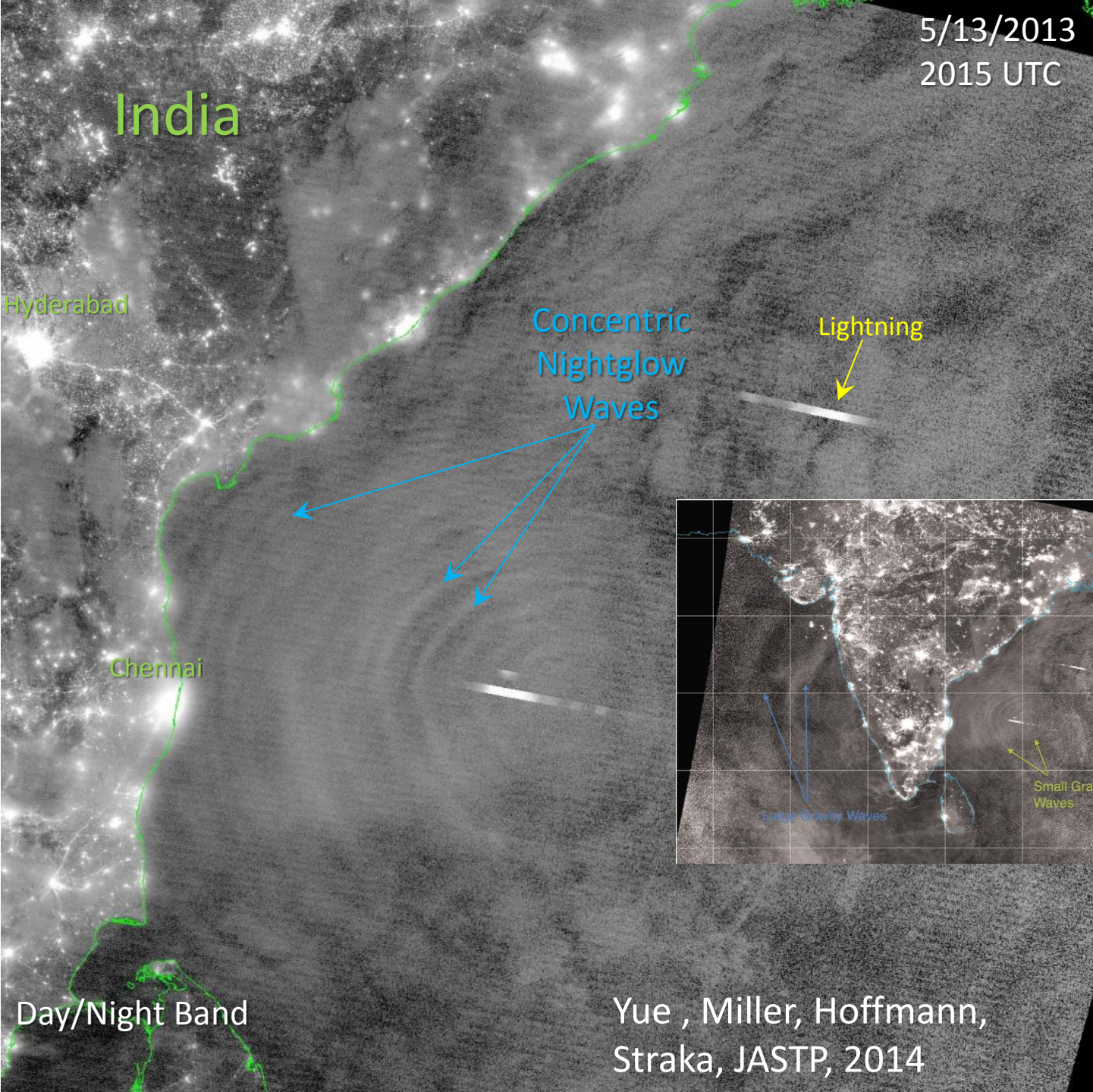
AIRS | 2014-04-04, 19:32 UTC







5/13/2013  
2015 UTC

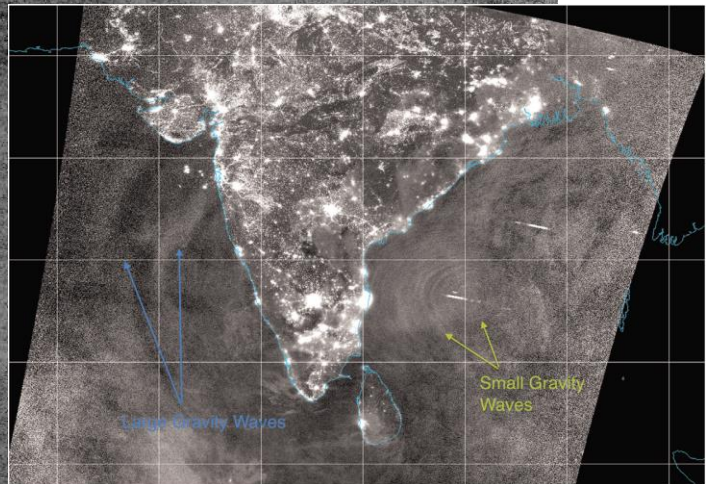


Concentric  
Nightglow  
Waves

Lightning

Chennai

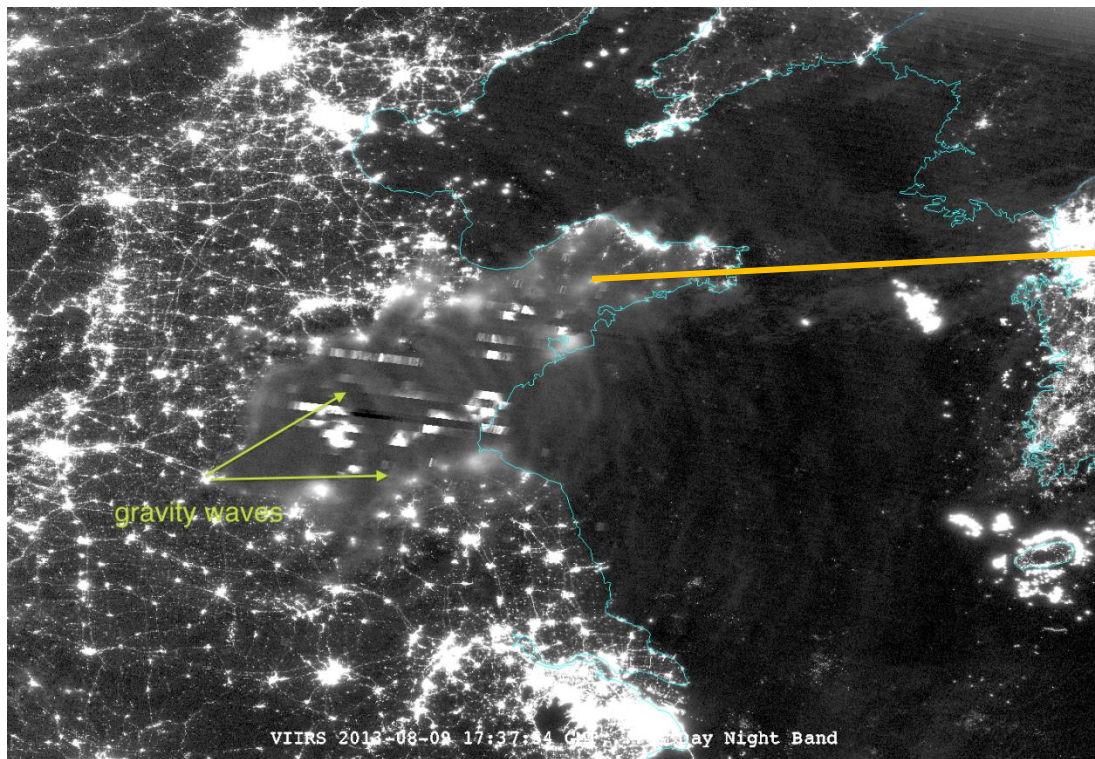
Day/Night Band



Large Gravity Waves

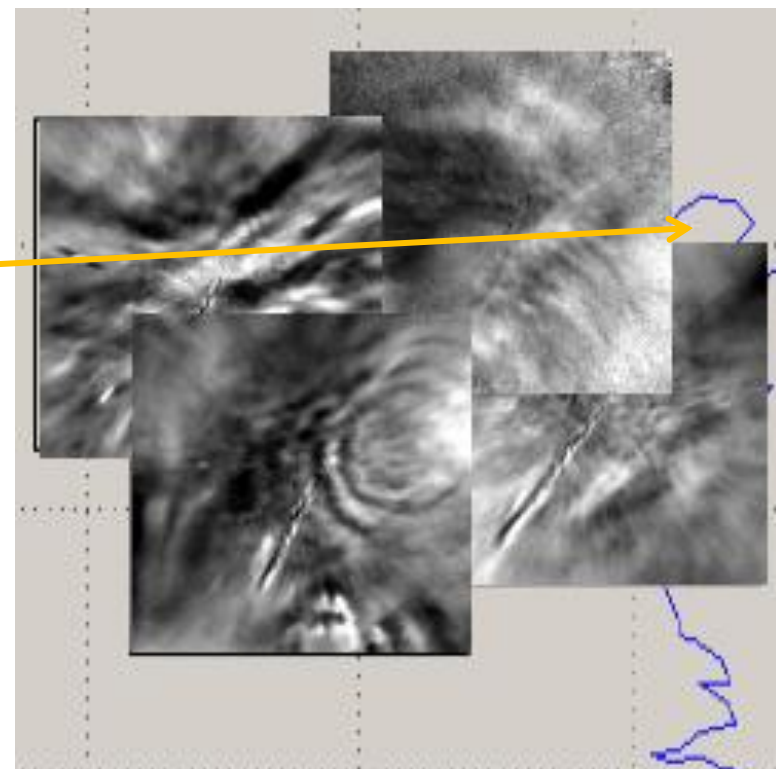
Small Gravity  
Waves

Yue , Miller, Hoffmann,  
Straka, JASTP, 2014

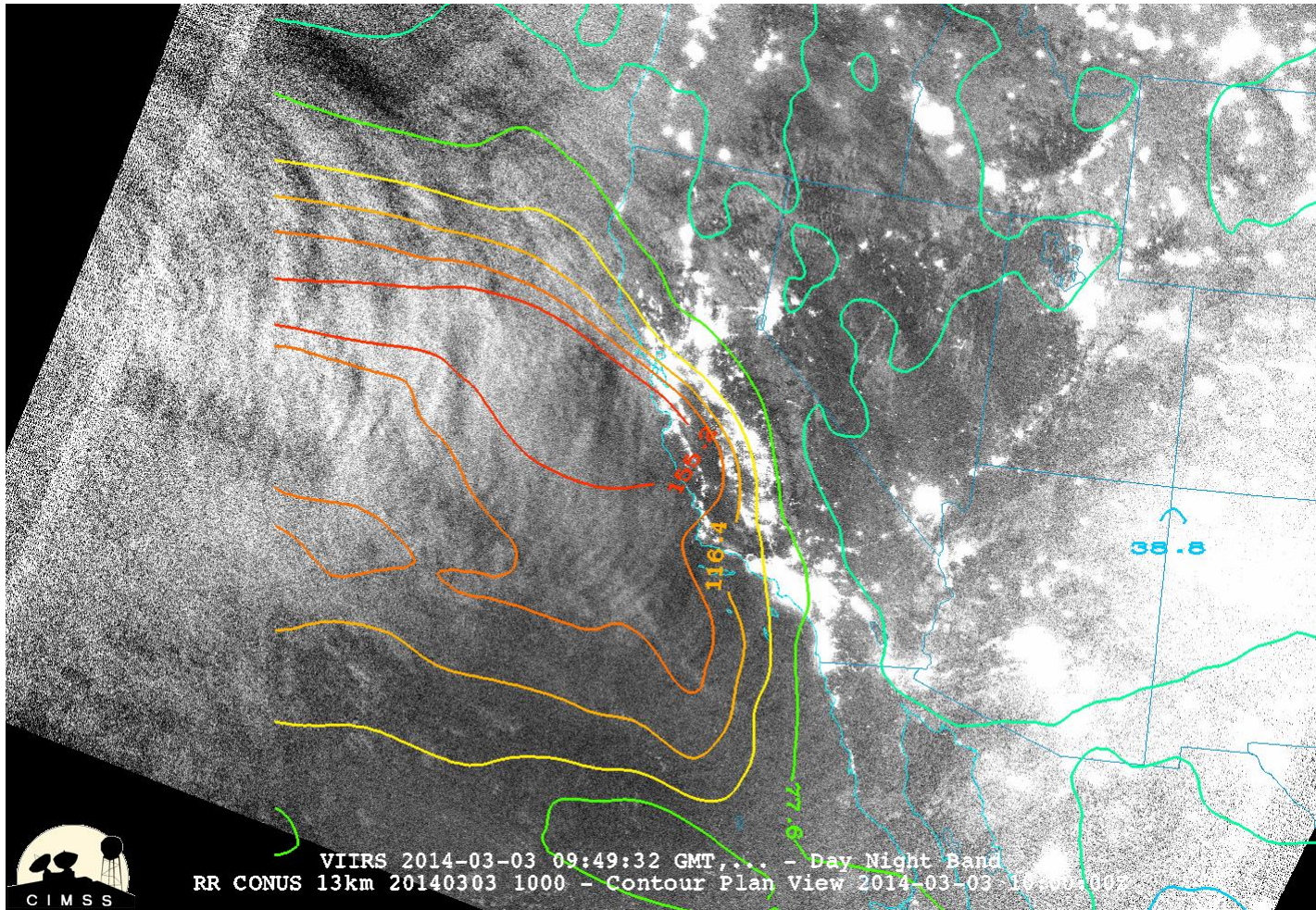


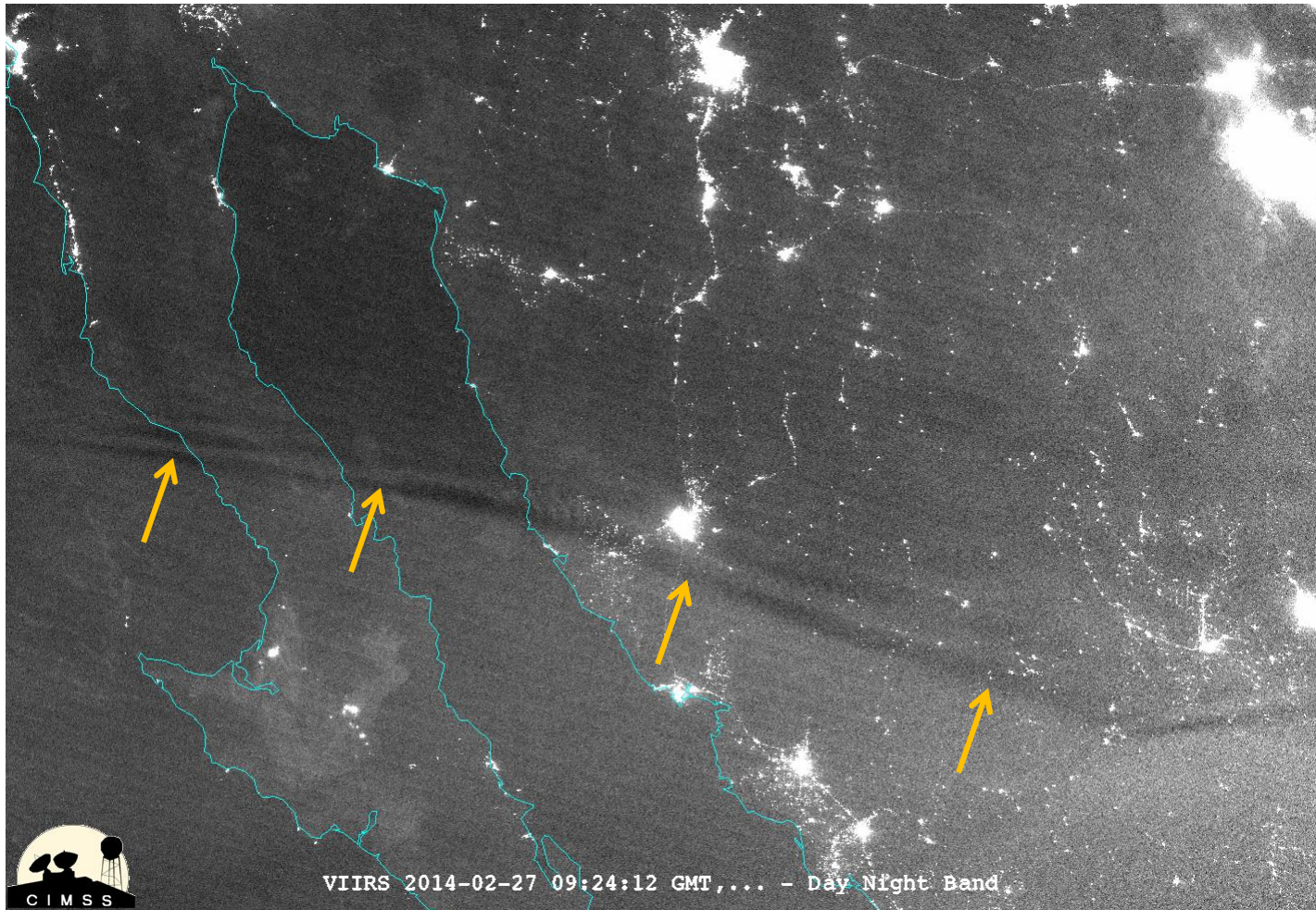
VIIRS DNB CGGW imagery on 9 Aug 2013  
over Northern China

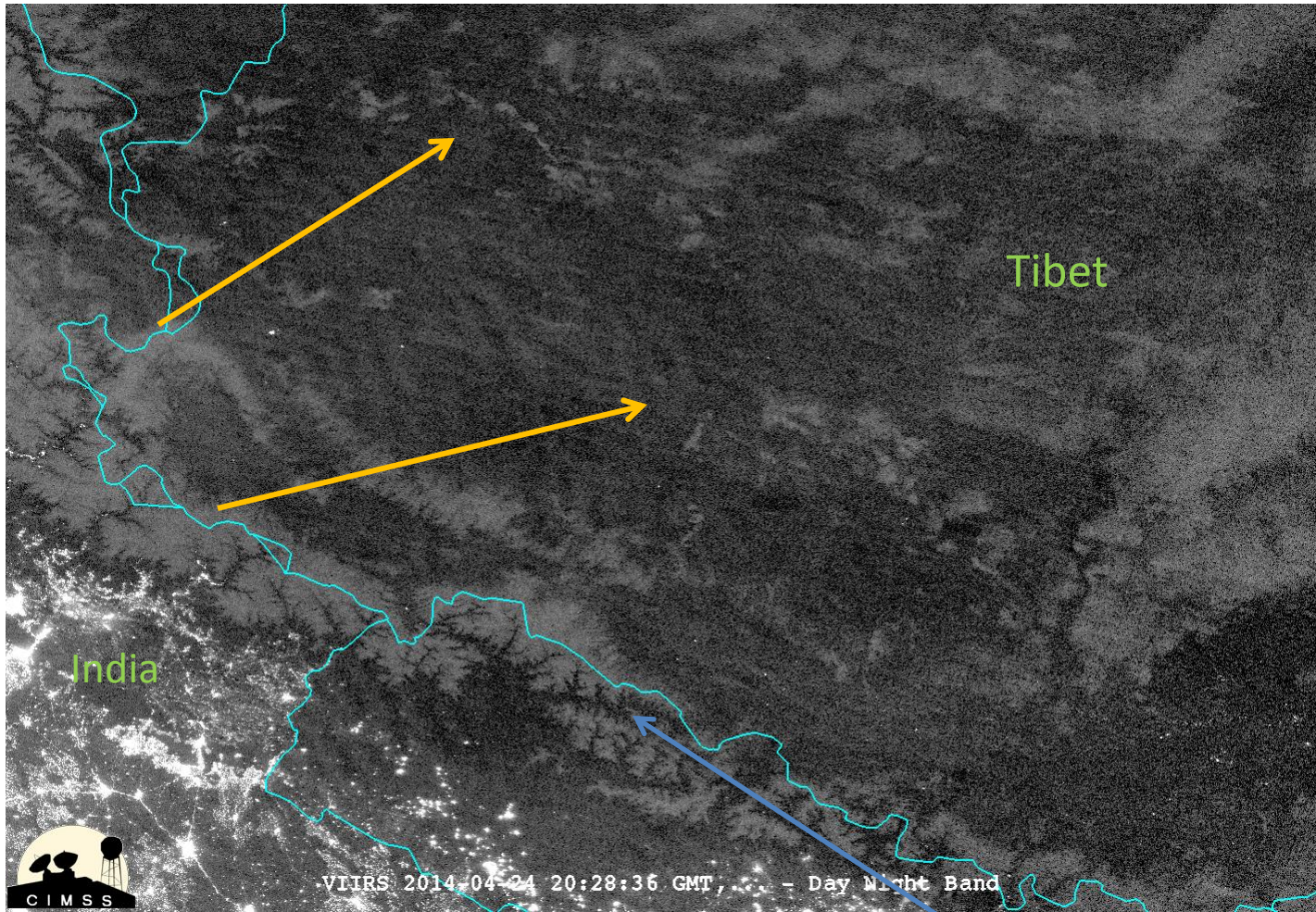
Xu, Jiyao et al., JGR, in preparation

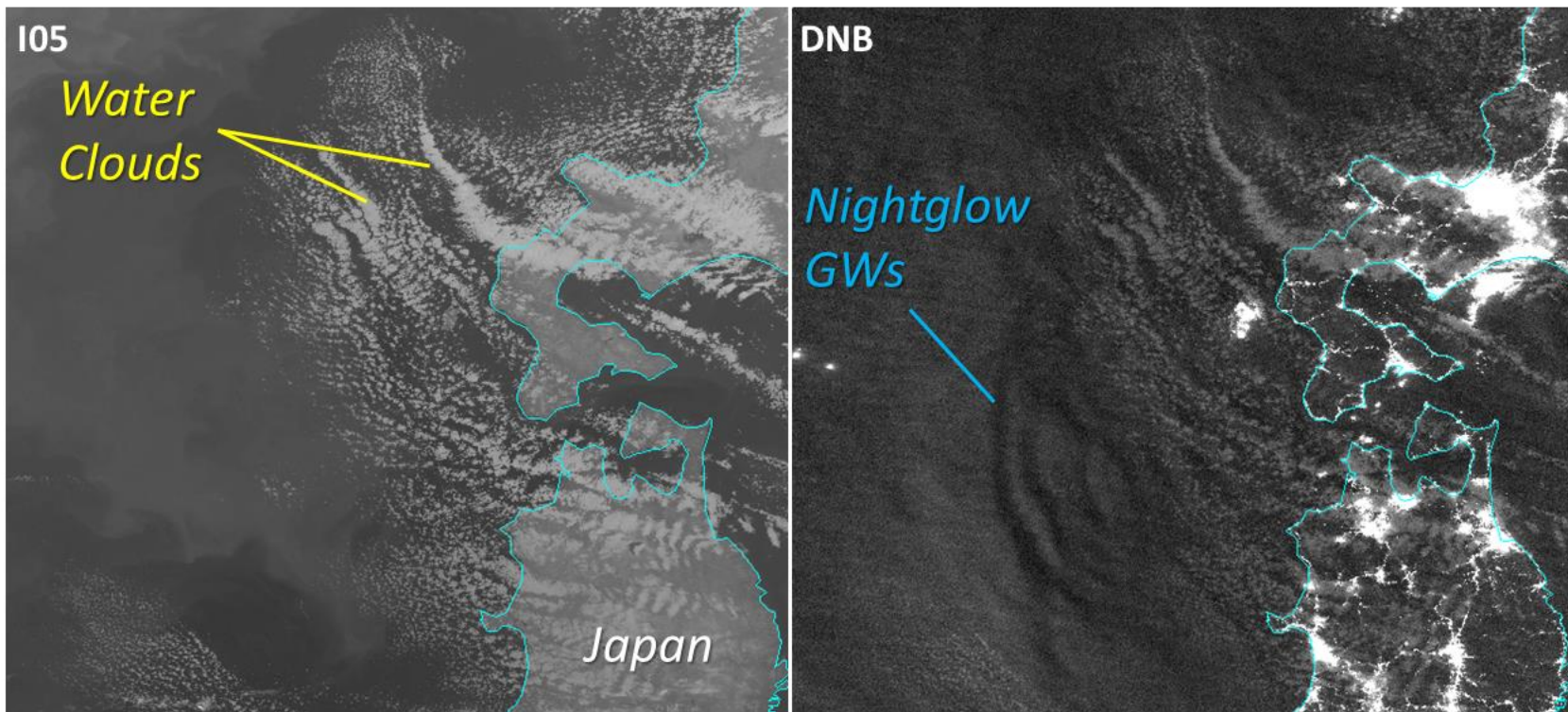


CGWs in four ground-based OH  
imagers operating in China in Aug  
2013

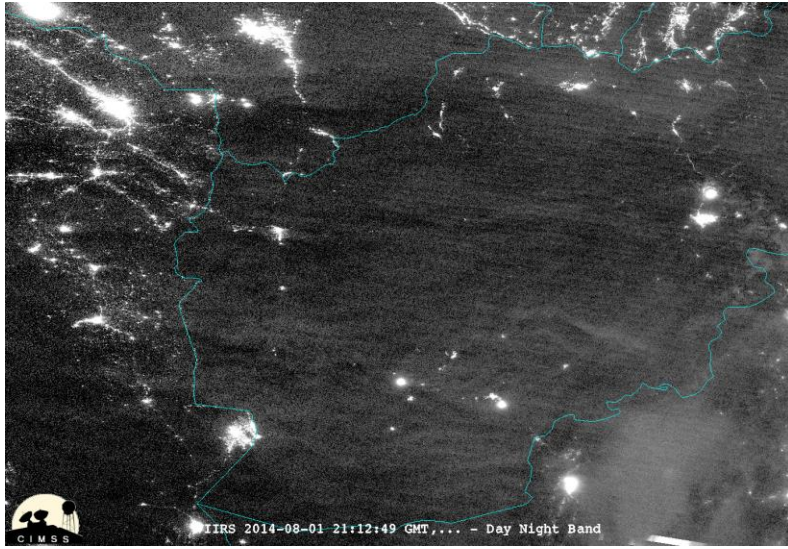




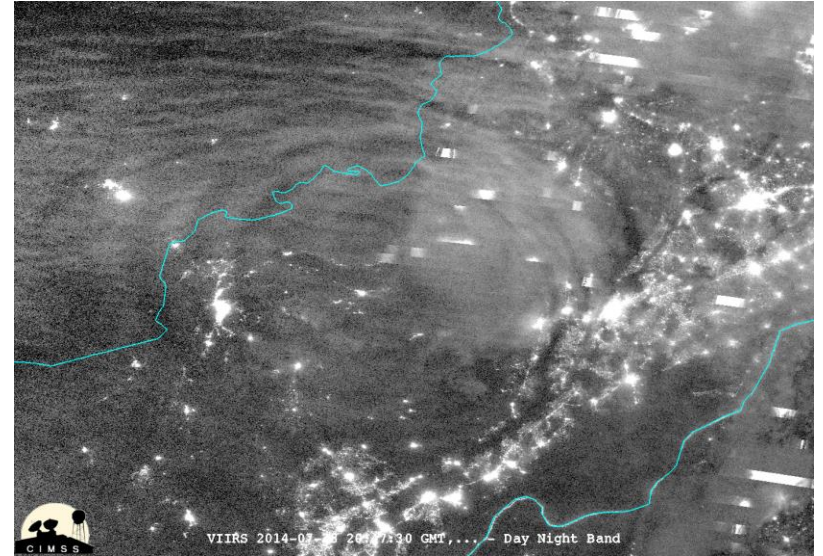




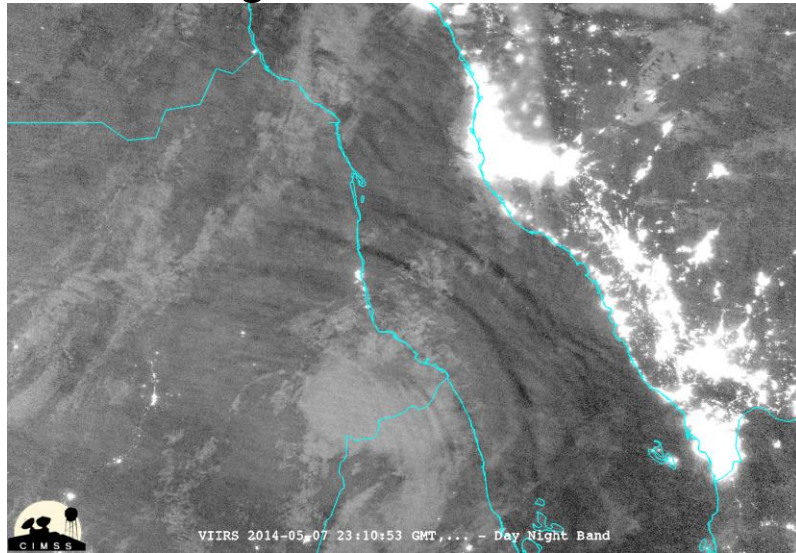
Hokkaido, Japan



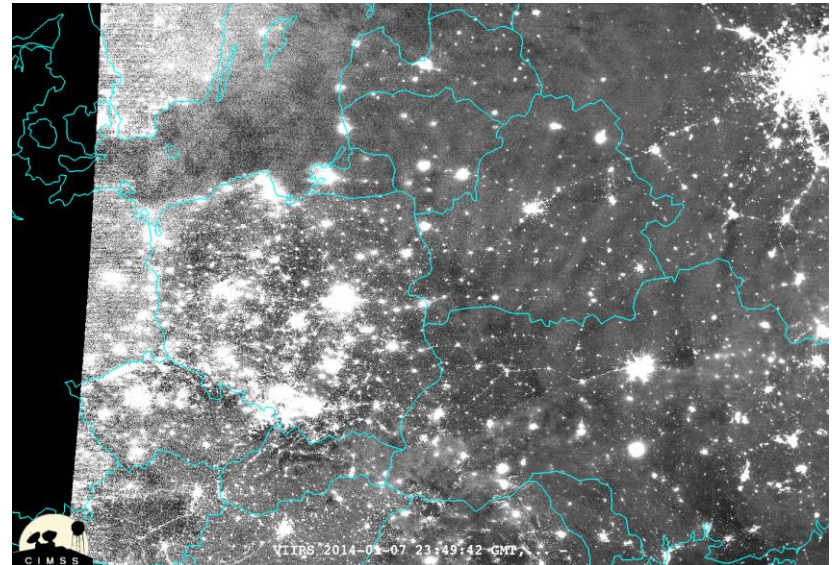
Afghanistan



Pakistan

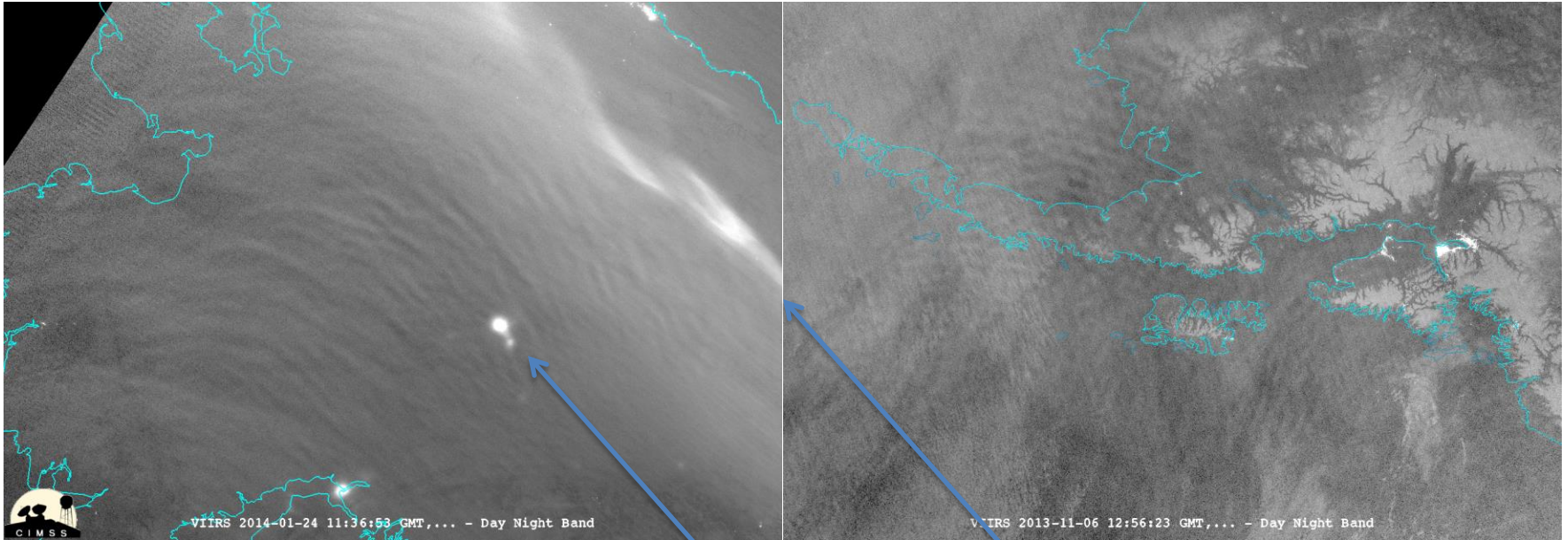


Yemen



Ukraine



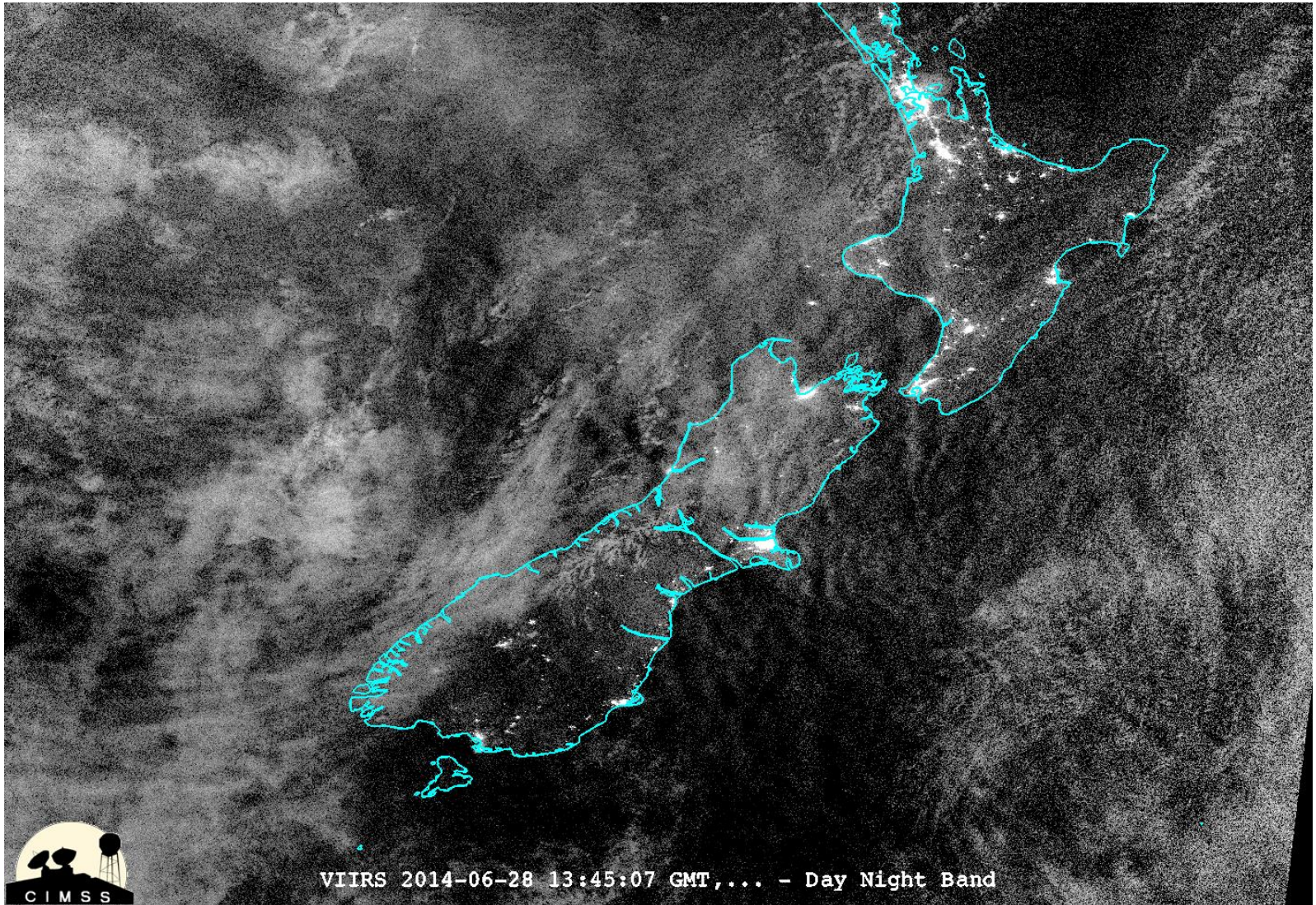


Alaska

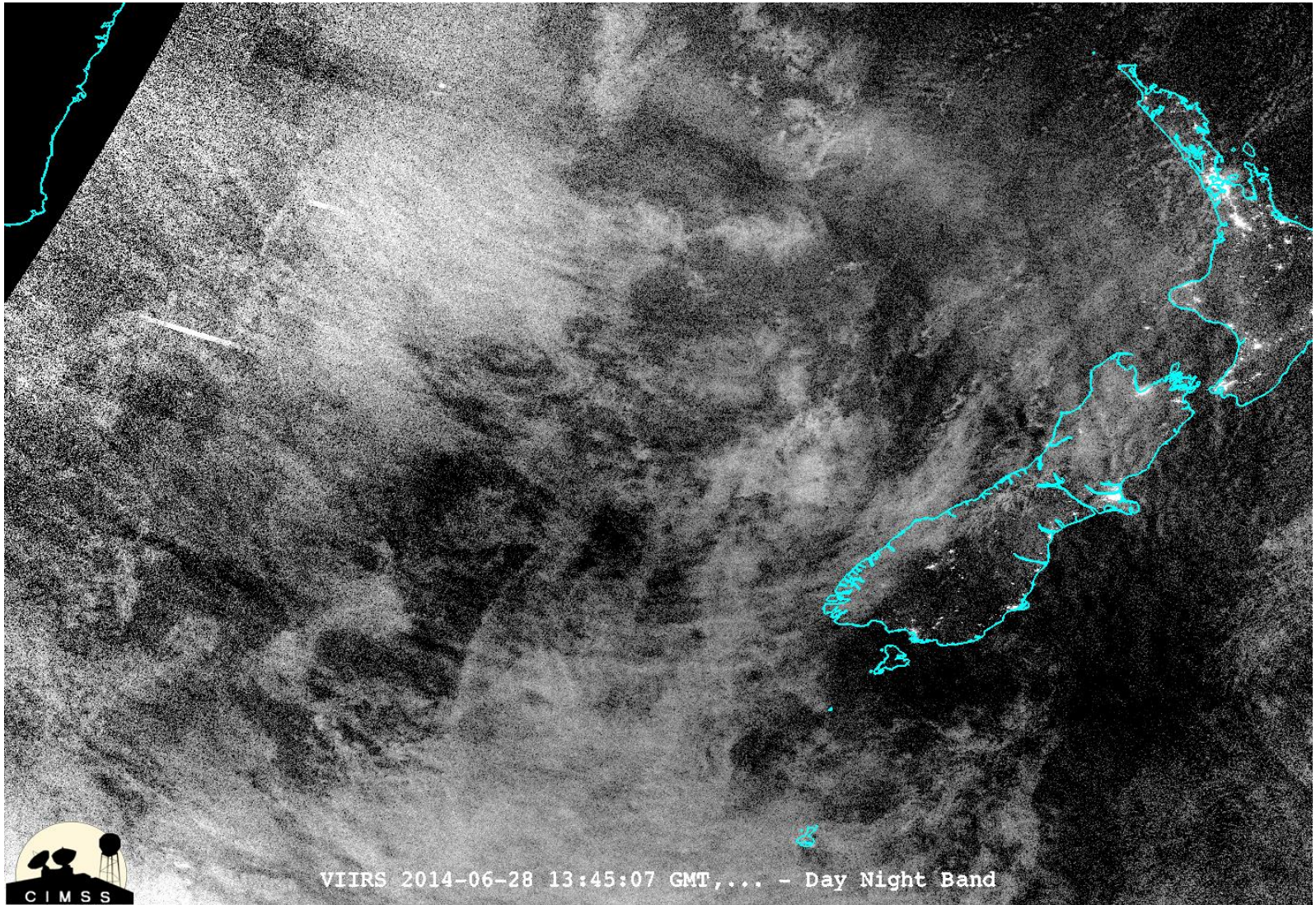
Aurora

Fairbanks

# DEEPWAVE EXAMPLES

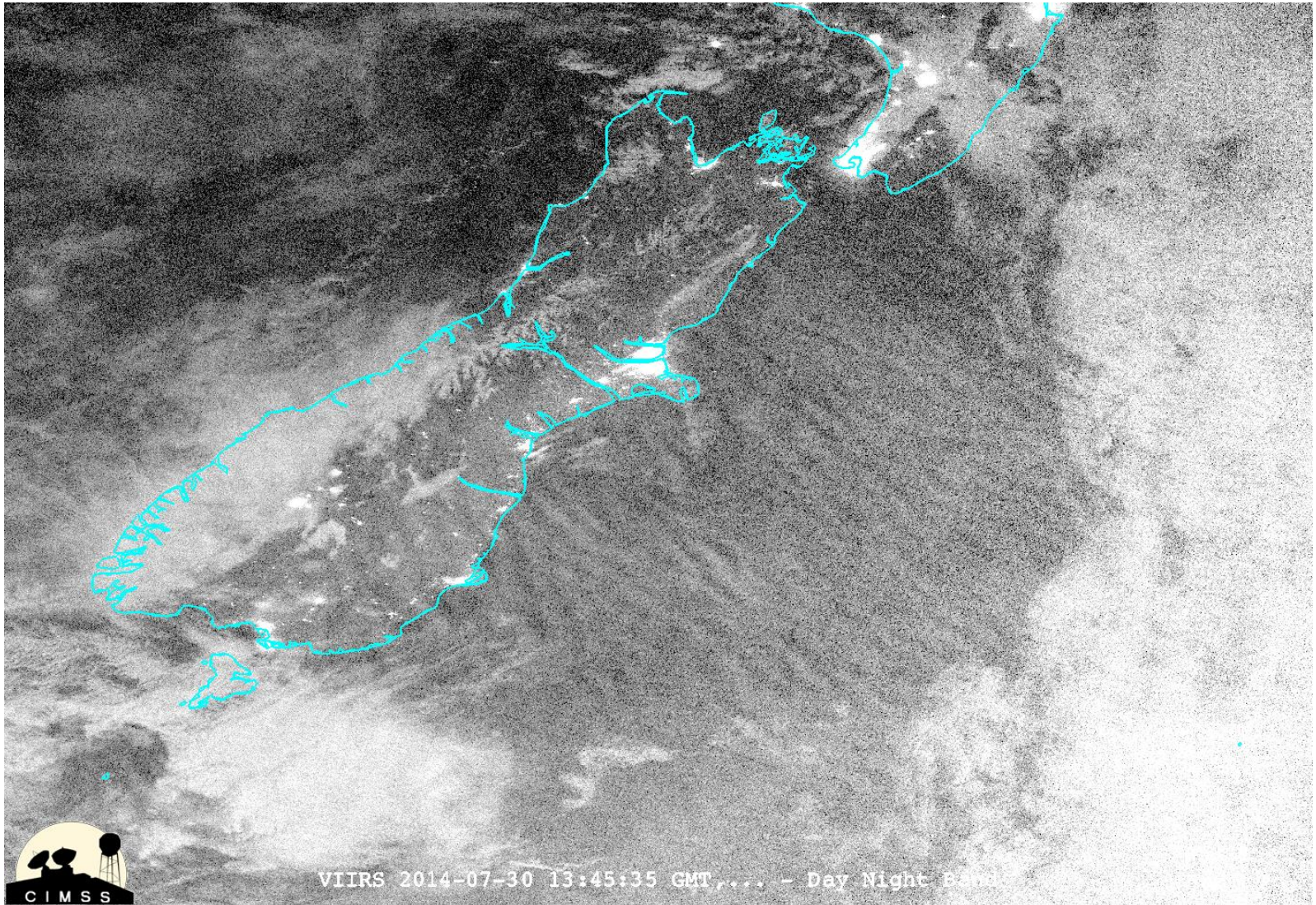


# DEEPWAVE EXAMPLES



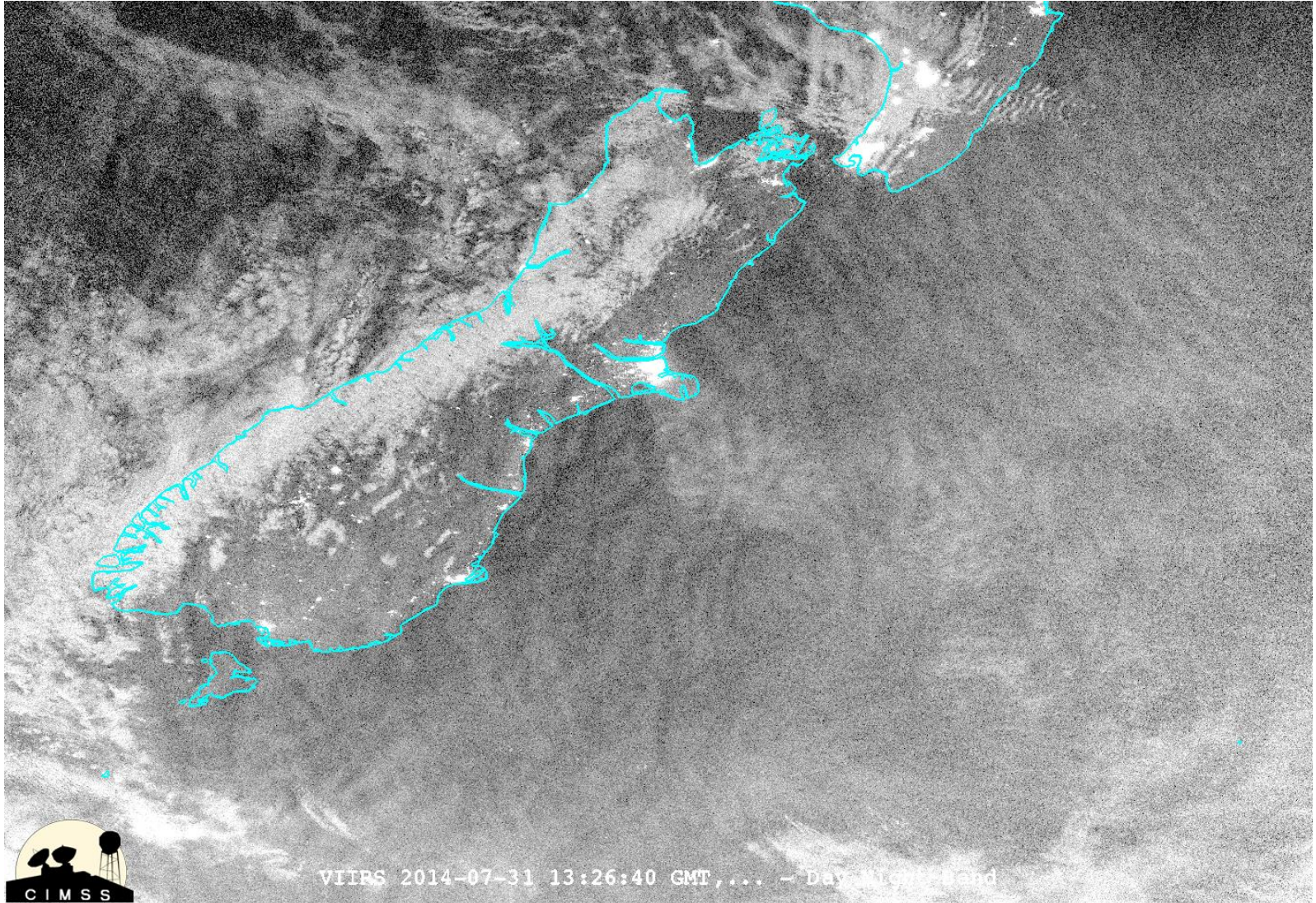
Note: IOP 17 Andreas Doernbrack (DLR)—less wind shear aloft

# DEEPWAVE EXAMPLES



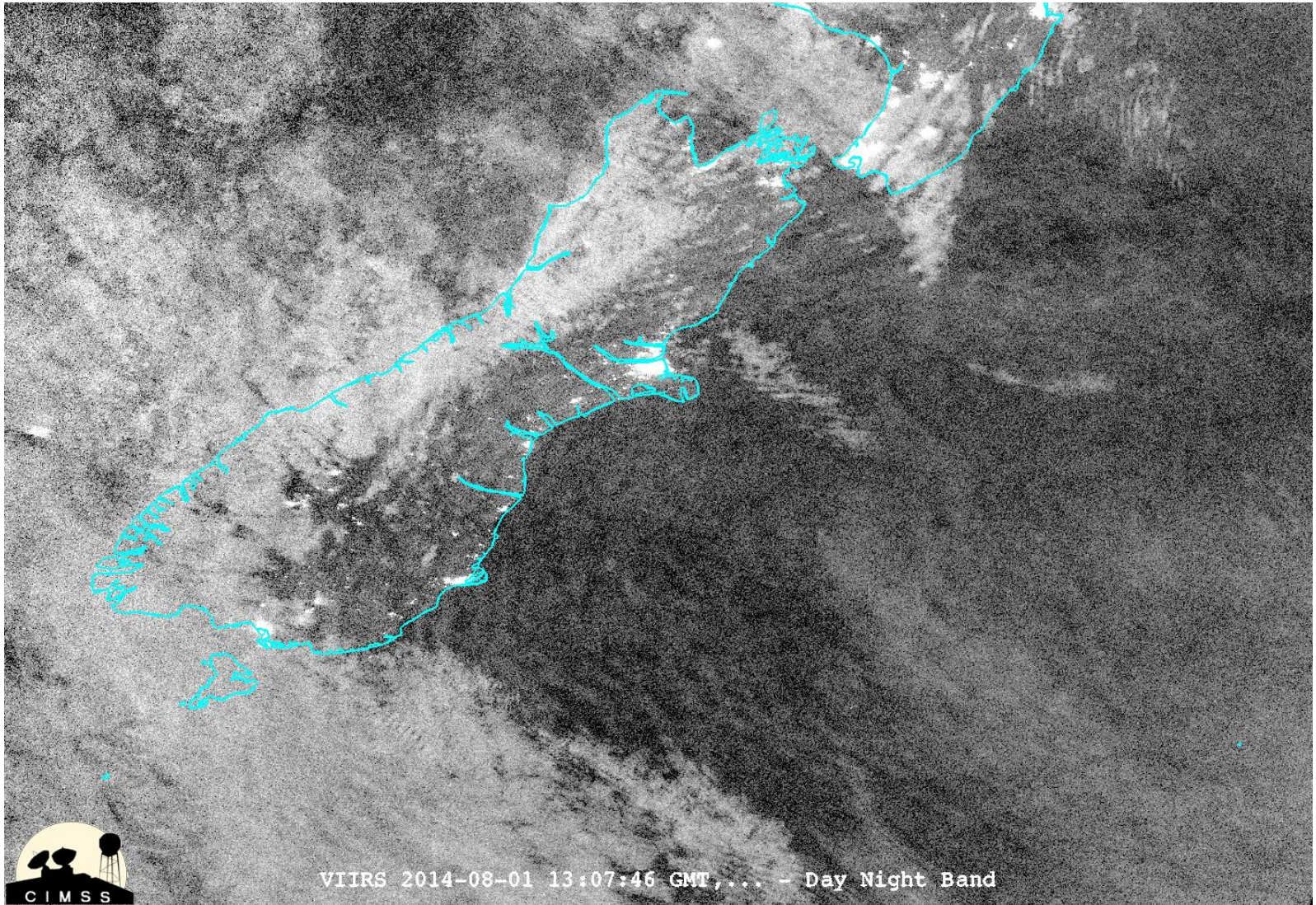
Note: IOP 17 Andreas Doernbrack (DLR)—less wind shear aloft

# DEEPWAVE EXAMPLES



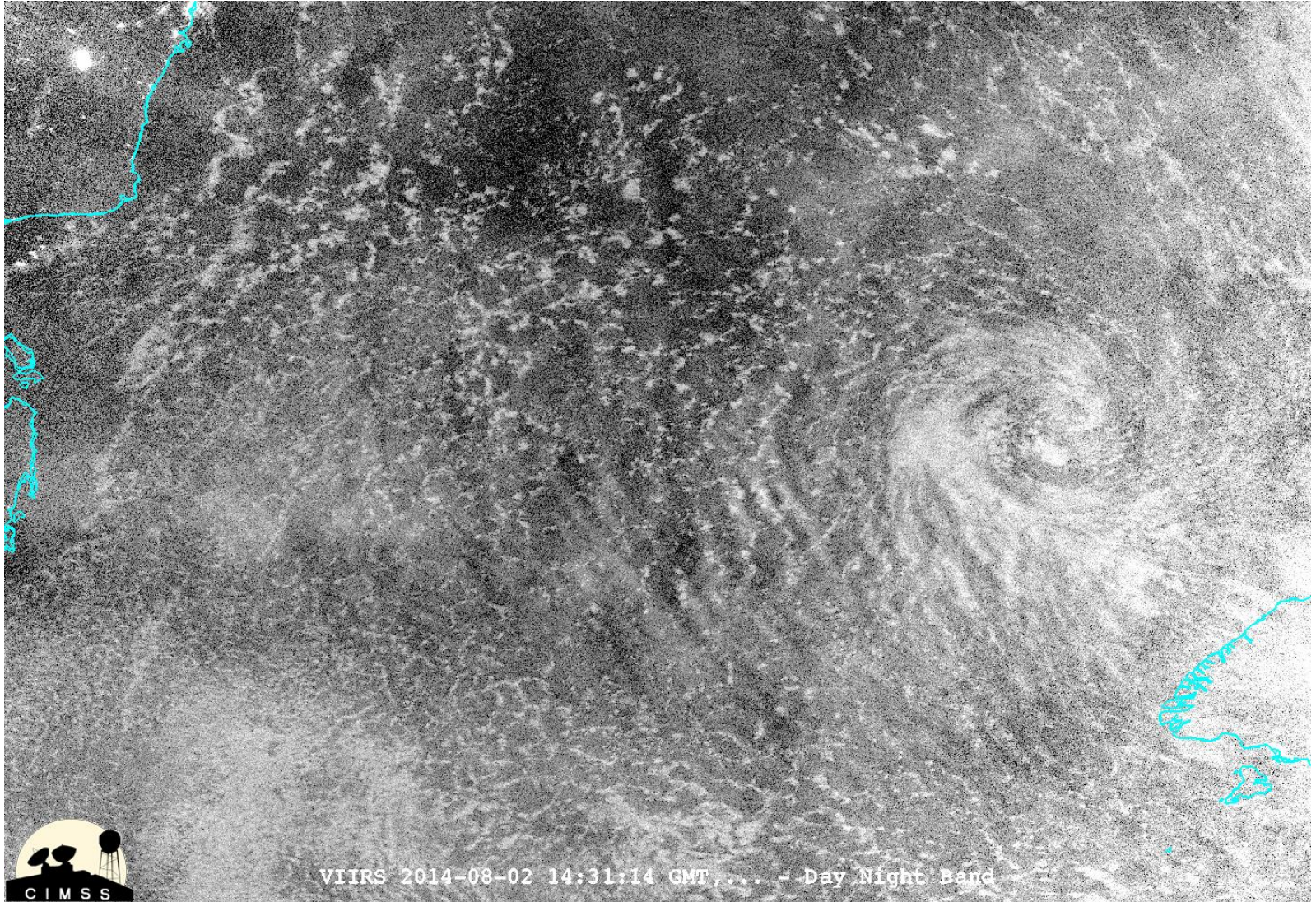
Note: IOP 17 Andreas Doernbrack (DLR)—less wind shear aloft

# DEEPWAVE EXAMPLES



Note: IOP 17 Andreas Doernbrack (DLR)—less wind shear aloft

# DEEPWAVE EXAMPLES



NOTE: Steve Smith Case....Still need to process IR to determine GW features

# DEEPWAVE EXAMPLES

2014/05/30 1250 UTC

