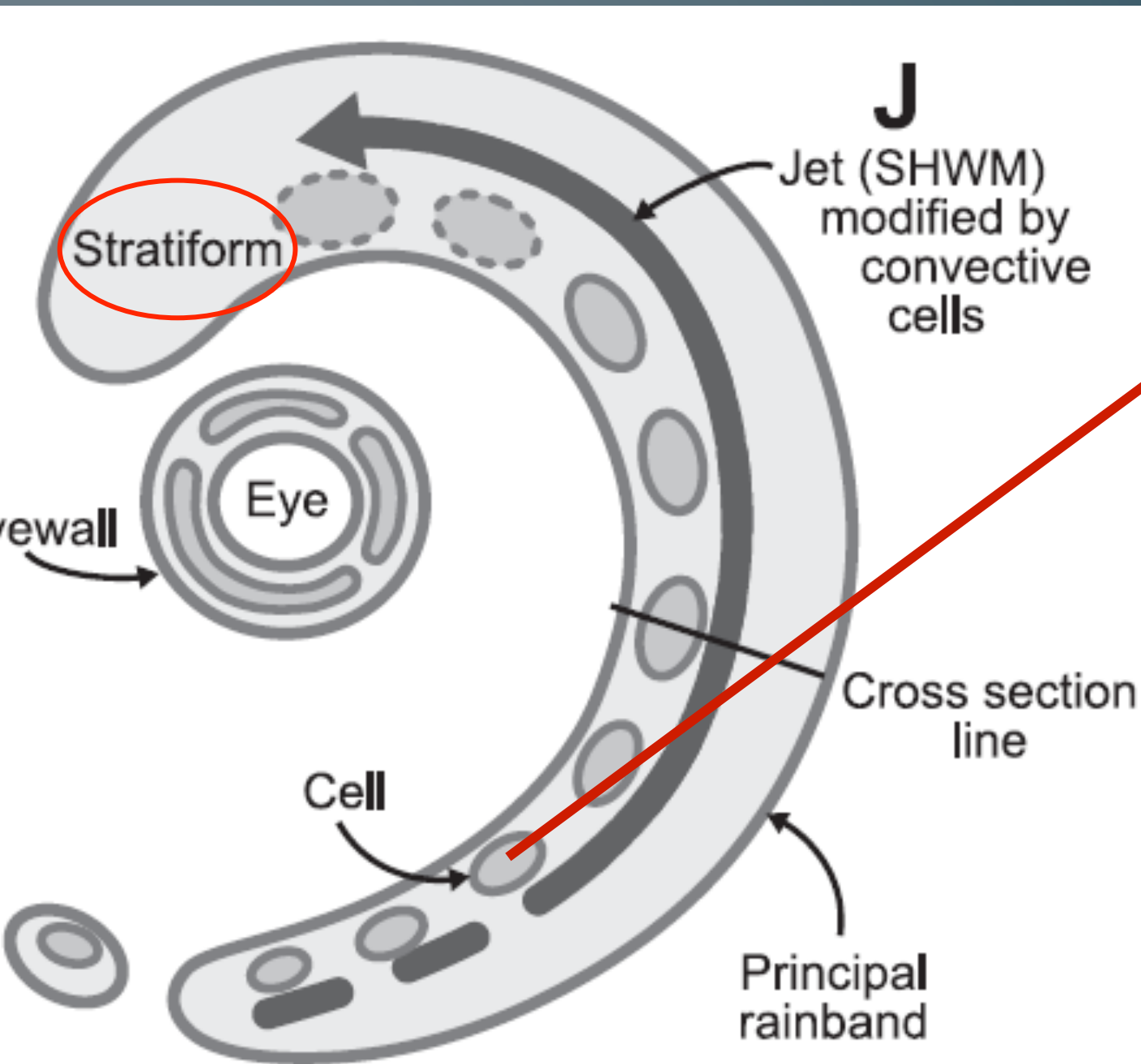
A satellite image showing two tropical storms in the Pacific Ocean. The storms are characterized by distinct, swirling cloud patterns with visible eyes. The surrounding ocean is dark blue, and the landmasses of North and South America are visible on the left side of the frame. The text is overlaid on the left side of the image.

***at Satellite tells  
of TS Flossie***

*ter: Chihying Chen, Xiaomin Chen*

# Clouds in TCs



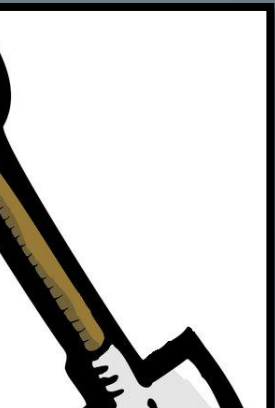
Embedded convective cells (Usually composed of ice crystals due to strong updrafts)

# Outline

What could we “dig out” from the high-resolution, multi-channel polar satellite?

How to distinguish the cloud phase in TS Flossie with the help of multi-channel analysis

It is well known overshooting tops (OTs) exist in strong convections within mature Hurricanes. Is that still true in the low-latitude TSs?



# Part I

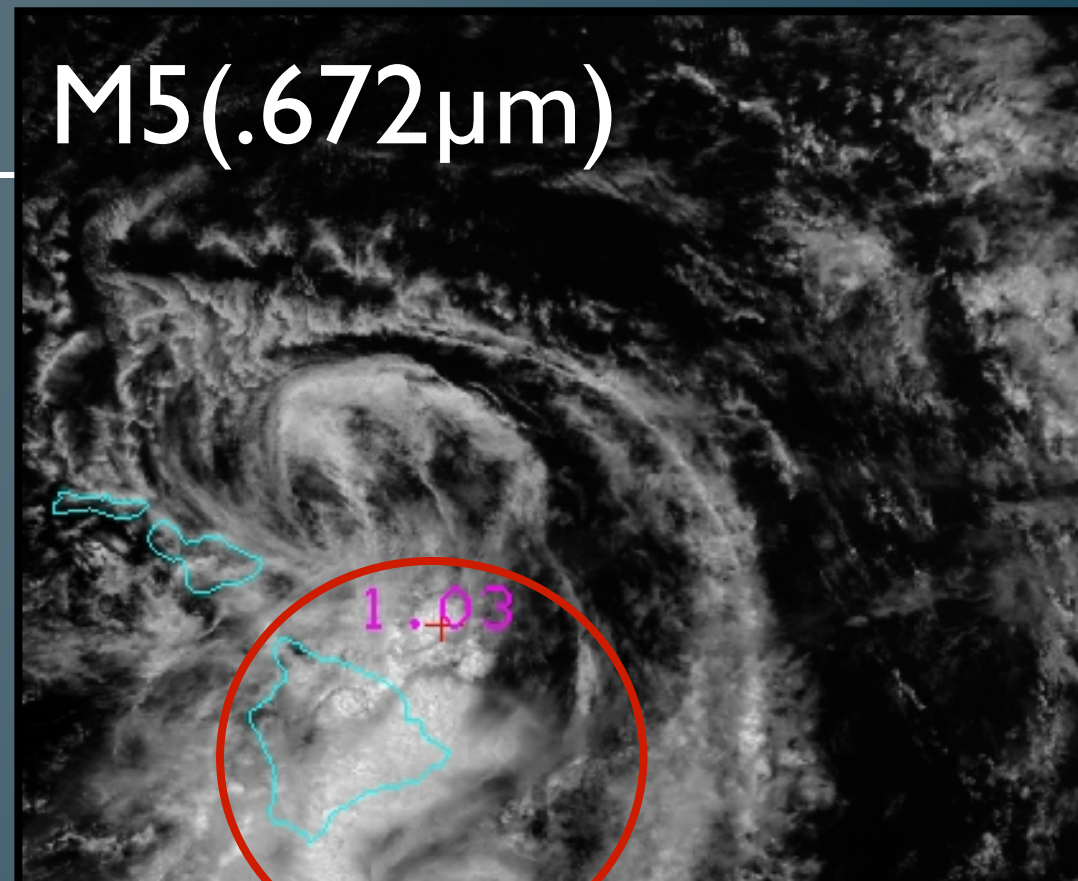
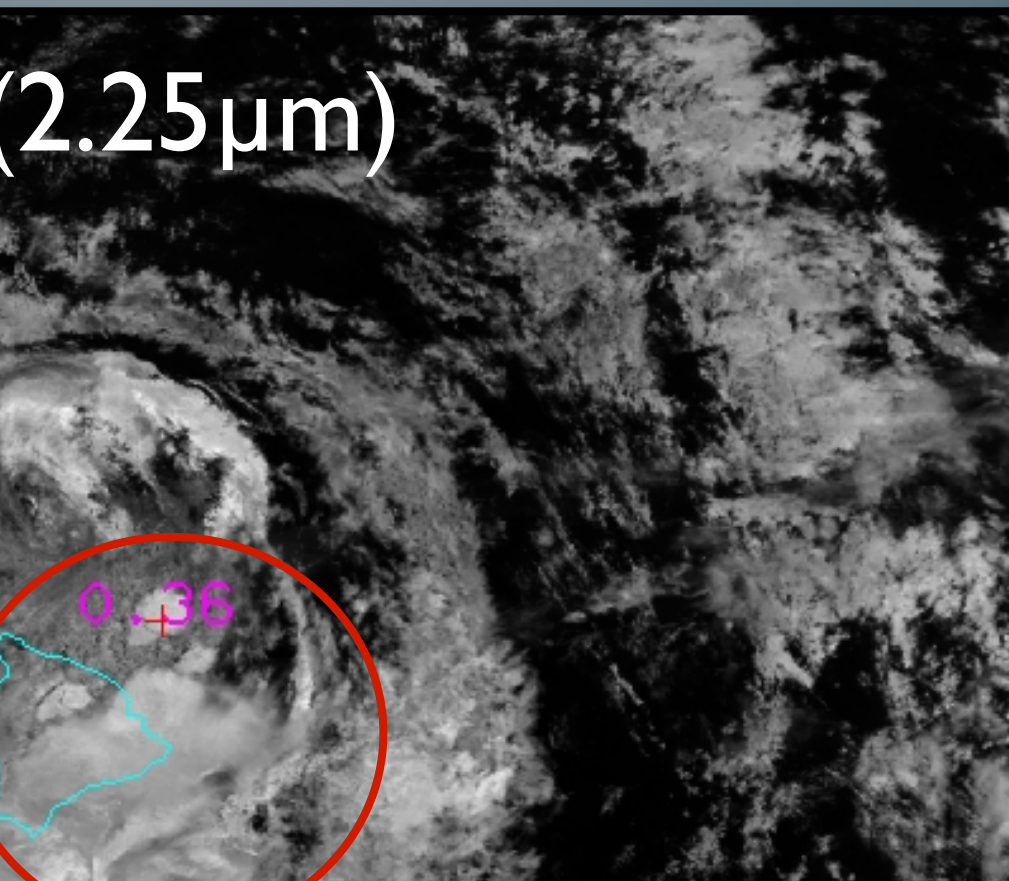
cloud phase: (Scatter plot of Hydra)

DIS: B1( $.65\mu\text{m}$ ) and B7( $2.1\mu\text{m}$ ) (Daytime not available)

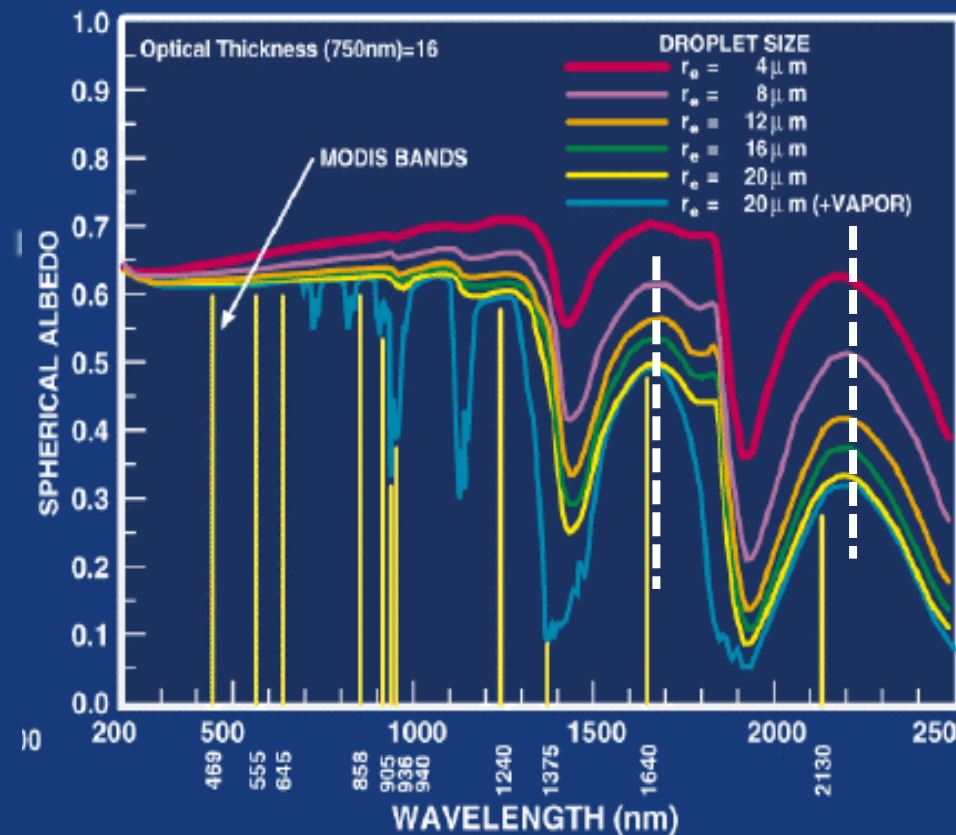
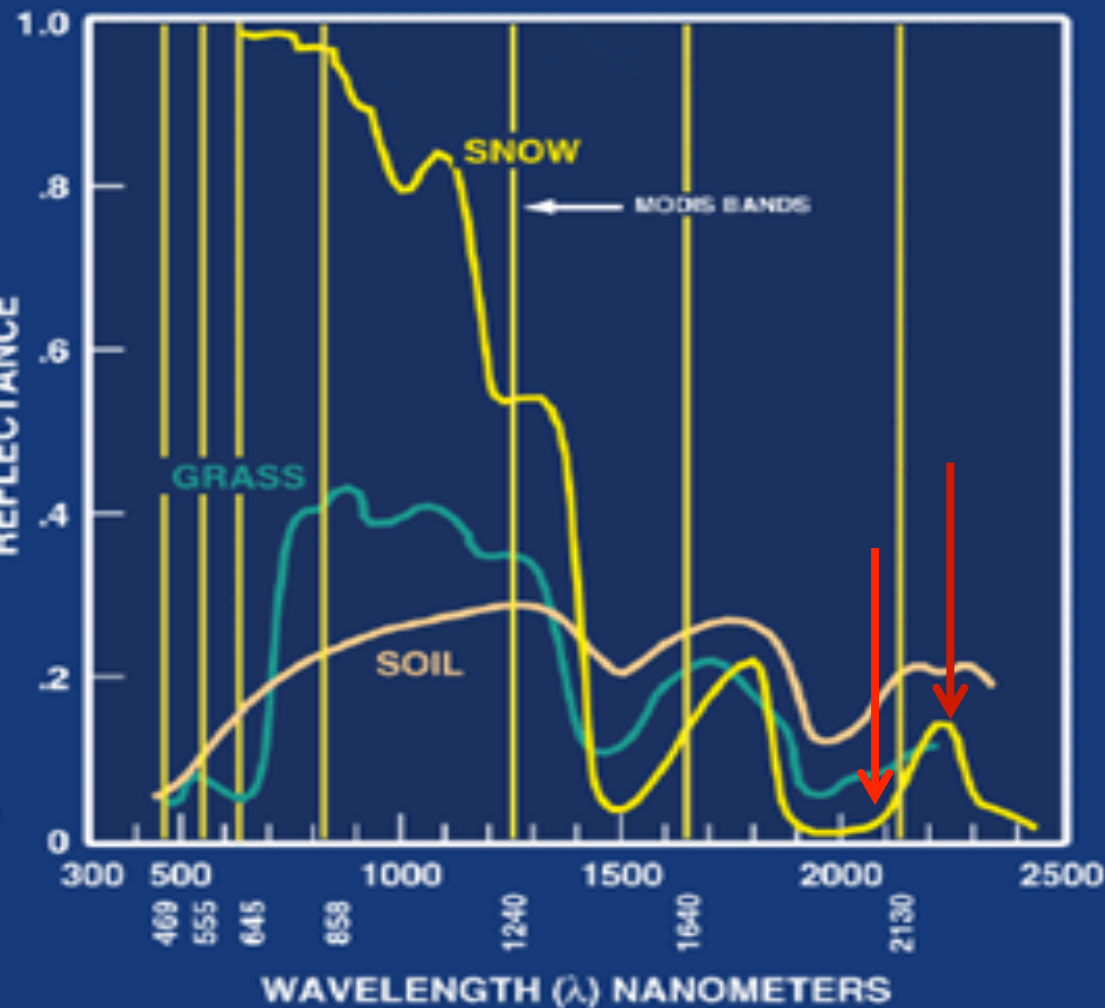
IRS: M5( $.67\mu\text{m}$ ) and M11( $2.25\mu\text{m}$ );

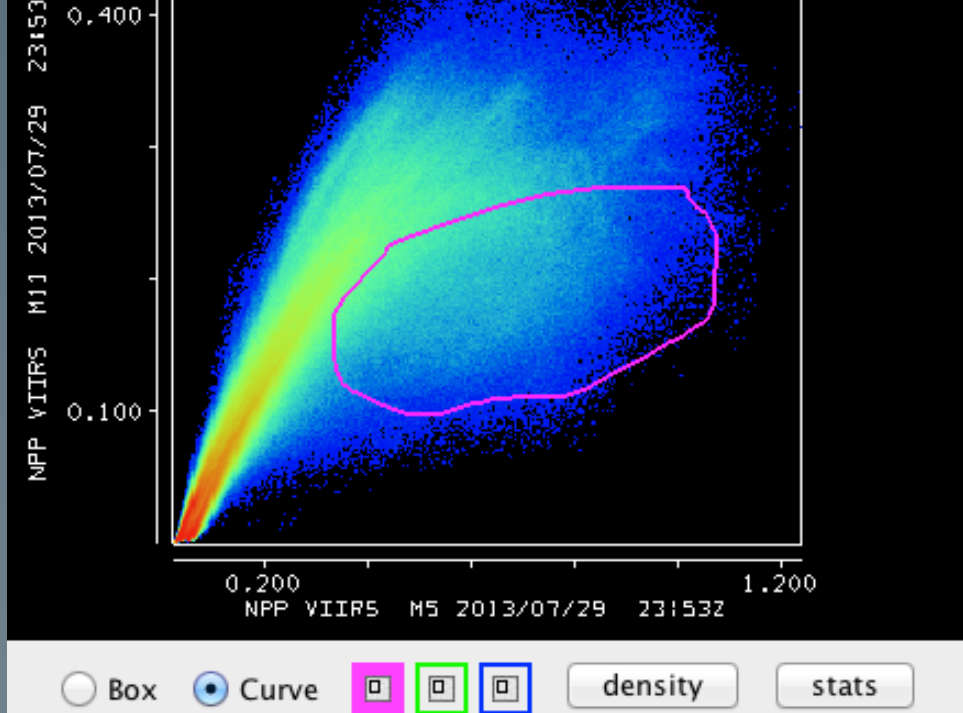
M5( $.67\mu\text{m}$ ) and M10( $1.61\mu\text{m}$ )

VIIRS 2013/07/29 23:53Z

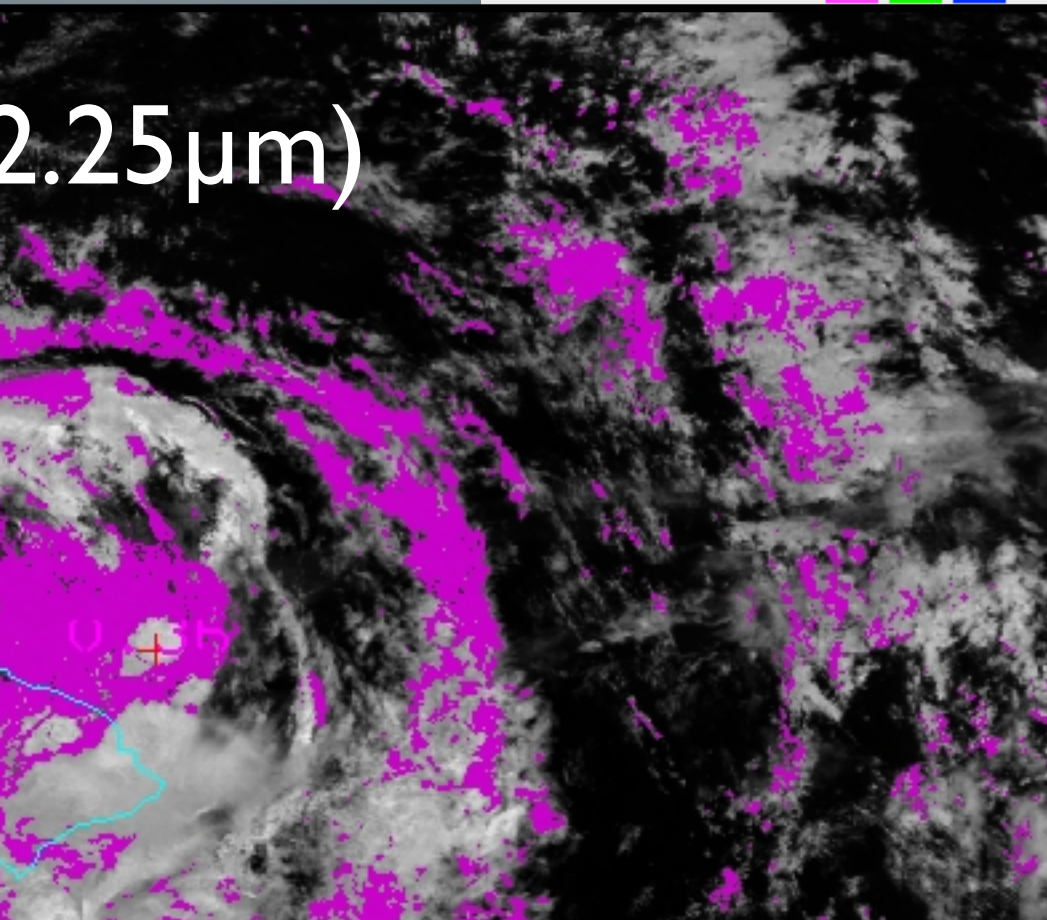


# ATMOSPHERE-SOLAR RADIATION

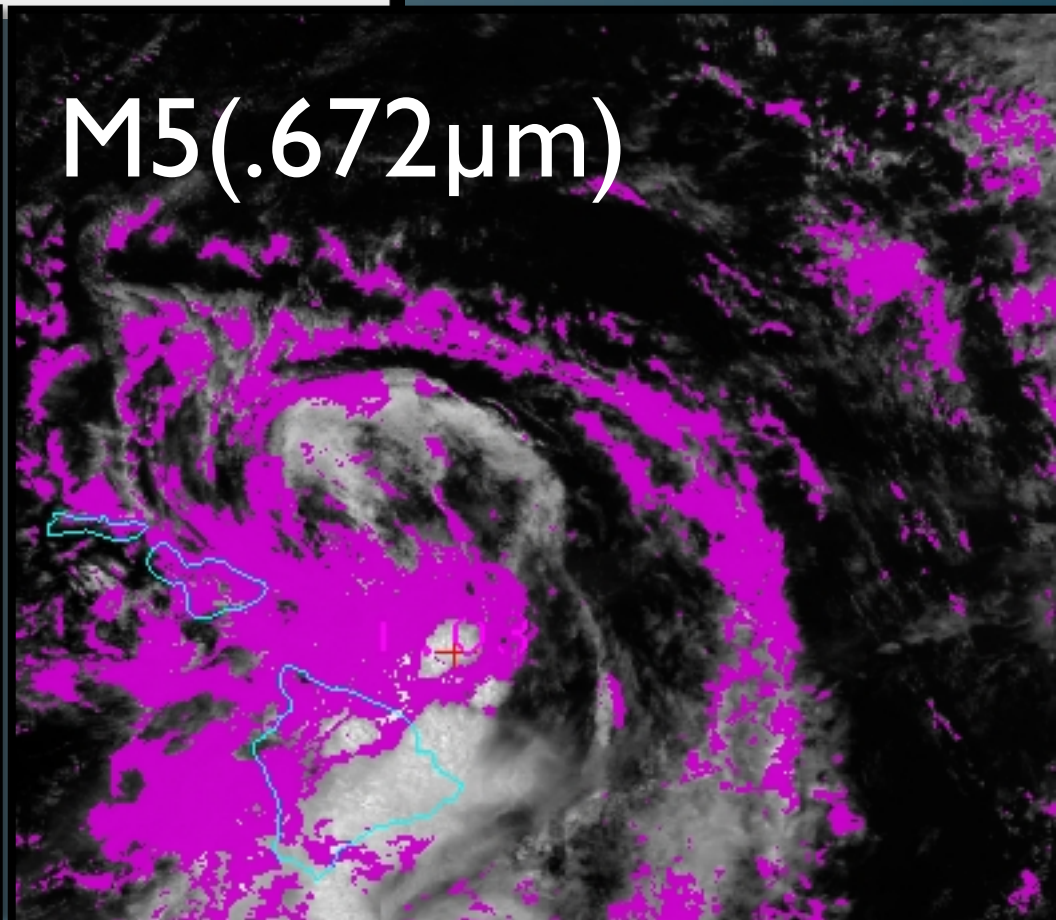


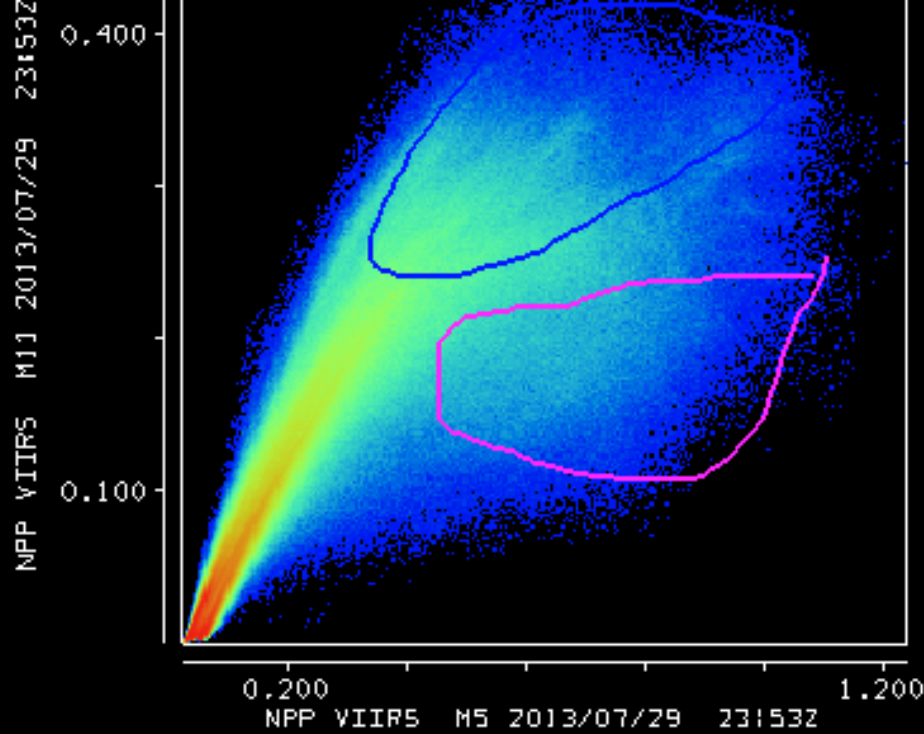


2.25 $\mu\text{m}$ )

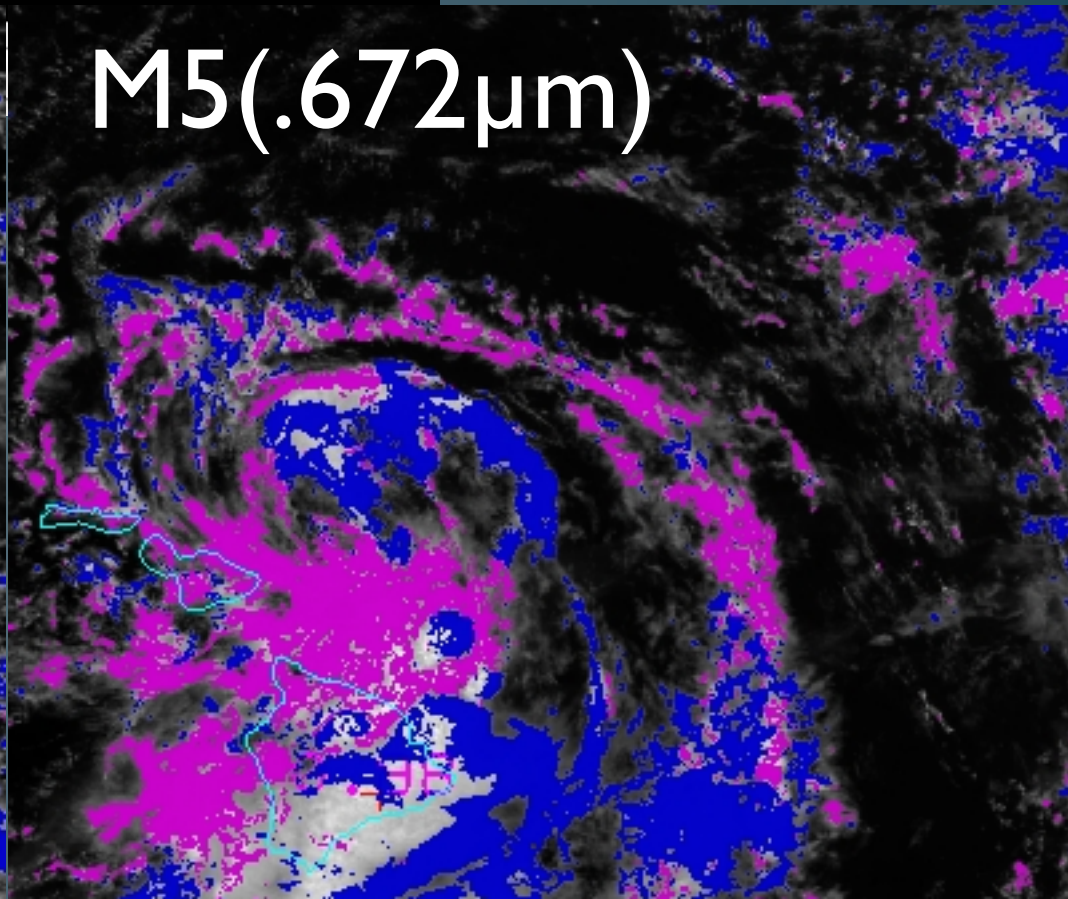
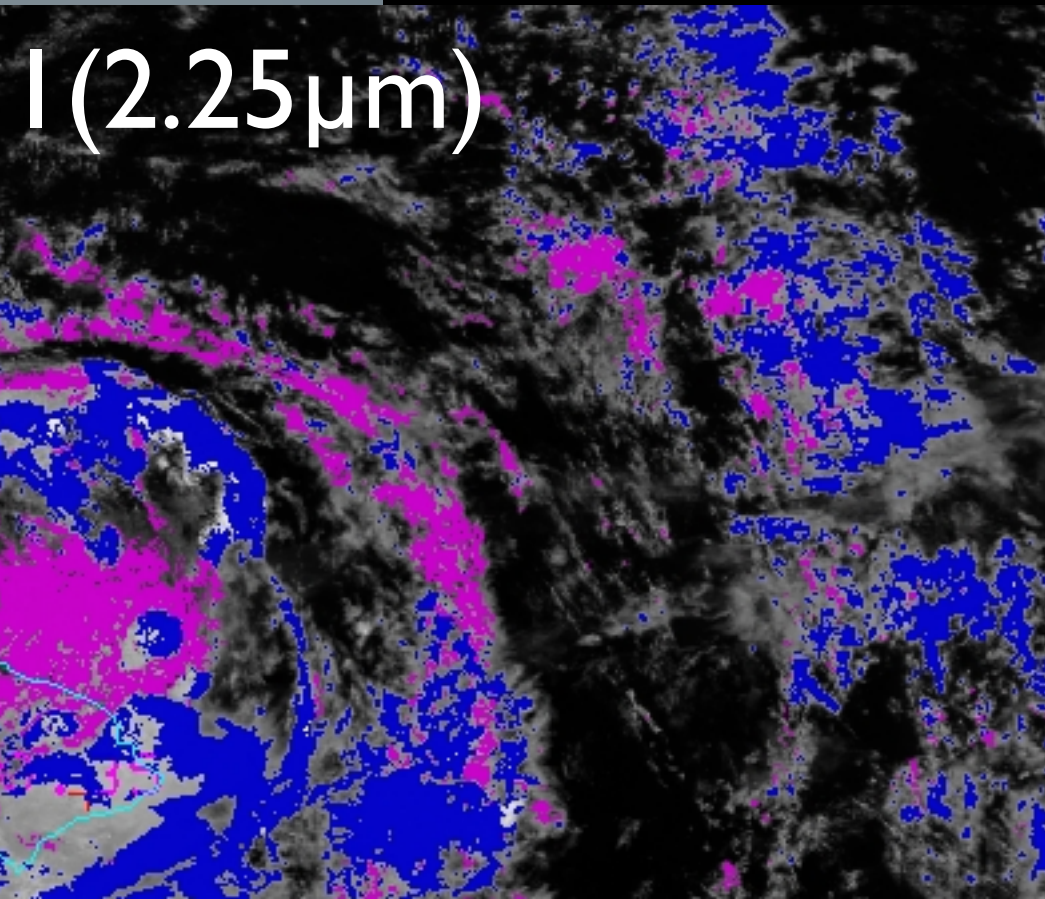


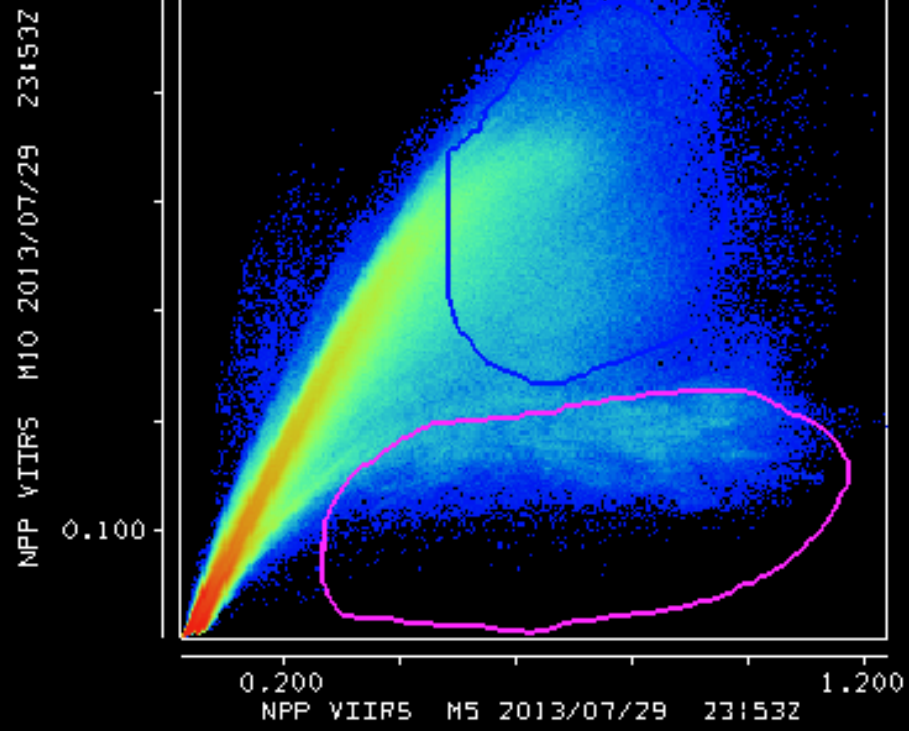
M5(.672 $\mu\text{m}$ )





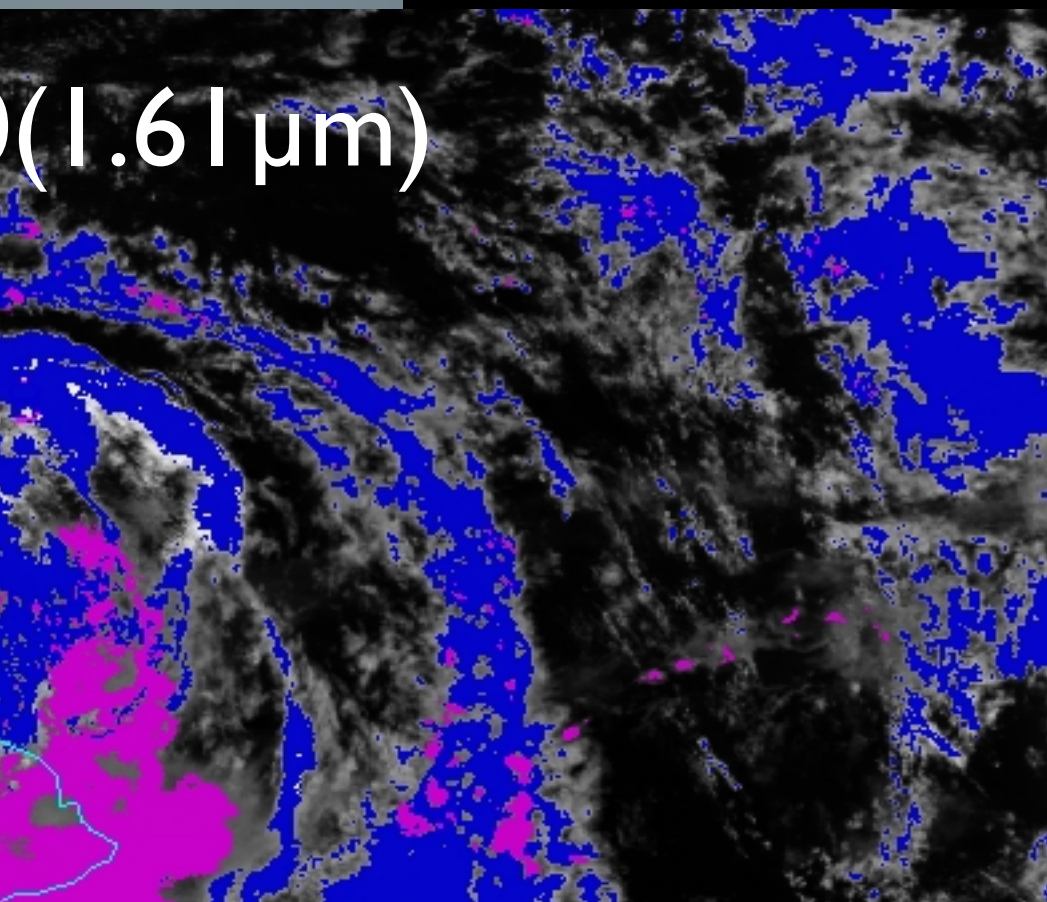
**Not consistent**  
**Why?**



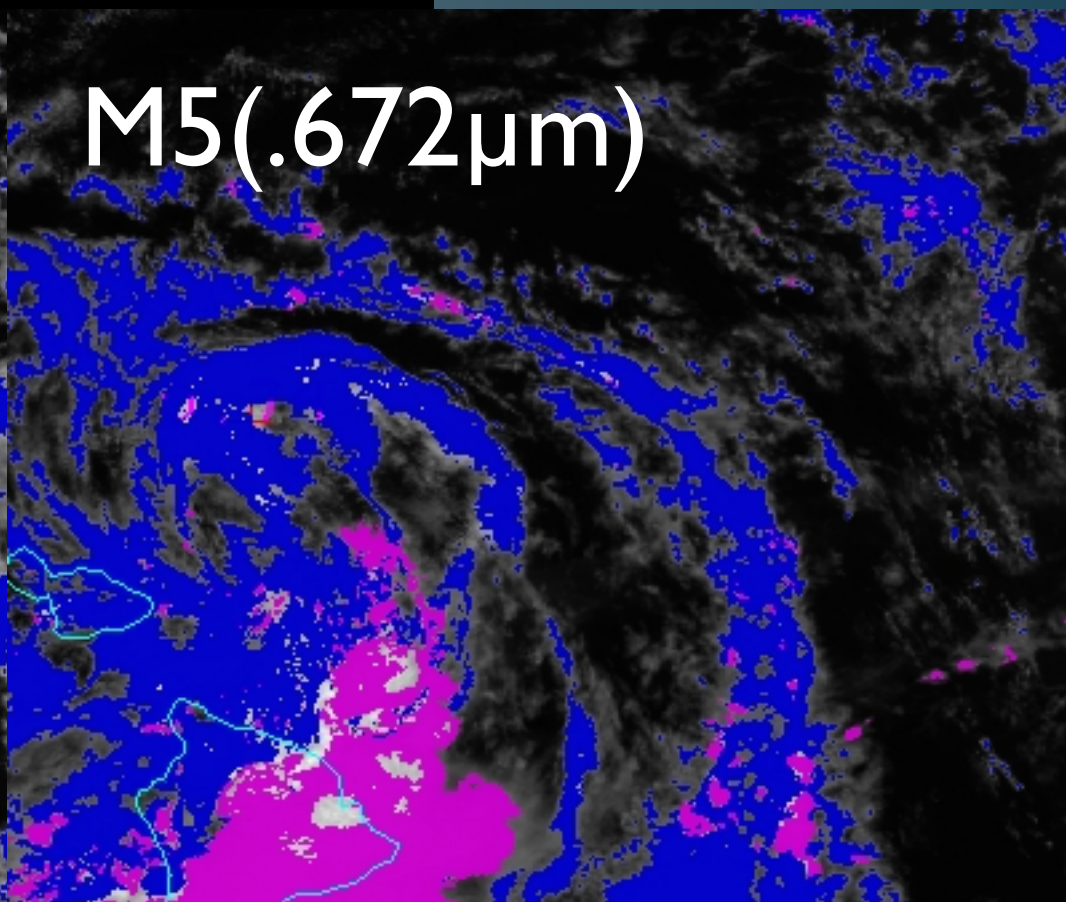


**Bingo!**

(1.61  $\mu\text{m}$ )

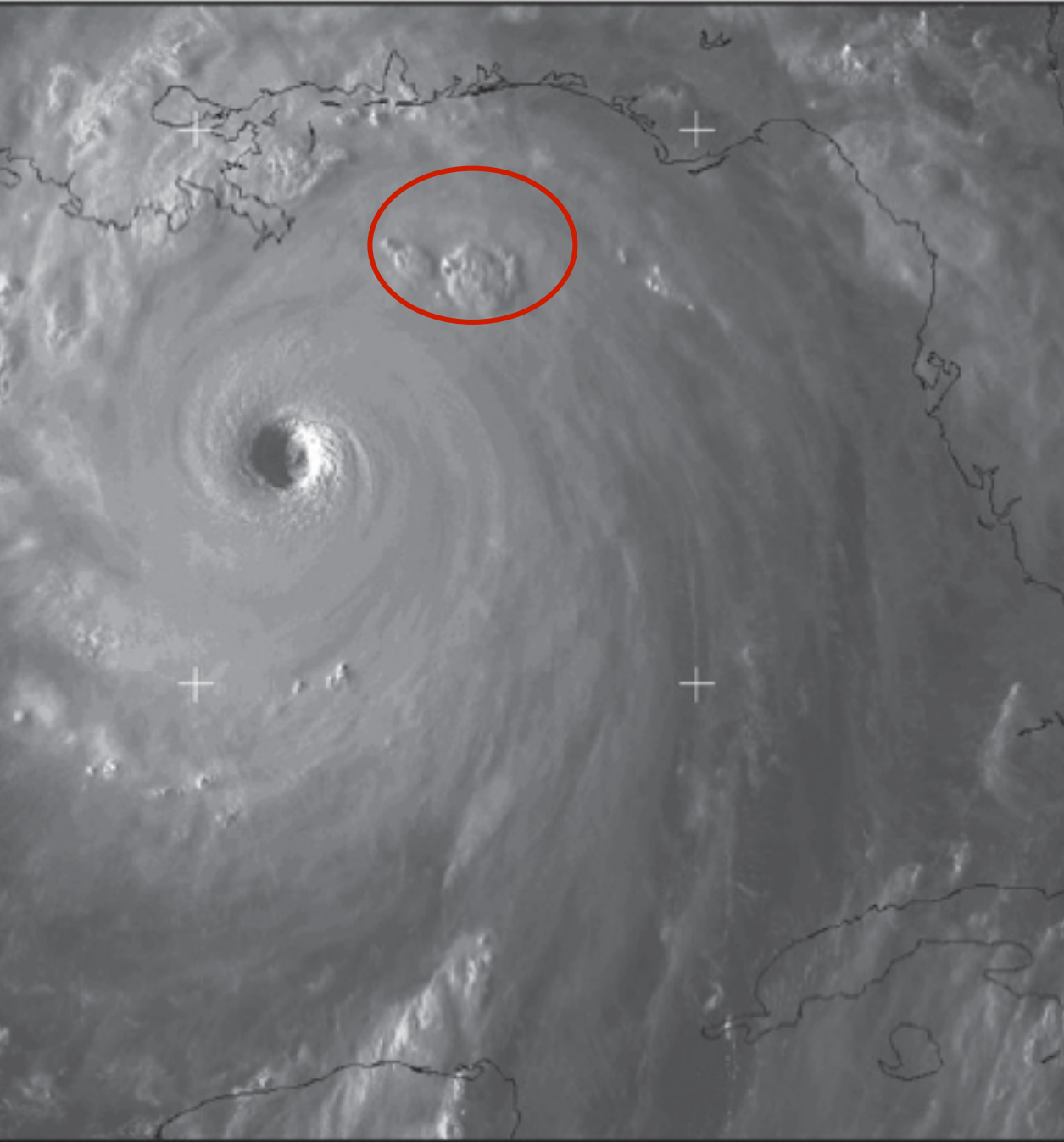


M5 (.672  $\mu\text{m}$ )





# Part II Overshooting Top



How to find OTs?

➤  $DCP = IRW$  (IR window) -

MODIS: B27( $6.7\mu\text{m}$ ) - B3  
( $11.0\mu\text{m}$ )

(Velden and Olander (1998)  
Bosart et al. 1999)

➤ There is one condition that  
result in  $DCP > 0$ , WV BT  
become warmer due to the  
presence of water vapor pu  
into the lower stratosphere  
convective cloud tops (OTs)

# P & WV

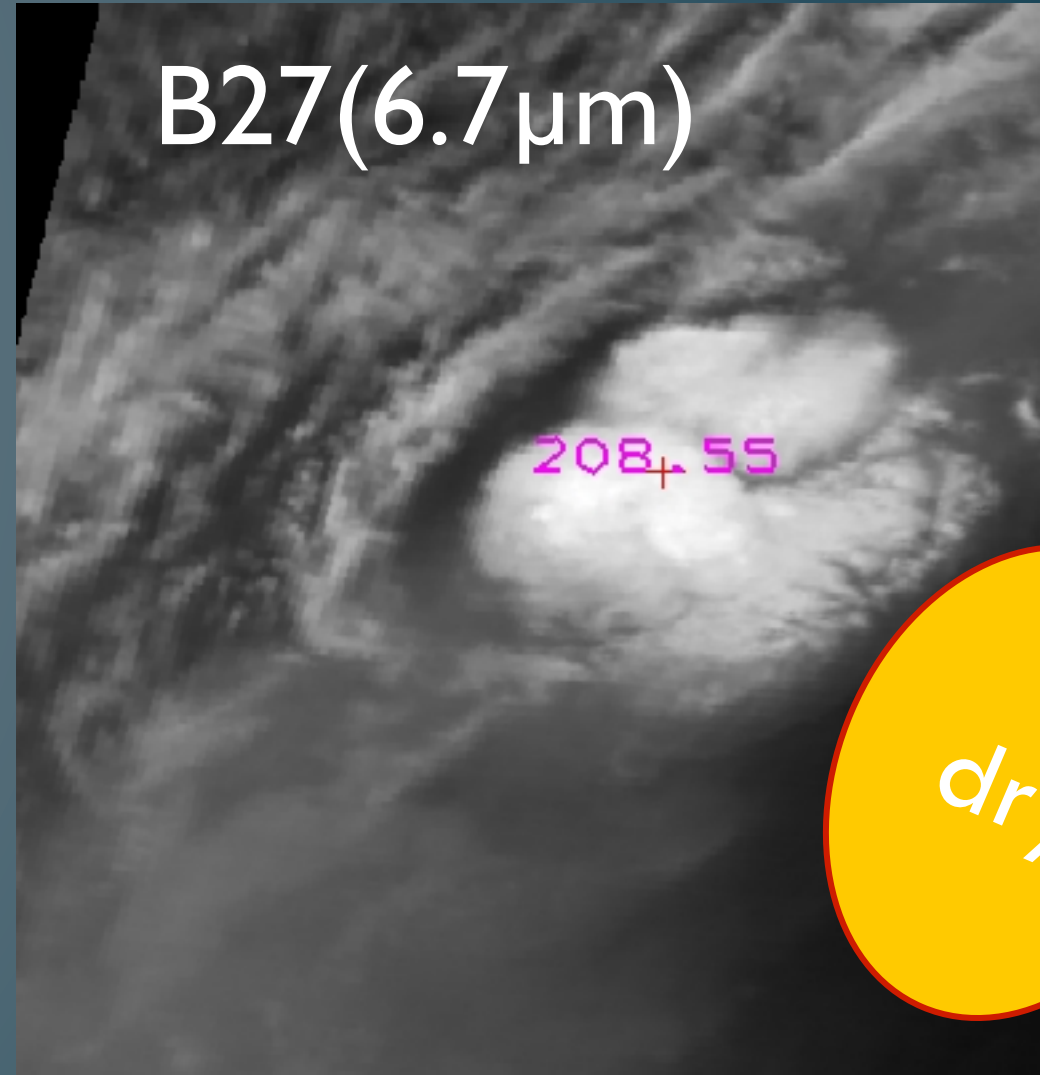
MODIS 2013/07/29 11:20Z

$(6.7\mu\text{m}) -$   
 $(11\mu\text{m})$



$> 1 \text{ degK}$

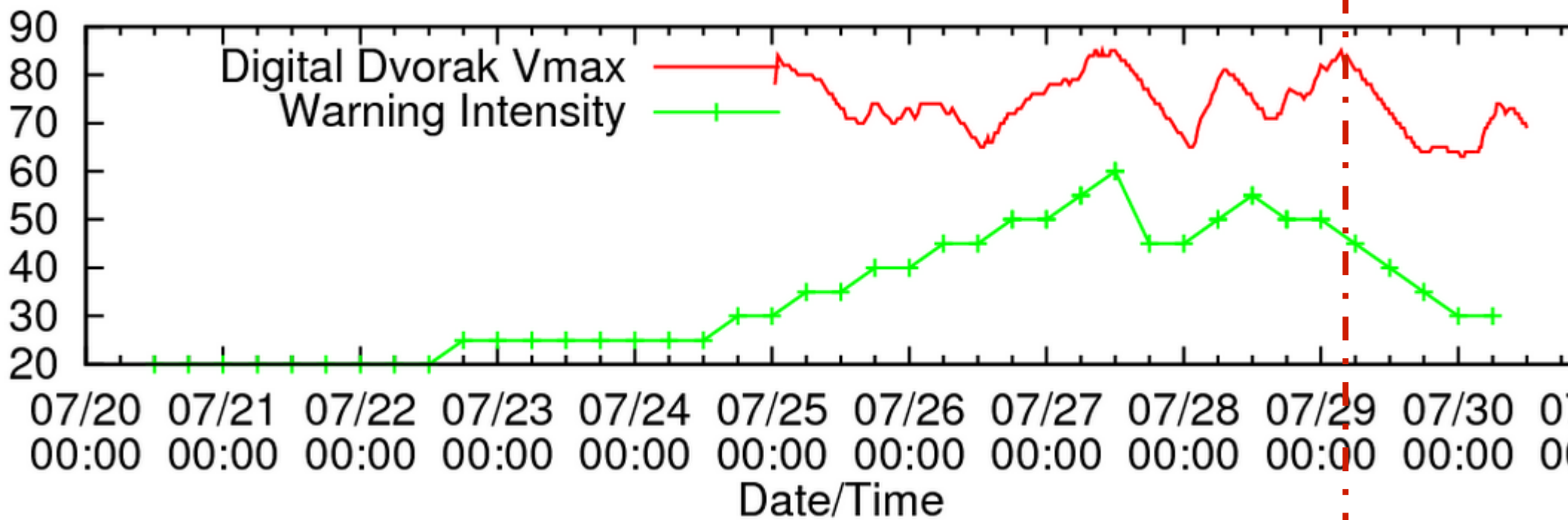
B27(6.7 $\mu\text{m}$ )



dr

# WC BST& Dvorak

ep062013 07/30/13 12 UTC Intensity - Digital Dvorak vs. Best Track



# Summary

Trivial band difference may lead to magnificent discrepancy in reflectivity (M11( $2.25\mu\text{m}$ ) and M10( $1.61\mu\text{m}$ )). Water sensitivity dominates!

Now particle reflectivity is sensitive to the different channels; visible light channel ( $.67\mu\text{m}$ ) shows a much larger reflectivity than that of M10( $1.61\mu\text{m}$ ) when detecting the ice cloud.

S Flossie do contains OTs embedded in convective cloud like Hurricanes.(ice cloud).

VV BT indicates the intrusion of dry air into the inner core of Flossie.

**Thanks!**