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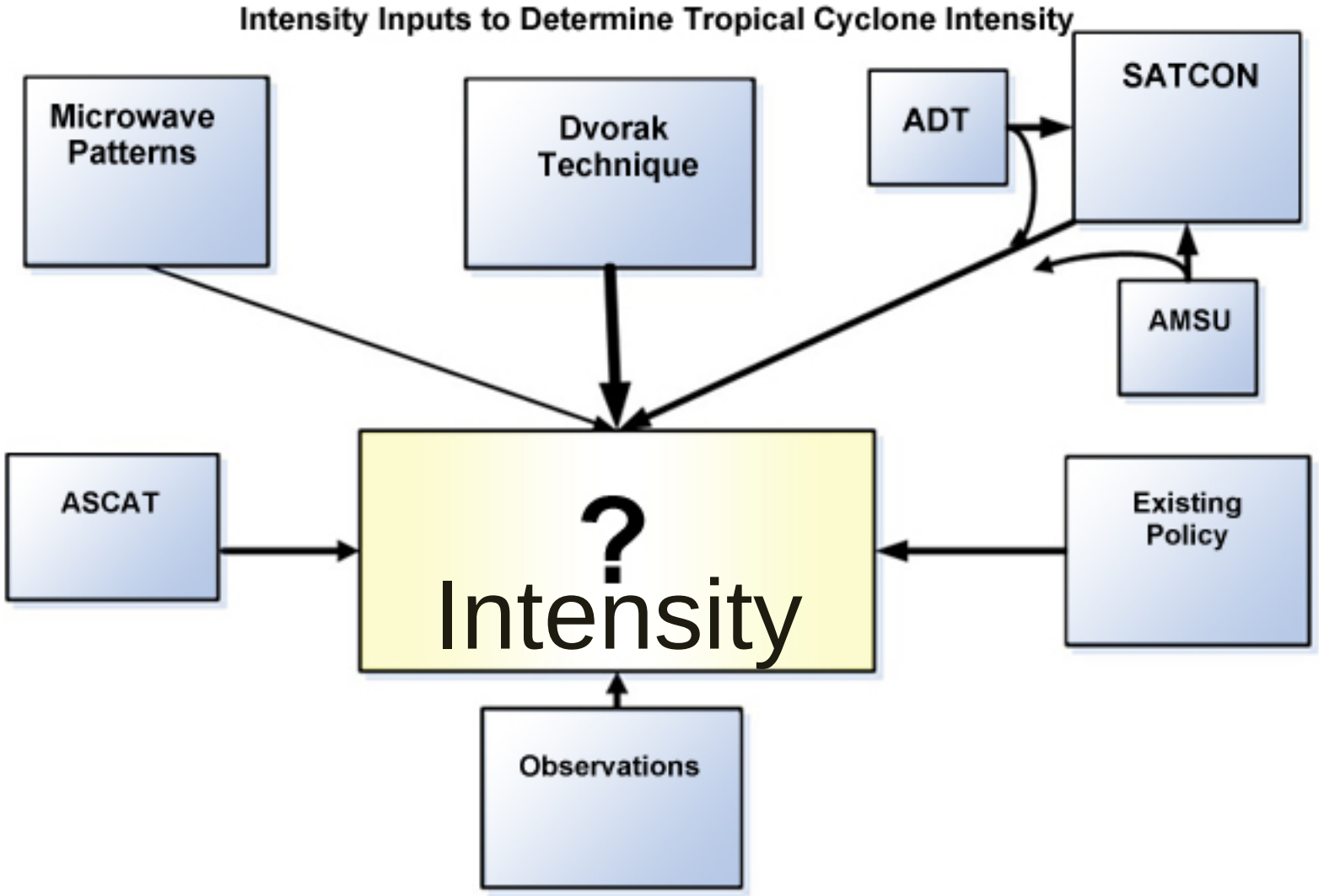
TC Intensity analysis
b. other methods



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TCs fluctuate intensity

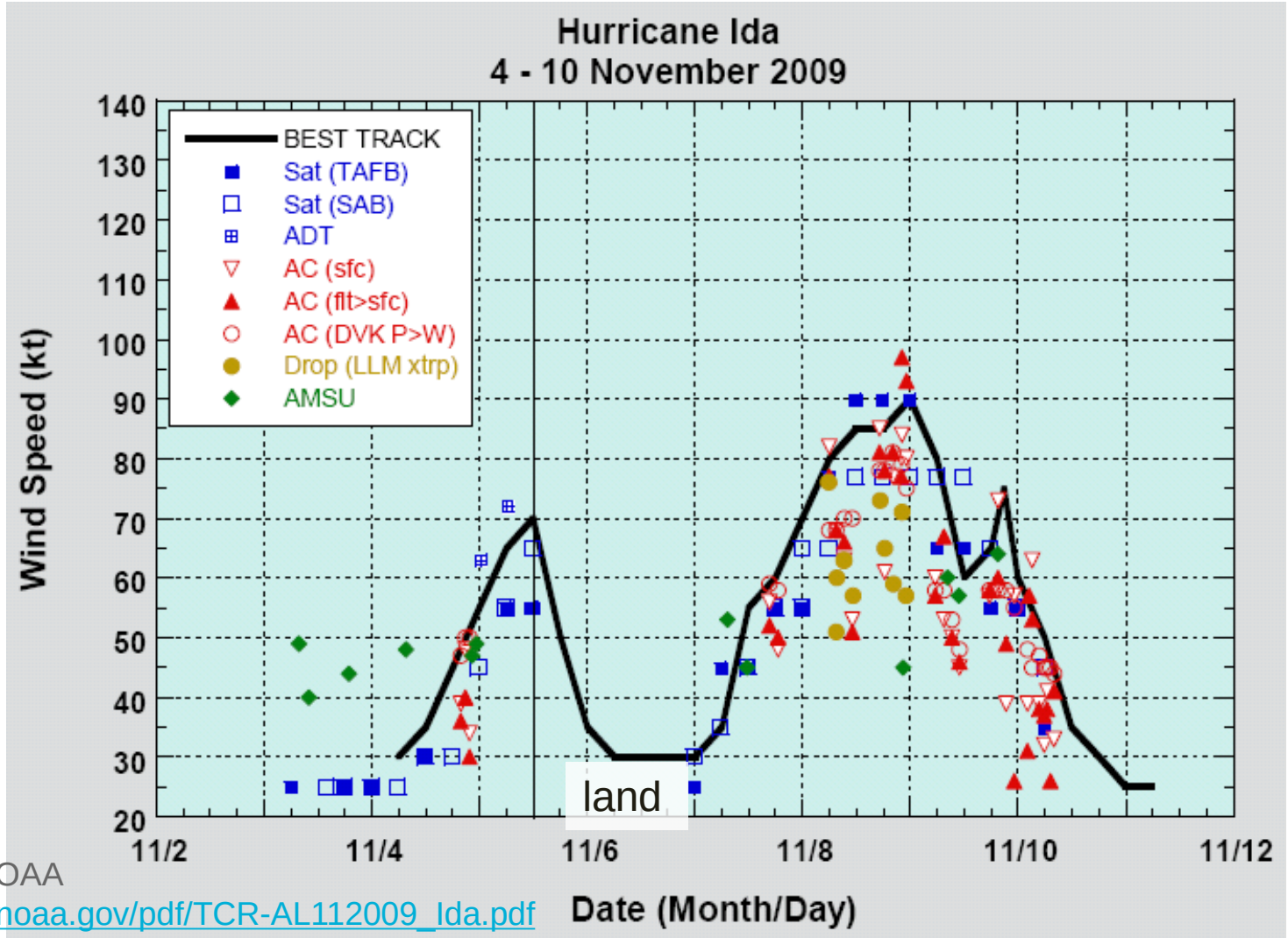

Image: NHC, NOAA
http://www.nhc.noaa.gov/pdf/TCR-AL112009_Ida.pdf

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Surface Observations

"Standard exposure AWS observed winds (10min) give a minimum maximum wind"

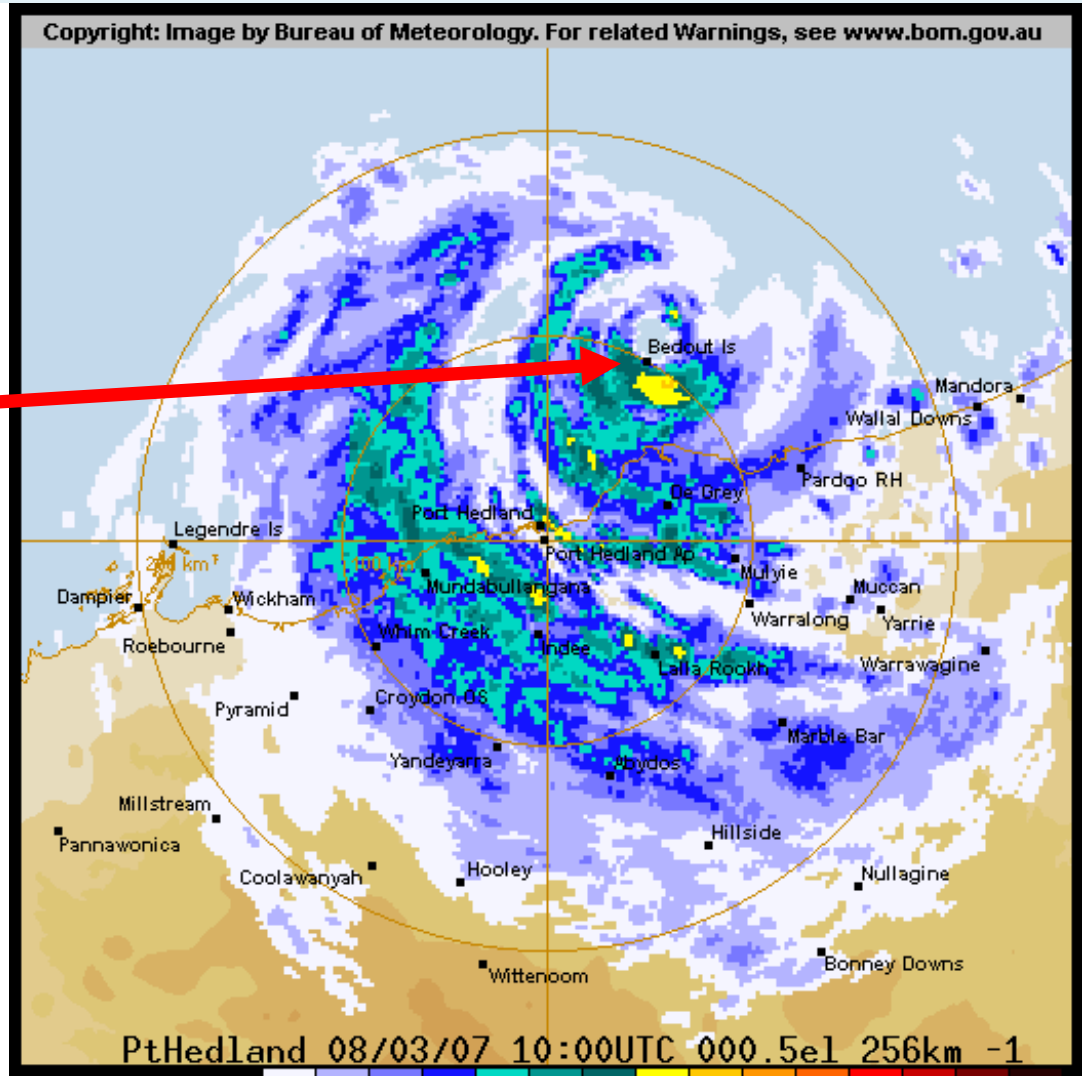
Examples: George

Bedout Is 105 knots

Hourly sampling

Dvorak: T6.5

Vmax = 110kn



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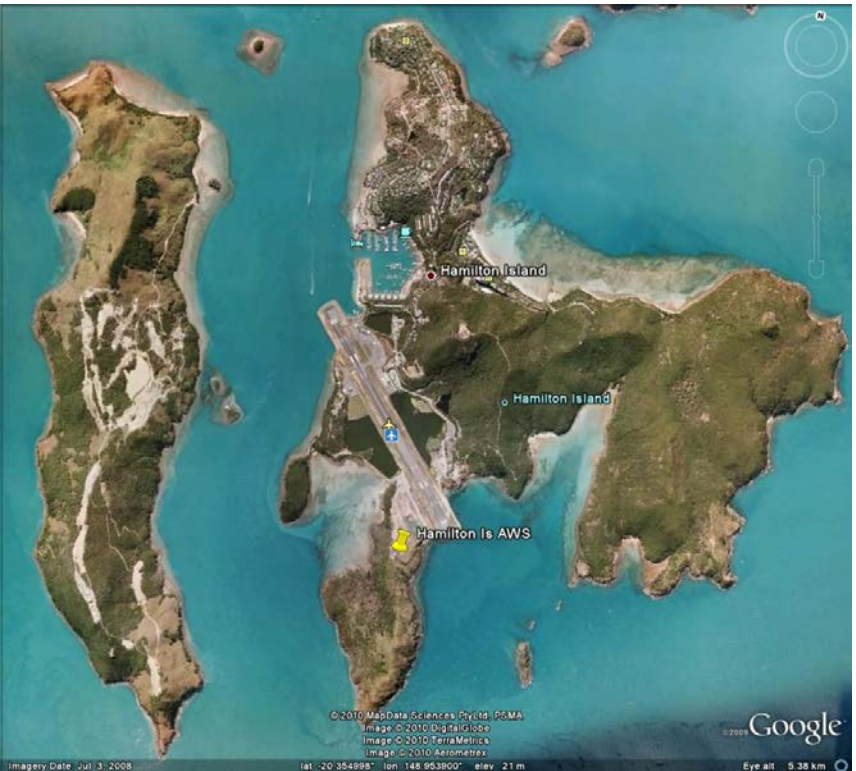
Surface Observations

Knowledge of site exposure is required:

Hayman Is (on a hill at 59m elevation) reported 93 kn from SE during Ului – slope reduction factor ~30% *ref Craig Miller* (cf Vmax=85kn in BT)



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Surface Observations

Ships: What to do with a 40kn observation??
Ships: ~10 % enhancement structure & reduction to 10m
BUT considerable variation in quality : correction for motion?

Ref: http://icoads.noaa.gov/kiel/Kiel.Taylor.pdf
ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/JCOMM-TR/J-TR-10-CLIMAR-99/Presentations/session_02/02.1_Taylor.pdf

Use caution! Check consistency, verify against scat

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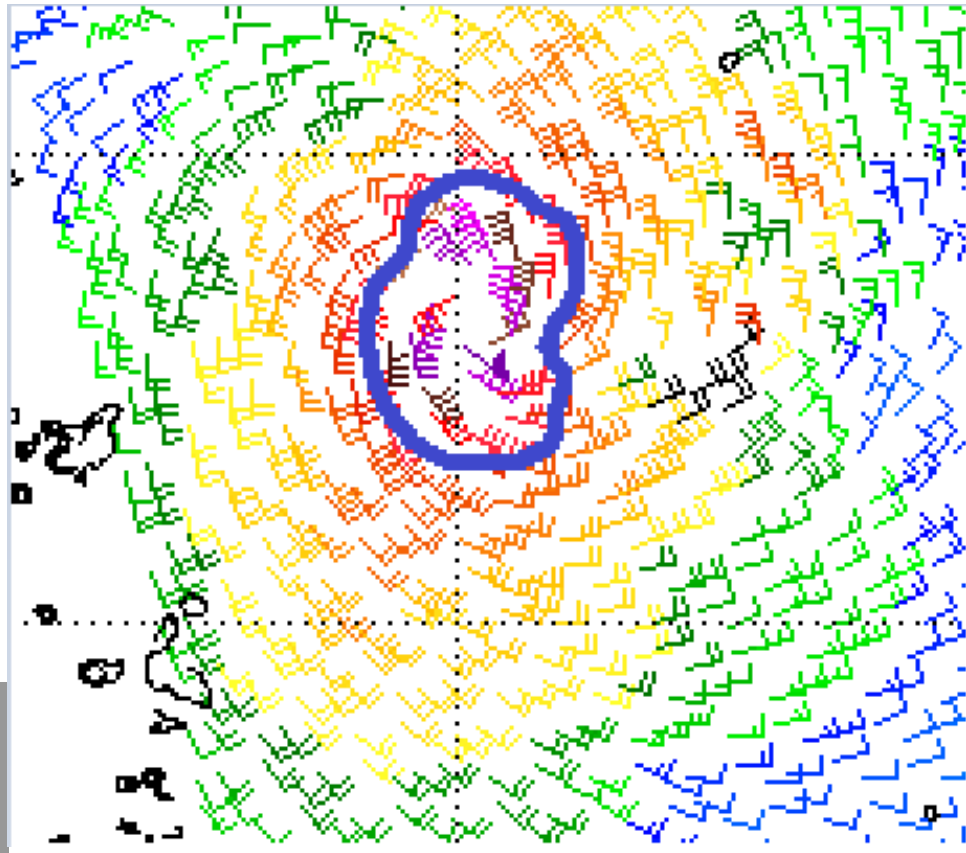
Scatterometry: ASCAT

– useful for <55 knot intensity range

Esp at tropical low stage when other measures don't work so well.

– good for structure - wind radii,



http://manati.orbit.nesdis.noaa.gov/ascat/

TC Ian 0949UTC 8/1/2014
ASCAT Vmax=50 knots
Max wind likely 50-55 kn

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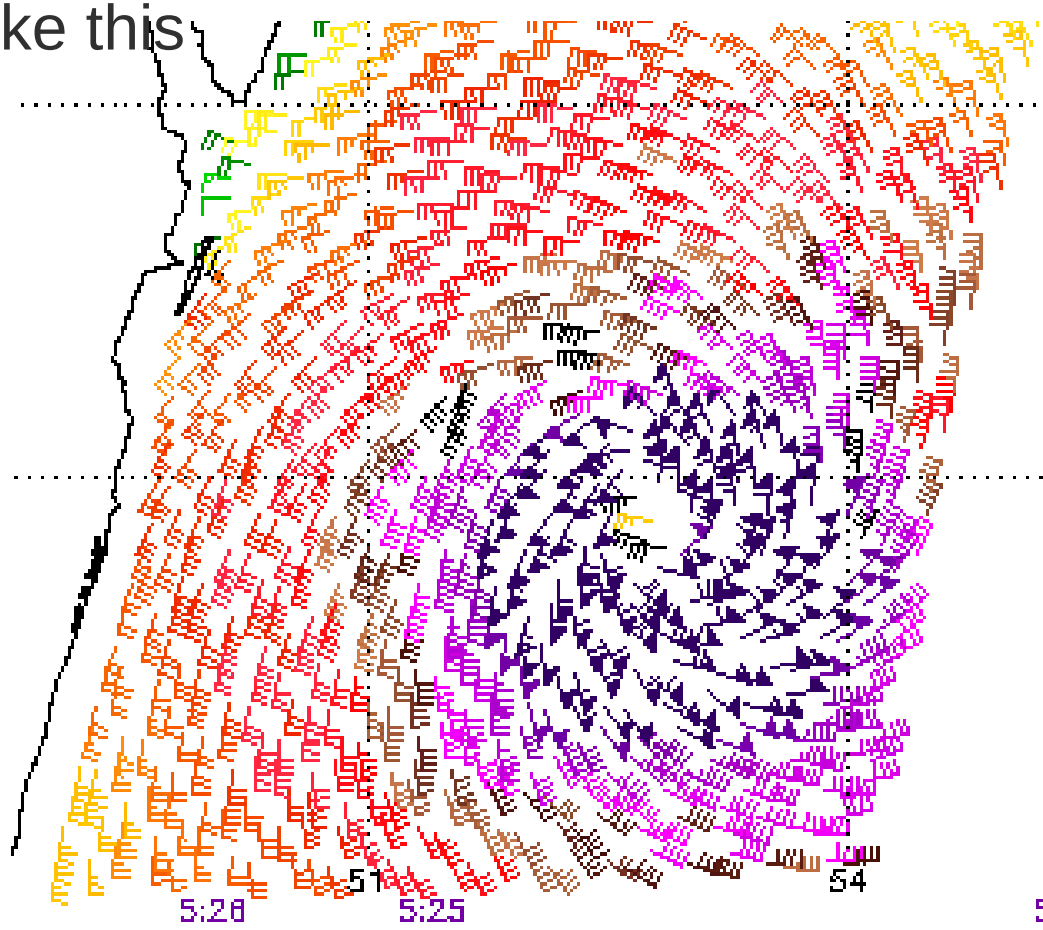
ASCAT

Strongest pattern would look like this

Giovanna 13 Feb 2012

> 100 kn intensity



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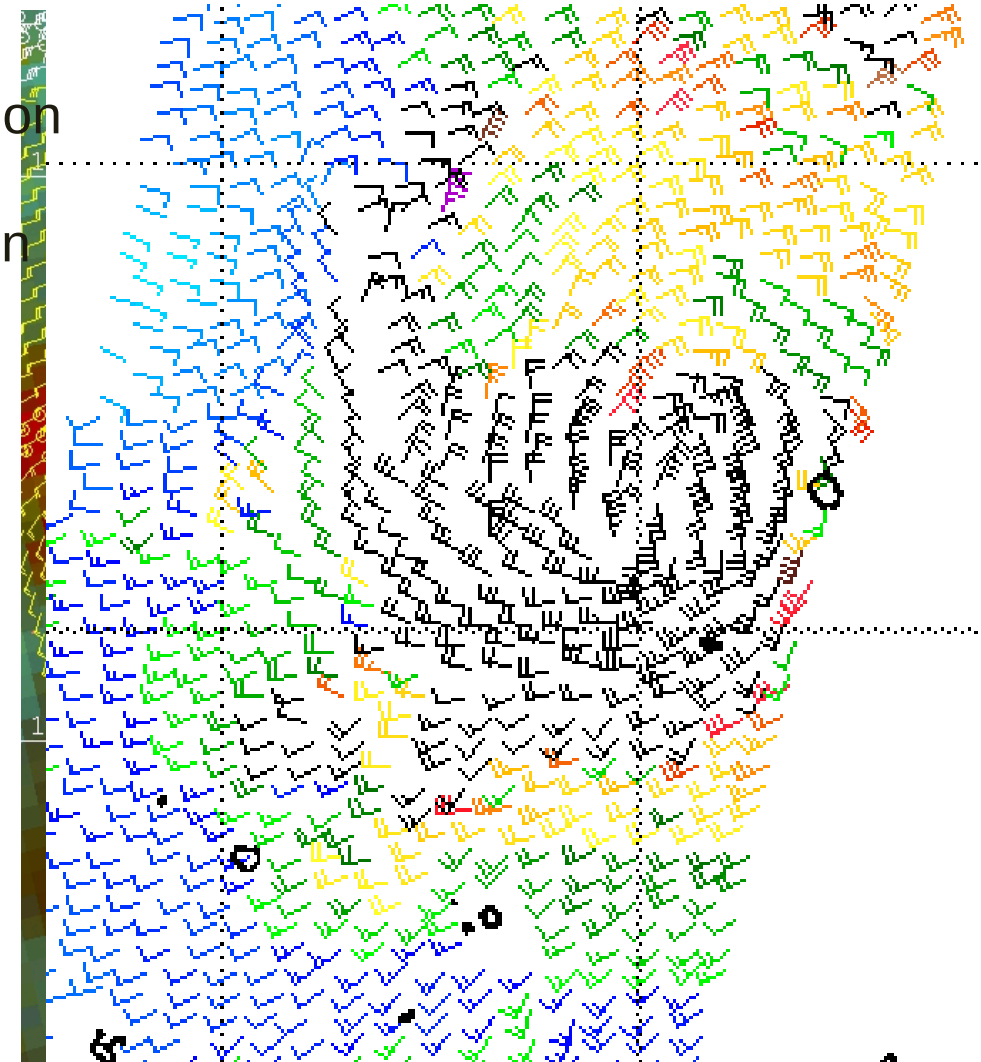
WindSat

Very sensitive to rain
so useless for central TC region

Useful for gale estimates in convection free areas



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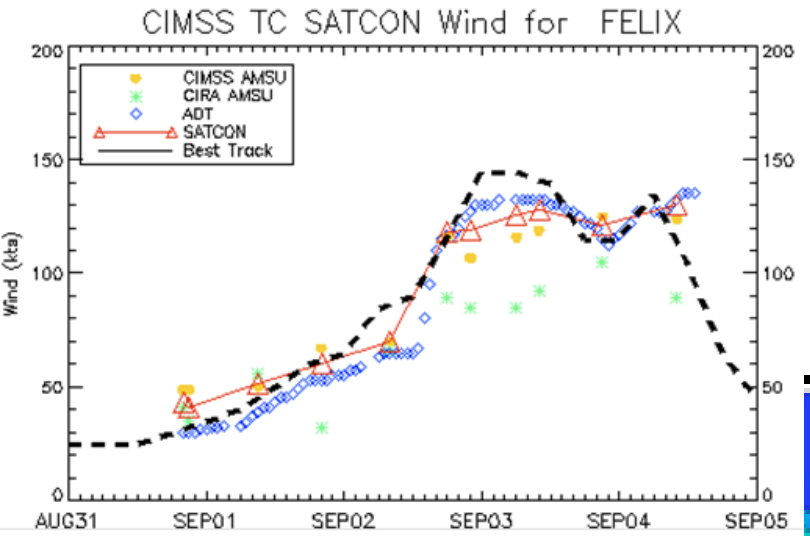
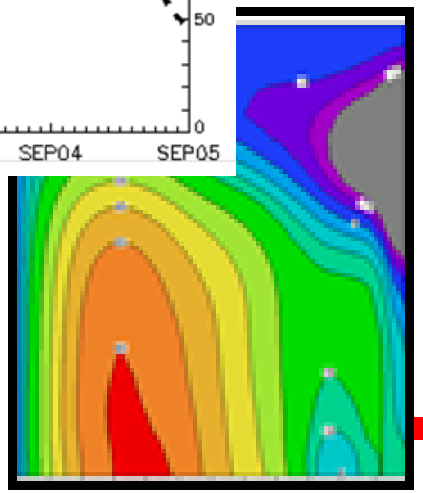
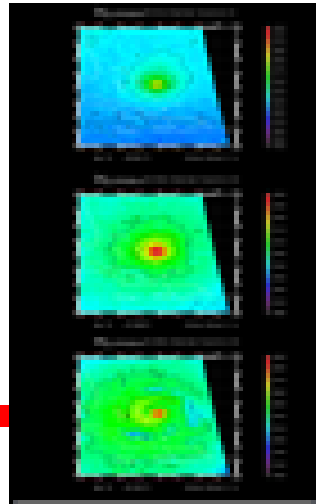
Objective Techniques
Satellite Consensus (SATCON)





CIRA AMSU

SATCON



CIMSS AMSU

CIMSS

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Advanced Dvorak Technique ADT

Uses IR imagery to assess eye temperature, curvature and cloud region temperature.

Logic based on the subjective Dvorak Method

Linear regression scheme developed by matching recon MSLP estimates to important IR parameters.

Each TC image is classified according to “scene type” which drives the logic structure leading to the intensity estimate

CIMSS: http://tropic.ssec.wisc.edu/real-time/adt/adt.html
NESDIS: http://www.ssd.noaa.gov/PS/TROP/adt.html

Version 8.2.1 current as of July 2017

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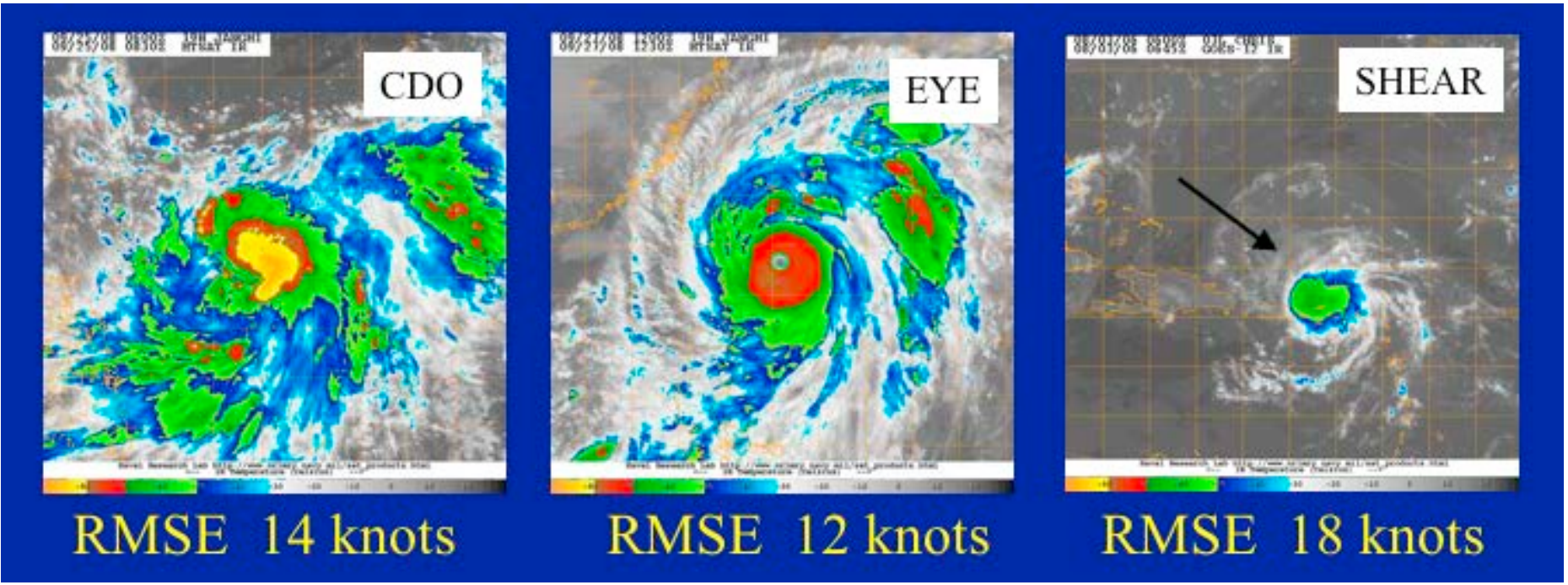
ADT - performance

Known error characteristics are useful
Larger errors can result if position is in error! Eg no eye pattern because algorithm can't resolve centre.



Example errors as a function of scene type

Microwave Intensity

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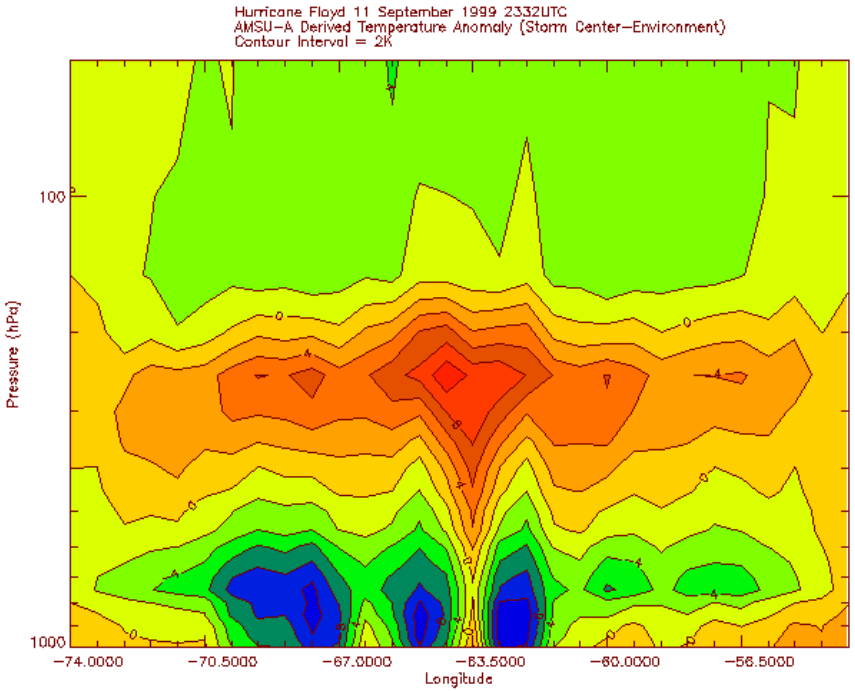
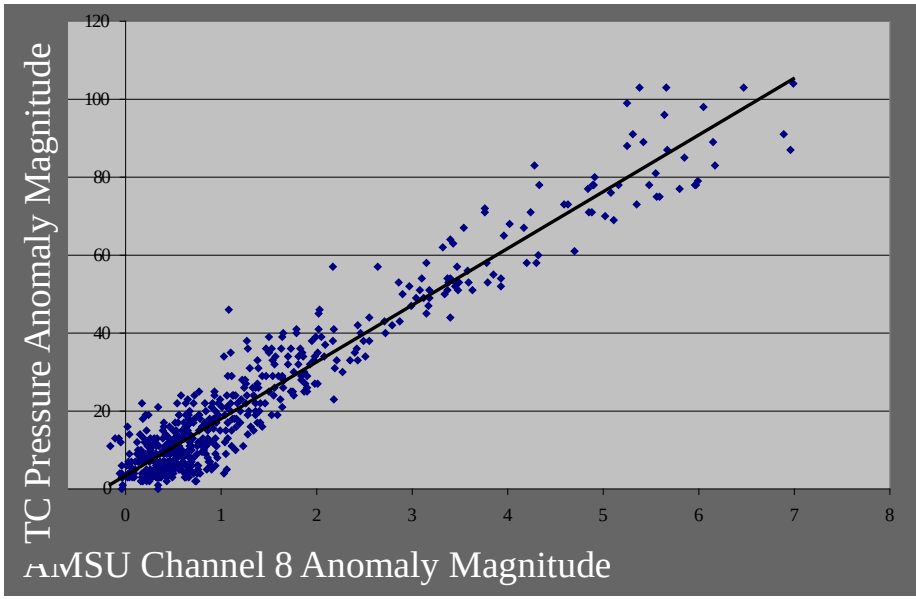
AMSU and SSMIS

Microwave sounder which includes channels for measuring brightness temperatures (Tb) at 550-150 hPa layer.





http://amsu.ssec.wisc.edu/explanation.html

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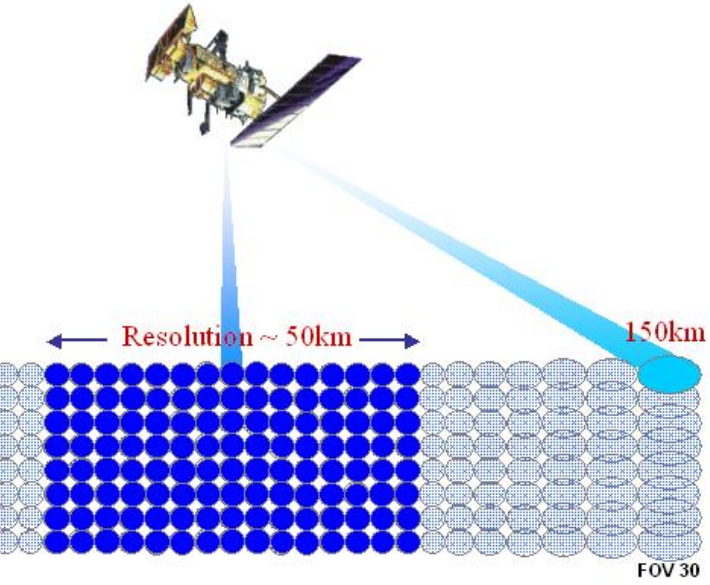
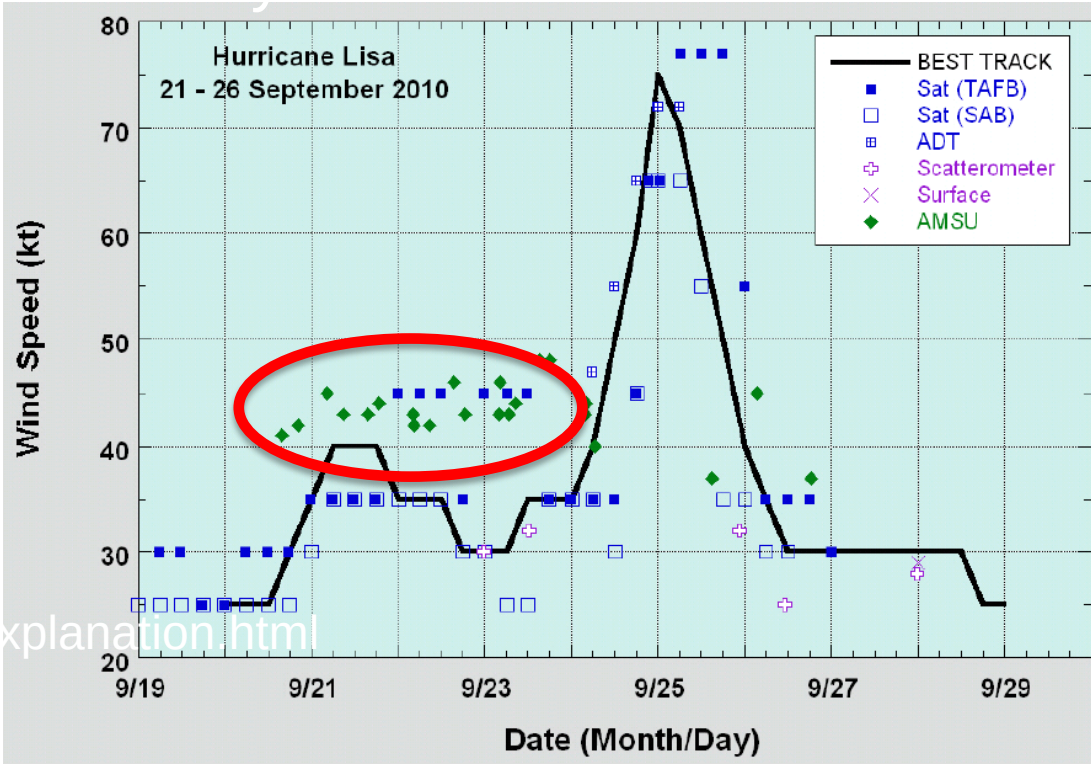
AMSU Intensity: Issues

Underestimates when TC near the edge of the swathe and for small eyes (corrections applied)
Overestimates for weak system
Rain contamination esp



MSU Scanning Geometry and Resolution



xplanation.html

NWP: structure and sometimes intensity

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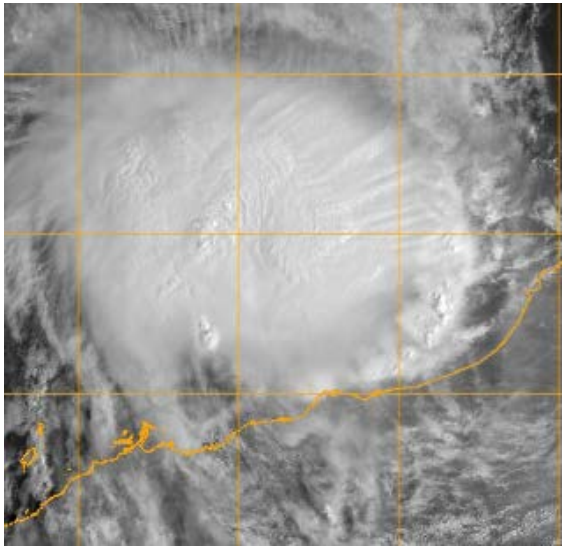
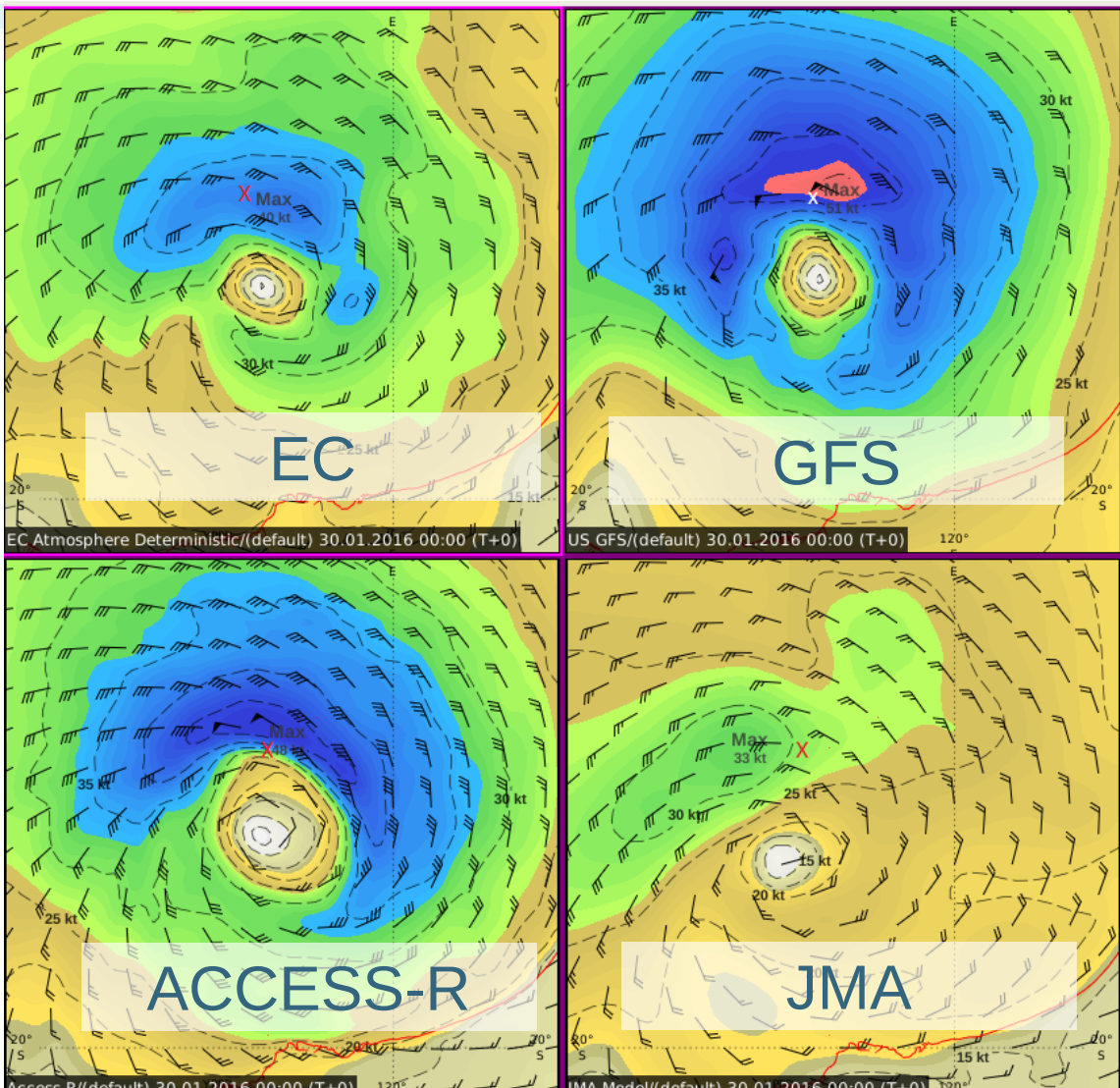
TC Stan 00UTC 30/1/2016
T4.0 => 55kn
Rowley Shoals 49kn (point x)
close to max winds





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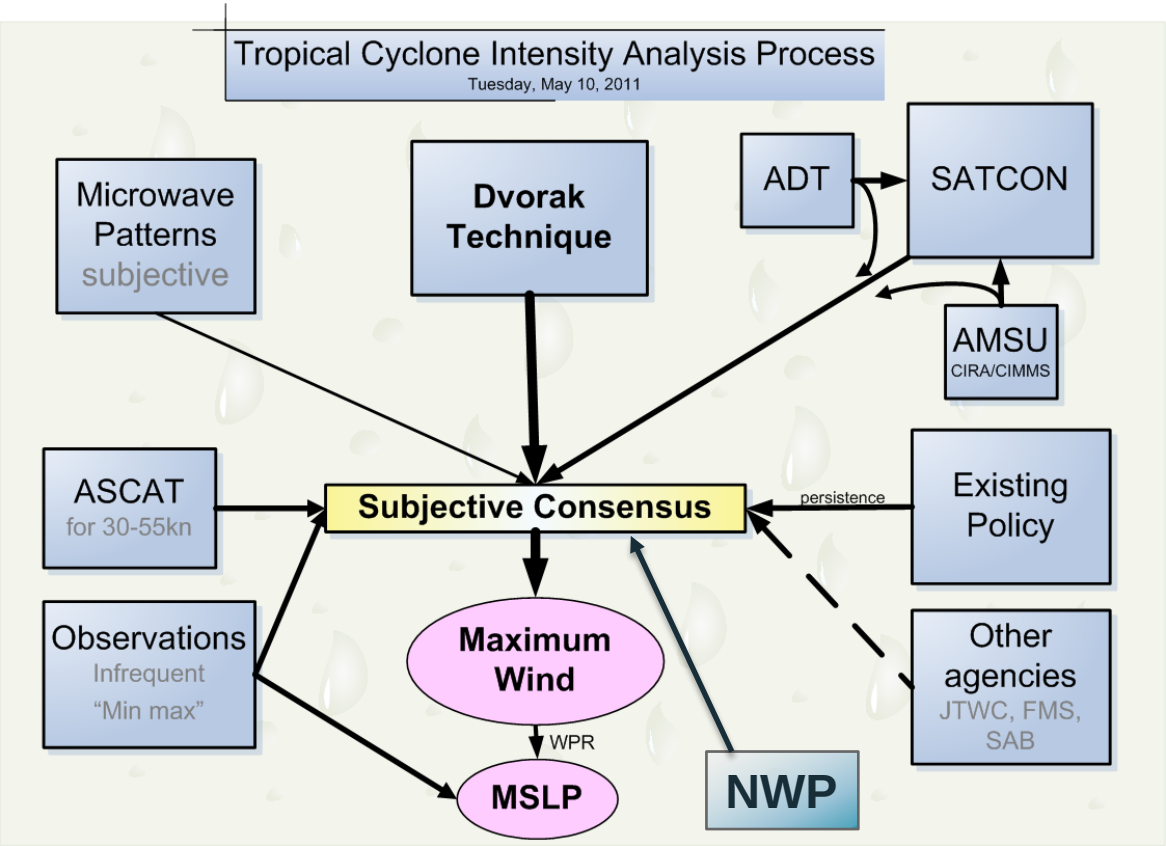
Intensity Summary



COMET module: https://www.meted.ucar.edu/training_module.php?id=1083

Intensity exercises: https://bmtc.moodle.com.au/course/view.php?id=107

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Intensity Questions

1. ASCAT is most useful for intensity estimates at the range of :

A. 25-35kn B. 25-50kn C. 25-75kn D. 50-75kn E. >75kn

2. SATCON has the following benefits (select all that apply).
   a. Automatic hourly updates 24h/day
   b. Uses IR, Vis and microwave imagery
   c. Objective method with known errors/bias
   d. Better than human (subjective) analysis

3. True or False "Your final intensity estimate should consider all available inputs and weight each according to the situation".