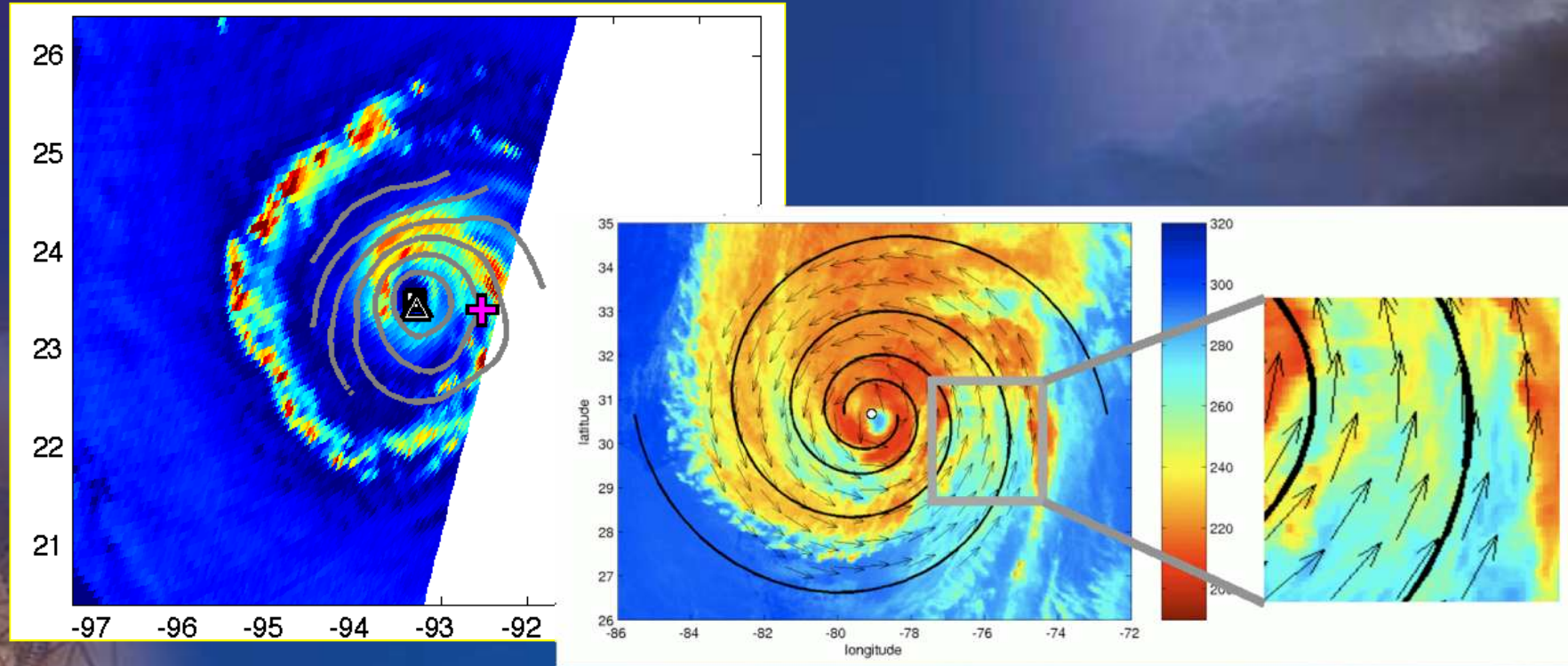




Advanced Dvorak Technique: An Automated Approach



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Acknowledgements:
Tim Olander, Cooperative Institute for
Meteorological Satellite Studies
Chris Velden, Cooperative Institute for
Meteorological Satellite Studies



Advanced Dvorak Technique

- ADT is a computer based algorithm that objectively determines TC intensity using geostationary IR imagery
- ADT is patterned after the traditional Dvorak technique
 - Output is CI and T number
 - Utilizes same scene types
- Primary motivation:
 - Remove subjectivity
 - Promote uniformity
- Subjectivity most prominent in cloud type patterning



Advanced Dvorak Technique History



- Objective Dvorak Technique (ODT), 1995
 - Analyst subjectivity could be introduced by selecting cloud pattern type and applying rules
 - Only worked on strong tropical storm or hurricane
- Automated Objective Dvorak Technique (AODT), 2001
 - Completed automated...no human interaction
 - Worked on any tropical cyclone (tropical depression and higher)
 - Added new scene types and constraints
- Advanced Dvorak Technique, 2004
 - Automated center determination
 - Inclusion of microwave data



Advanced Dvorak Technique

- ADT differs from traditional Dvorak technique
 - Performed hourly
 - Uses time averaging of T no
 - Includes some microwave adjustments
- Employs automated center finding in stronger systems
- Relies on some inputs from NHC, JTWC, or CPHC
 - Uses center position in weaker systems and as first guess in stronger systems
 - For C/K/Z MSLP estimate: needs radius of 34 kt winds, outermost closed isobar, and radius of outermost closed isobar



CIMSS ADT OUTPUT



UW-CIMSS "TCTrak" Tropical Cyclone Tracker for ...

tropic.ssec.wisc.edu/real-time/storm.newtest.php?&basin=austeast&snam

Back Forward Reload Close Capture Help

UW - CIMSS
 ADVANCED DVORAK TECHNIQUE
 ADT-Version 8.1.3
 Tropical Cyclone Intensity Algorithm

----- Current Analysis -----
 Date : 07 MAR 2013 Time : 233000 UTC
 Lat : 15:12:36 S Lon : 157:22:20 E

CI# /Pressure/ Vmax
 2.9 / 993.2mb / 43.0kt

Final T#	Adj T#	Raw T#
2.4	2.5	2.5

Center Temp : -13.0C Cloud Region Temp : -32.4C

Scene Type : CURVED BAND with 0.33 ARC in MD GRAY
 Maximum CURVED BAND with 0.76 ARC in MD GRAY
 at Lat: 16:00:36 S Lon: 156:58:12 E

Positioning Method : FORECAST INTERPOLATION

Ocean Basin : WEST PACIFIC
 Dvorak CI > MSLP Conversion Used : PACIFIC

Tno/CI Rules : Constraint Limits : NO LIMIT
 Weakening Flag : ON
 Rapid Dissipation Flag : OFF

C/K/Z MSLP Estimate Inputs :
 - Average 34 knot radii : 45km
 - Environmental MSLP : 1002mb

Satellite Viewing Angle : 22.8 degrees

Current Intensity #

Corresponding MSLP & max winds

Adjustments from microwave

Final T #

Similar to Data T #

Scene Classification

Dvorak constraints



ADT Increased Precision

- ADT produces CI in increments of 0.1, yielding more precise MSW
- ADT using Courtney / Knaff / Zehr approach to determine MSLP
 - Considers TC latitude, size, and environmental pressure

From Dvorak		
CI	MSW	MSLP
1.0	25	
1.5	25	
2.0	30	1000
2.5	35	997
3.0	45	991
3.5	55	984
4.0	65	976
4.5	77	966
5.0	90	954
5.5	102	941
6.0	115	927
6.5	127	914
7.0	140	898
7.5	155	879
8.0	170	858





ADT Performance: MSW (kt) (1999 - 2010)



- Nearing skill of subjective Dvorak
- Still struggles with weak systems

N = 289	CIMSS ADT	Dvorak
BIAS	- 2.5	- 1.9
AVG ERROR	10.9	7.7
RMSE	14.3	9.9

Validation from recon-aided Best Track



Advanced Dvorak Technique Passive Microwave Data



- Only used in developing systems
- Microwave imagery used to search for developing eye structure under dense overcast
- If thresholds are met, the Final T in the ADT history file is overridden with a 4.3 or 5.0
- All subsequent T numbers and MET in history file are altered





Advanced Dvorak Technique



- CIMSS website:
 - <http://tropic.ssec.wisc.edu/>

Cooperative Institute for Meteorological Satellite Studies
Space Science and Engineering Center / University of Wisconsin-Madison

Tropical Cyclones ...A Satellite Perspective

CIMSS TC Webpage Product Archive

DATA STATUS (as of 06 Mar 2014 / 06:01 UTC) : All products are currently available.

TC Image Gallery Who We Are Our Research Archive FAQ Links Contact Us Statistics SKM

Current Time : 06 March 2014 / 11:36:13 UTC

Storm Coverage (Information)

Mouse over and click on individual storm symbols for specific information. Current storm coverage is provided on this page.

CIMSS TC Intensity and Structure Products "Quick Links": **ADT** AMSU SATCON MIMIC-TC MIMIC-TPW

Tropical Outlooks/Regional Websites: **Atlantic** East Pacific West Pacific Indian Ocean Australia/Fiji

Regional Real-Time Products

Mouse over specific tropical basin (colored regions) for menu of available products; click on desired products.

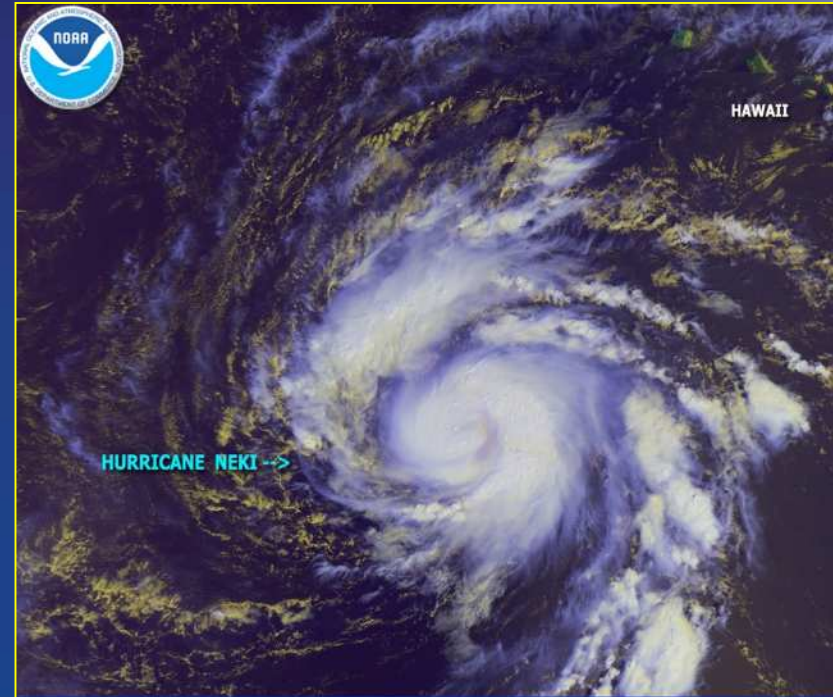
— click for Global Mosaics

Tropical Cyclone Image Gallery

Access
ADT



Questions?



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