Advanced Dvorak Technique: An Automated Approach

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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

- Current Intensity #
- Final T #
- Scene Classification
- Adjustments from microwave
- Corresponding MSLP & max winds
- Similar to Data T #
- 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

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

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

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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/
Questions?

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