Improvements to the Self-Calibrating Multivariate Precipitation Retrieval (SCaMPR) for Estimating High-Impact Rainfall Events

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Outline

- SCaMPR Background
- Algorithm Changes and Impacts
- Future Work

SCaMPR Background

- Self-Calibrating Multivariate Precipitation Retrieval
- Satellite-based rain rate estimates for real-time flood forecasting
  - High spatial resolution (4 km)
  - Brief data latency (15 min)
- Uses a blend of IR and MW data to maximize accuracy and coverage while minimizing latency

SCaMPR Background

- GOES / MW Blending Technique
  - Uses matched GOES IR data and MW rain rates to train an algorithm for deriving rain rates from GOES data
    - Rain / no rain separation using discriminant analysis
    - Rain rate retrieval using linear regression
  - Both predictor selection and coefficient calibration are performed
- Input Data Sets
  - Predictors: GOES bands 3, 4, 5/6, BTD's, texture
  - Target Data: SSM/I and AMSU rain rates

SCaMPR Background

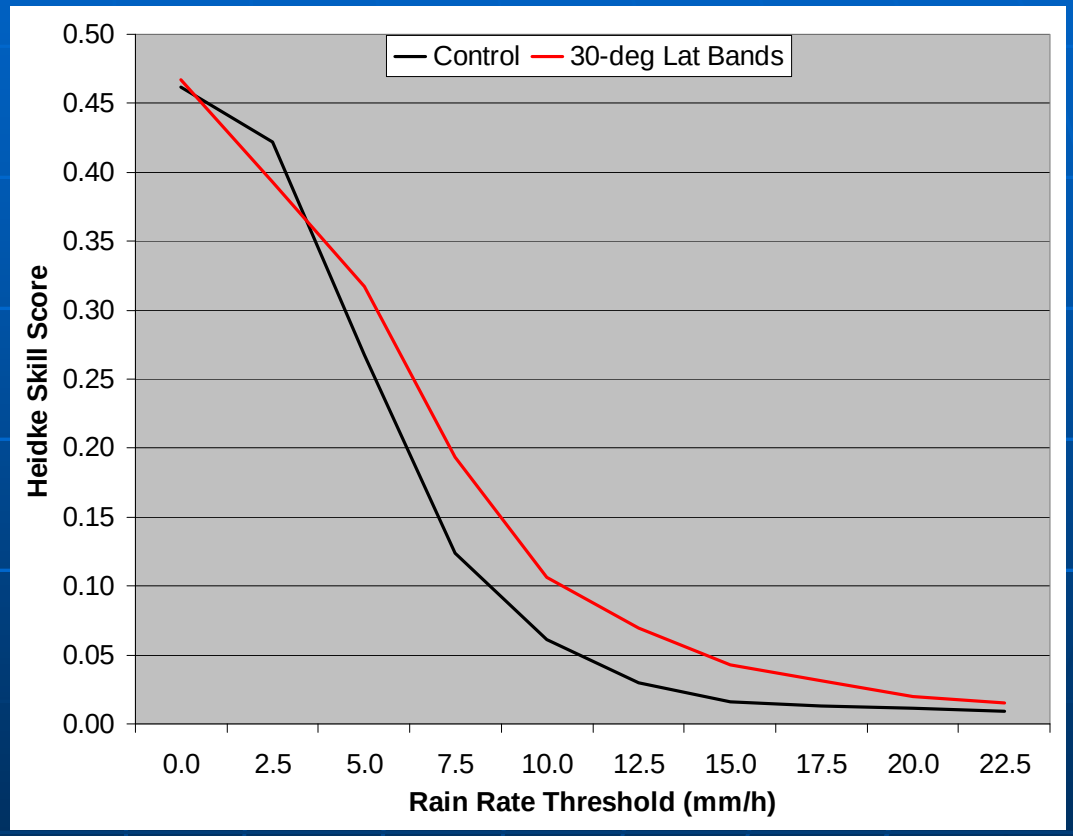
- Has run in real time over the CONUS (20-60 N, 135-60 W) since Nov 2004
- Separate calibrations for 15x15-degree boxes with 10 degrees of overlap; pixel value is a distance-weighted average
- Nonlinear transformations of rain rate predictors (via regression vs. target rain rates) to improve regression fit

Changes: Improved MW Data
(supported by NASA PMM)

- Larger Data Set
  - Original used only SSM/I and AMSU for calibration data
  - New version adds TRMM PR and TMI to calibration data set
- Improved MW Intercalibration
  - Original version multiplies SSM/I rain rates by 0.85 to match AMSU distribution
  - New version matches CDF's of TMI with SSM/I and AMSU to create LUT's for corrections

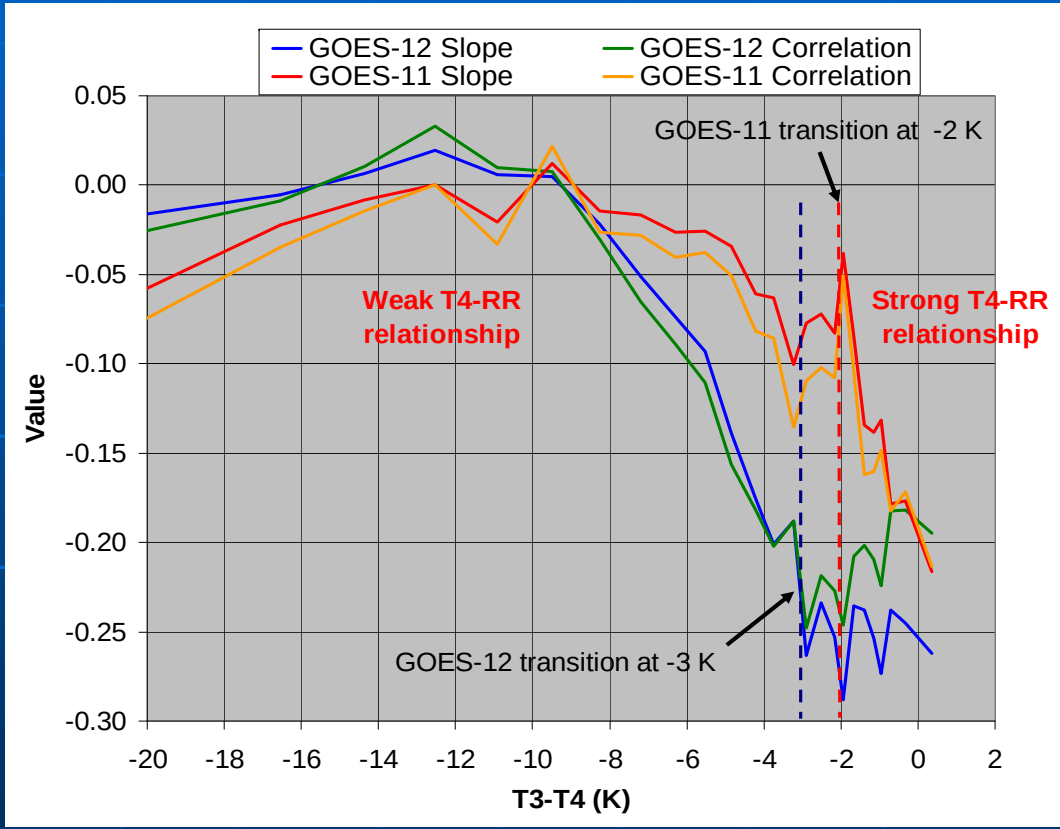
Changes: Calibration Regions
(supported by GOES-R AWG)

- Current version calibrated for overlapping 15°x15° regions
- Sensitivity studies showed no benefit beyond dividing into 30° lat bands
- Greatly reduced processing time will allow significant expansion of SCaMPR coverage



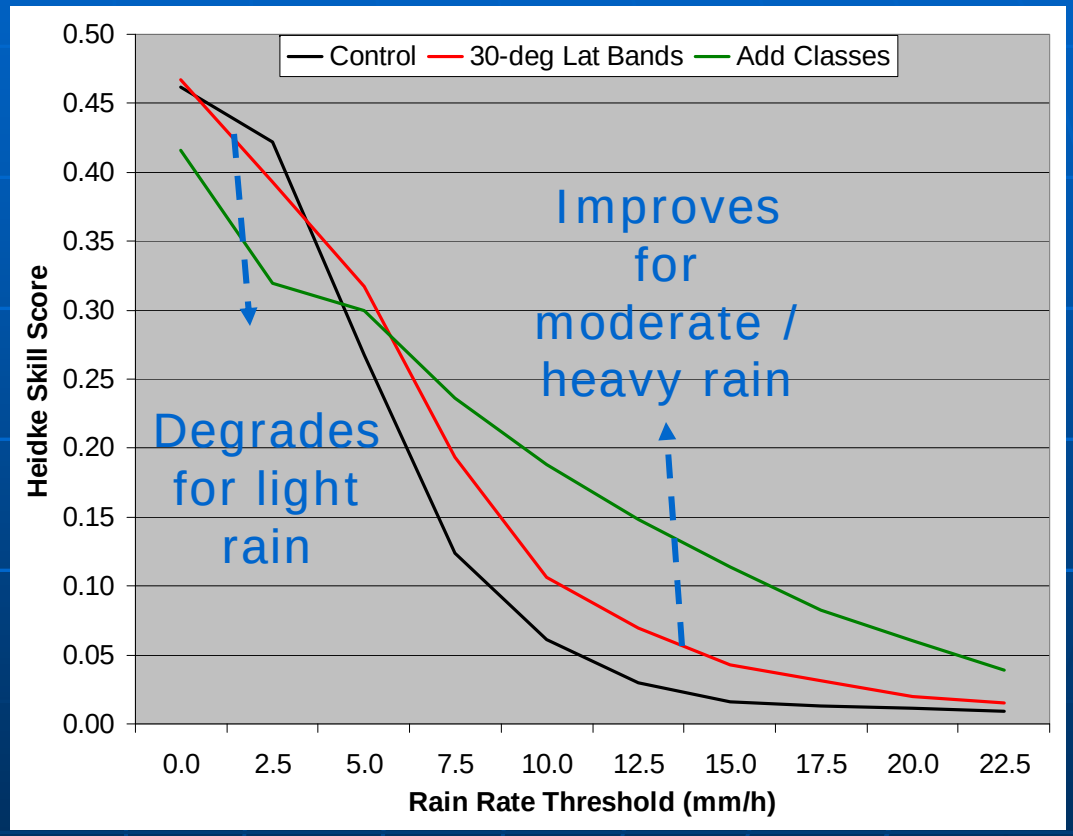
Changes: T3-T4 Classification
(supported by GOES-R AWG)

- GOES T3-T4 (WV-IR window) previously shown to ID deep convection
- IR-rain rate relationship varies as a function of T3-T4—basis for classification



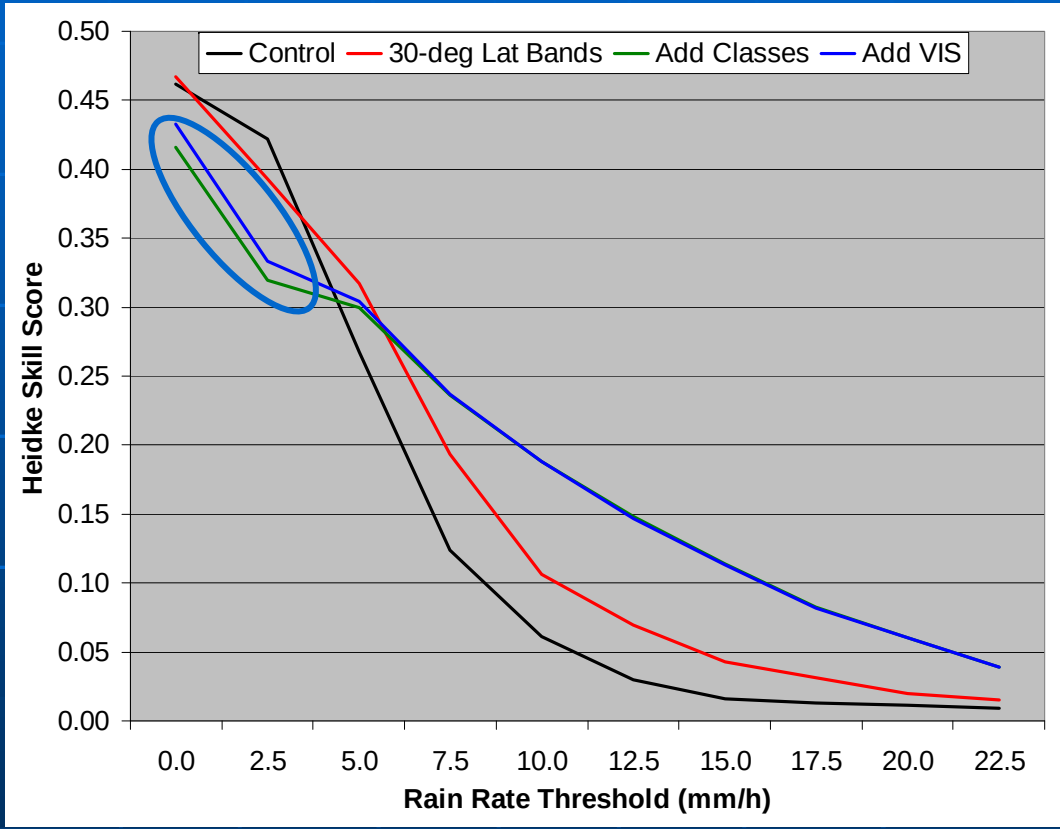
Changes: T3-T4 Classification
(supported by GOES-R AWG)

- Classification improves performance for moderate / heavy rain, degrades for light rain
- Acceptable for flood forecasting applications (though not for climate)



Changes: Adding VIS Data
(supported by GOES-R AWG)

- VIS data previously shown to have value in rain / no rain discrimination
- Results consistent with these findings using separate daytime calibration with VIS added



- No additional impact from band 2 reflectance

Ongoing / Future Work

- Incorporate these changes into the real-time version of SCaMPR
- Evaluate the potential of a PW / RH correction
- Evaluate SCaMPR against the operational Hydro-Estimator for possible operational consideration

Questions?