Ensemble Tropical Rainfall Potential (eTRaP)

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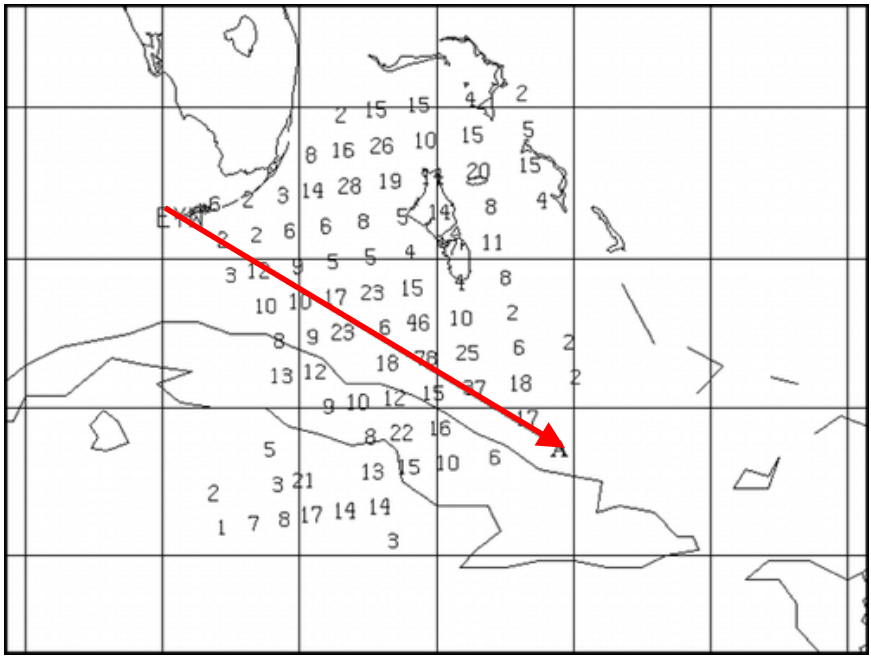
…and many others!

eTRaP Background

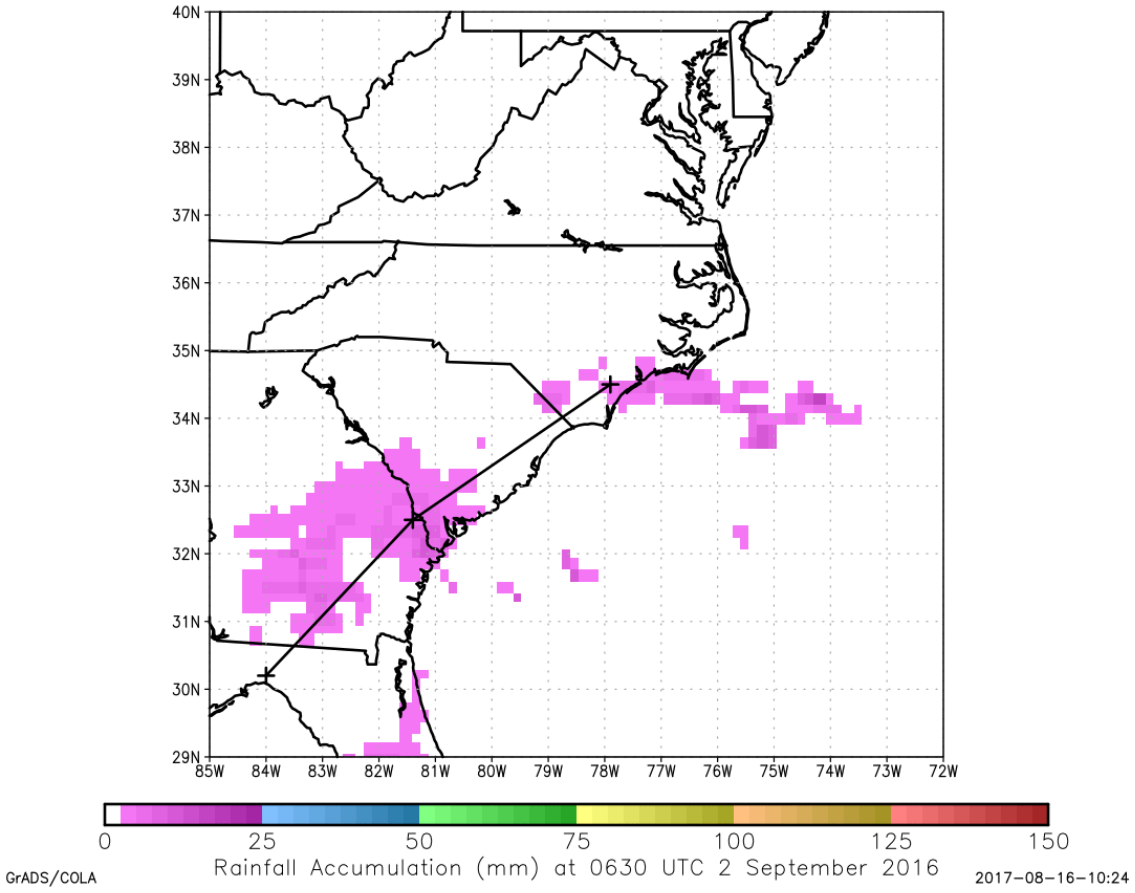
- eTRaP began in the 1980s with Tropical Rainfall Potential (TRaP), which was initially a manually-produced, point forecast of total rainfall from a tropical system
  - Initially based on its satellite-estimated diameter, speed, and average rain rate
  - Later based on gridded rain rates from microwave retrievals



NOAA-15 AMSU-A rain rates (0.01”/h) for Hurricane Georges at 0023 UTC 25 September 1998

eTRaP Background

- This eventually evolved into an automated, gridded forecast of 24-h rainfall from a tropical system by advecting the (gridded) satellite estimates of instantaneous rain rate forward along the operational forecast track



eTRaP Background

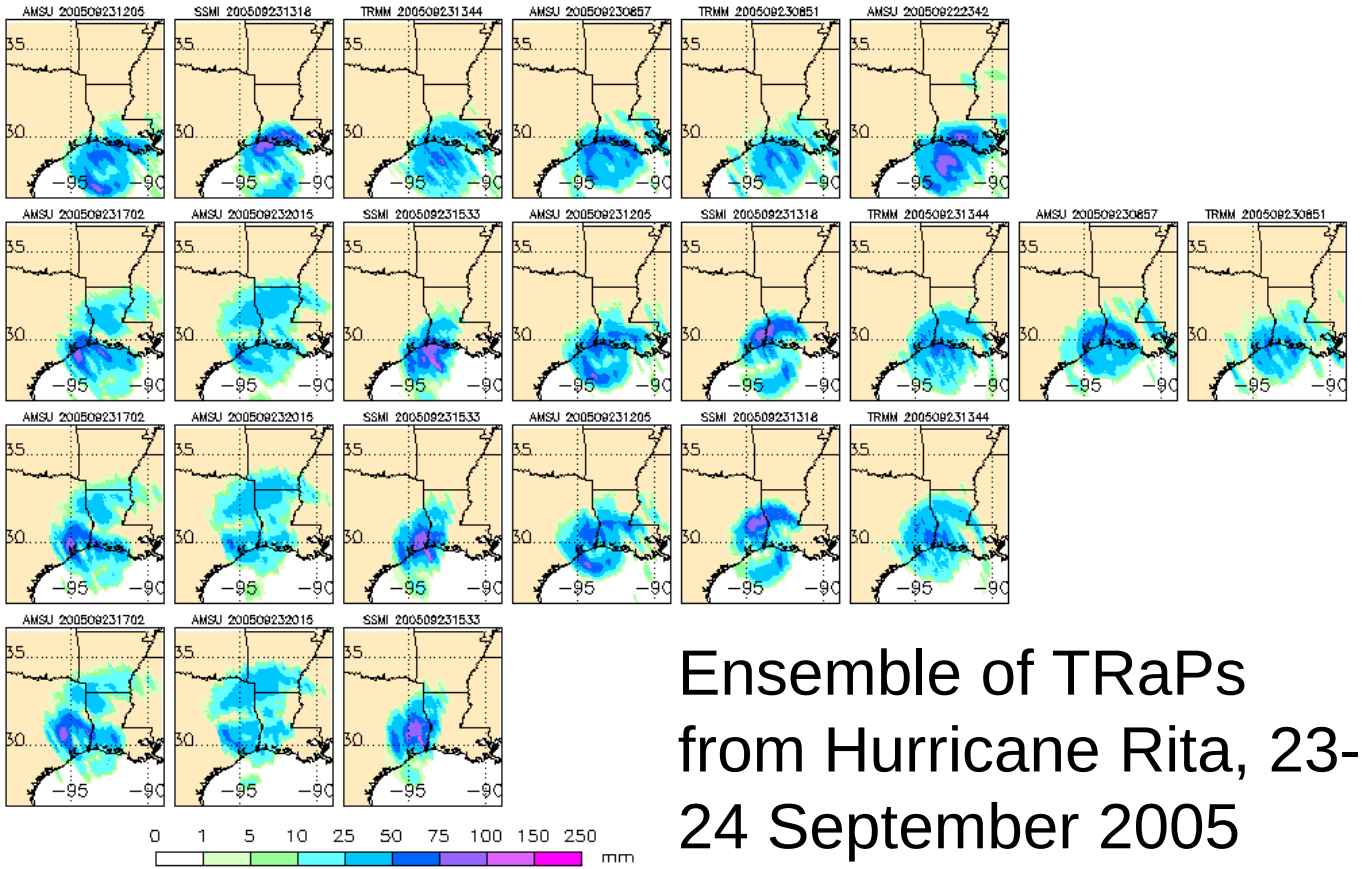
- The next step was to create an ensemble of TRaPs from different sensors, forecast initialization times, and operational forecast tracks to get deterministic and probabilistic (threshold exceedance) rainfall forecasts

18-00 UTC

00-06 UTC

06-12 UTC

12-18 UTC



Ensemble of TRaPs from Hurricane Rita, 23-24 September 2005

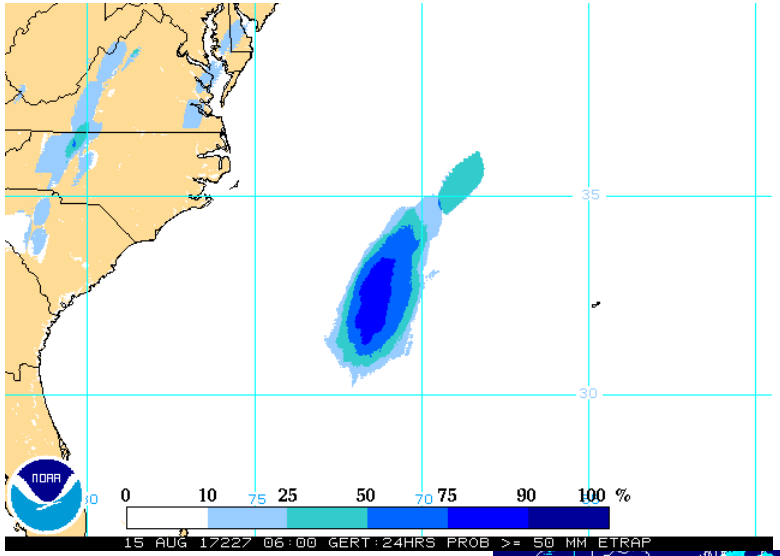
eTRaP Inputs

- eTRaP is produced every 6 h (initialization times 00, 06, 12, 18 UTC, data cutoff +3 h, latency 1 h) for tropical systems worldwide using TRaPs from
  - AMSU (NOAA-18/19, METOP-A/B)
  - SSMIS (DMSP F16/17/18)
  - 11 μm IR (Hydro-Estimator) (GOES-E/W, METEOSAT-8/10, Himawari-8)
  - **ATMS (S-NPP)**
  - **AMSR2 (GCOM-W)**
  - GMI (GPM)
- Rainfall CLImatology-PERsistence (R-CLIPER), which uses rain rates from conditional climatology in place of satellite estimtates, will be added at the end of August.

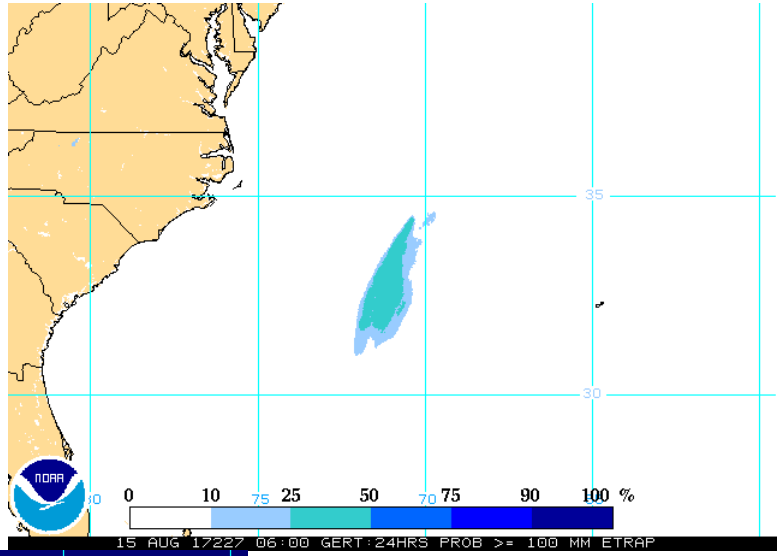
eTRaP Example: Hurricane Gert

0-24 h forecasts initialized 1200 UTC 15 August 2017

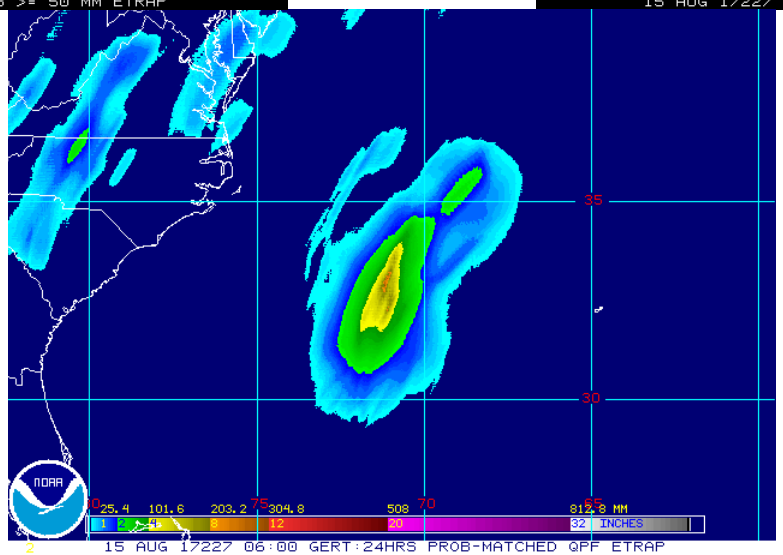
Probability of ≥50 mm



Probability of ≥100 mm

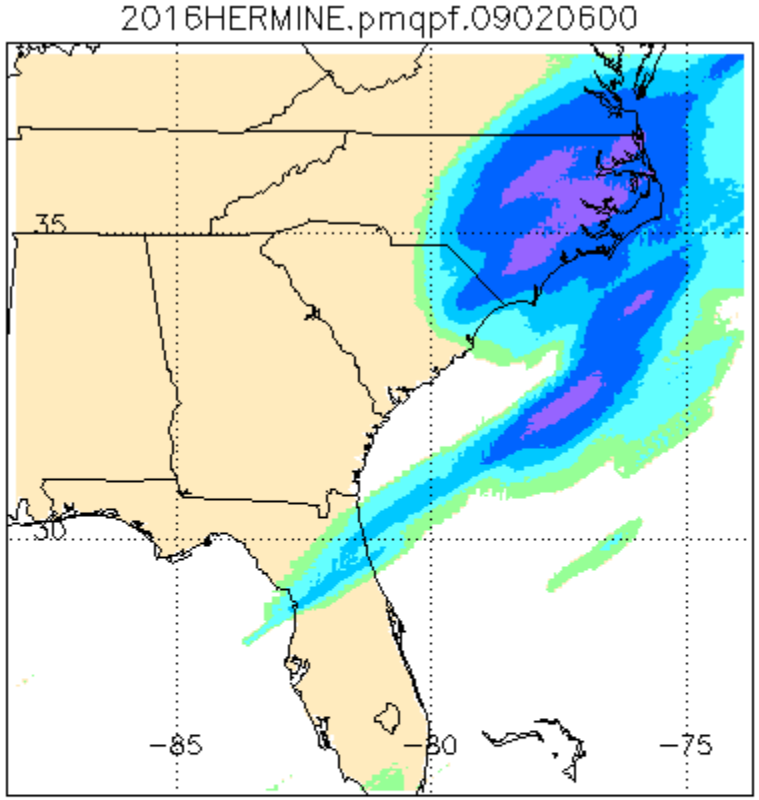


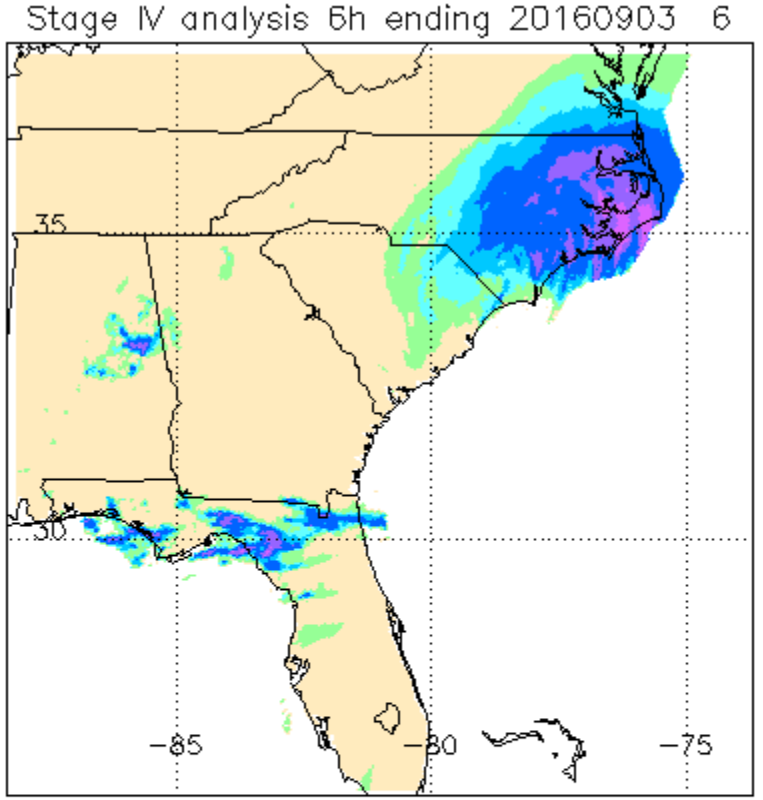
Probability-Matched QPF



eTRaP Example: Hurricane Hermine

18-24 h forecast initialized 06 UTC 2 September 2017





No data
<1 mm
1–5 mm
5–10 mm
10–20 mm
20–50 mm
50–100 mm
100–200 mm
200–400 mm
400–600 mm

		Observed ≥12.7	Observed <12.7
Forecast	≥12.7	8469	3835
Forecast	<12.7	1794	76671

Total number(≧0)=90769, grid=0.030°

Statistics for rain ≧12.7 mm	Obs	Fcst
# gridpoints	10263	12304
Average rainrate (mm)	40.41	36.01
Rain volume (km^3)	42.09	37.51
Maximum rain (mm)	202.11	81.68

Mean abs error = 19.44 mm
RMS error = 28.45 mm
Correlation coeff = 0.131
Bias score = 1.199
Probability of detection = 0.825
False alarm ratio = 0.312
Hanssen & Kuipers score = 0.778
Equitable threat score= 0.557

Questions?