National Environmental Satellite, Data, and Information Service

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NOAA – NESDIS Snowfall Rate

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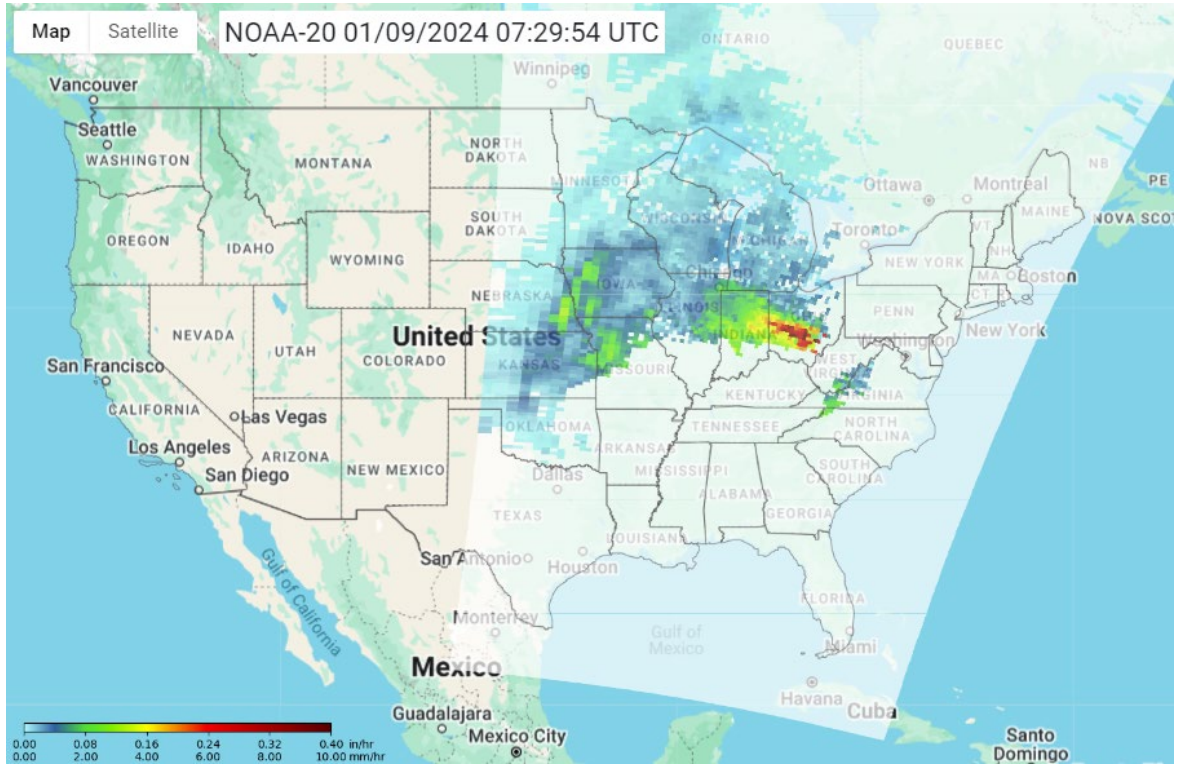
Overview

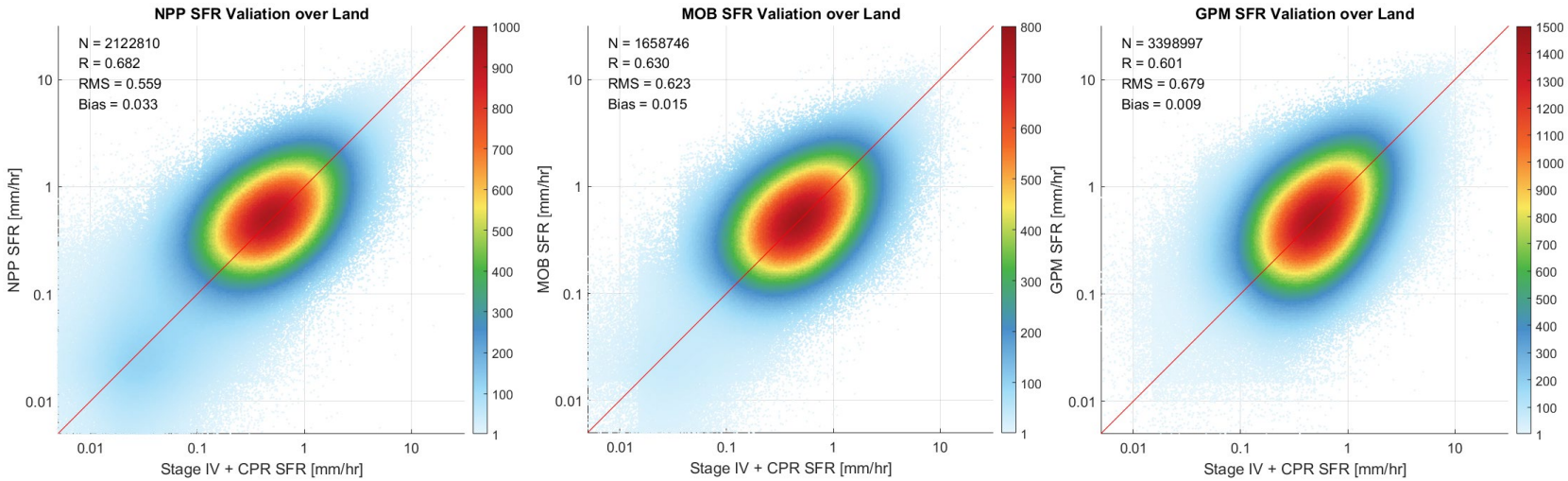
- The NOAA/NESDIS operational global snowfall rate (SFR) product is retrieved from passive microwave measurements taken by:
  - The **ATMS** onboard S-NPP, NOAA-20, and NOAA-21
  - **AMSU-A/MHS** onboard NOAA-19, Metop-B, and Metop-C
  - **GMI** onboard GPM
  - **SSMIS** onboard DMSP-16/-17/-18 (experimental)
- products are produced operationally in near real-time



Algorithms

- Snowfall Detection: XGBoost machine learning model
  - Features: Collocated satellite brightness temperatures and Global Forecast System (GFS) model data
  - Target: land – Stage IV & CPR, ocean – CPR & ERA%
- Snowfall rate estimation
  - 1DVAR-retrieved cloud properties
  - Snowfall rate estimation
  - ML snowfall rate bias correction
  - Histogram matching

Land SFR Validation against Stage IV & CPR



	NOAA-21	NOAA-20	S-NPP	MetOp-C	MetOp-B	NOAA-19	GPM
R	0.76	0.75	0.74	0.65	0.68	0.72	0.65
RMS (mm/hr)	0.36	0.43	0.39	0.64	0.55	0.42	0.61
Bias (mm/hr)	-0.011	0.003	0.005	0.014	0.005	0.008	-0.001

Applications

- Input to the blended precipitation product, CMORPH2
- Supporting nowcasting
  - Providing situational awareness for winter storms
  - Filling in radar gaps
- Reducing latency with Direct Broadcast (DB) data
- SFR latency: DB-based latency is 15-30 min
- The US National Weather Service (NWS) Alaska offices conducted SFR assessment over the last two winters
- Forecasters assessed SFR in their operational environment and submit feedback
- **77% of the responses ranked SFR as either Useful or Very Useful**