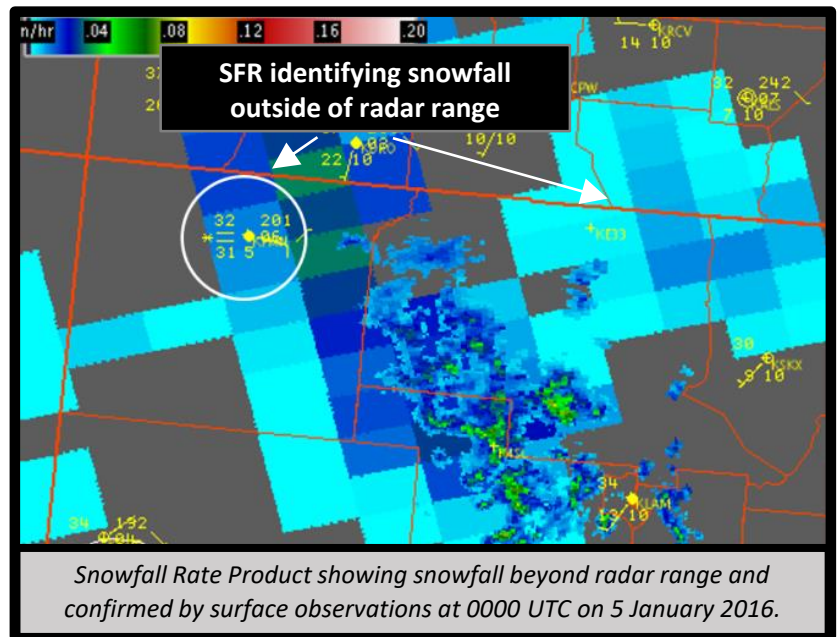


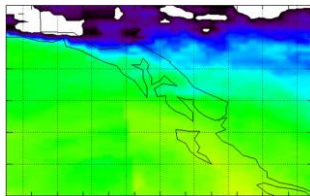
Why is the Snowfall Rate (SFR) Product Important?

The NESDIS snowfall rate product is a liquid equivalent, instantaneous snowfall rate derived from multiple passive microwave instruments on several satellites. Since the passive microwave signal can penetrate clouds, the observations provide a signature of the snow within the clouds. The SFR can identify the extent of a snowstorm and the location of the most intense snowfall; features not readily apparent from traditional visible or IR imagery. The SFR is most valuable in filling observational gaps in radar poor regions such as mountains and remote locations.

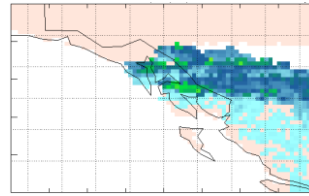


How is the Snowfall Rate Product Created and Availability

Passive microwave observations from 9 instruments used (7-16 km resolution at nadir)



Observations converted to show snowfall rate (in/hr)



Availability:

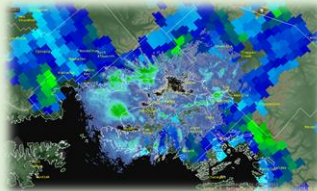
- ~18 retrievals per day (mid-lats), up to ~50 in polar regions
- ~9 morning and 9 afternoon overpasses
- 30 min latency, but up to 2 hours for 2 DMSP satellites

Impact on Operations

Primary Application

Satellite perspective:

Identify extent of frozen precipitation and most intense locations better than visible and IR.



Gap filling: Snowfall rate product fills in snowfall activity that would not otherwise be readily available due to limitations in radar coverage

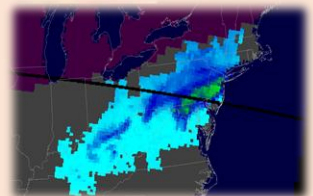
Large events: Best performance for moderate to heavy snowfall in mesoscale and synoptic scale systems from non-shallow stratiform clouds.

Microwave: Penetrates clouds and algorithm sensitive to different atmospheric layers to sample snowfall through the precipitation layer.

Limitations

Polar Orbiting Data:

Data are derived from polar-orbiting satellites, which means infrequent updates, especially in the mid-latitudes.



Not ground snow: Observes snow in atmospheric column with ~30 minute lag between SFR and best ground or lower radar observations

Over land only: The current SFR product is retrieved over land only due to limitations of available observations over water to train the product.

Not too cold: Limited to regions where the surface air temperature is ~7°F and above.

Limited light snow: The minimum detection for SFR is 0.002 in/hour and maximum is 0.20 in/hr (liquid).

Snowfall Rate Interpretation

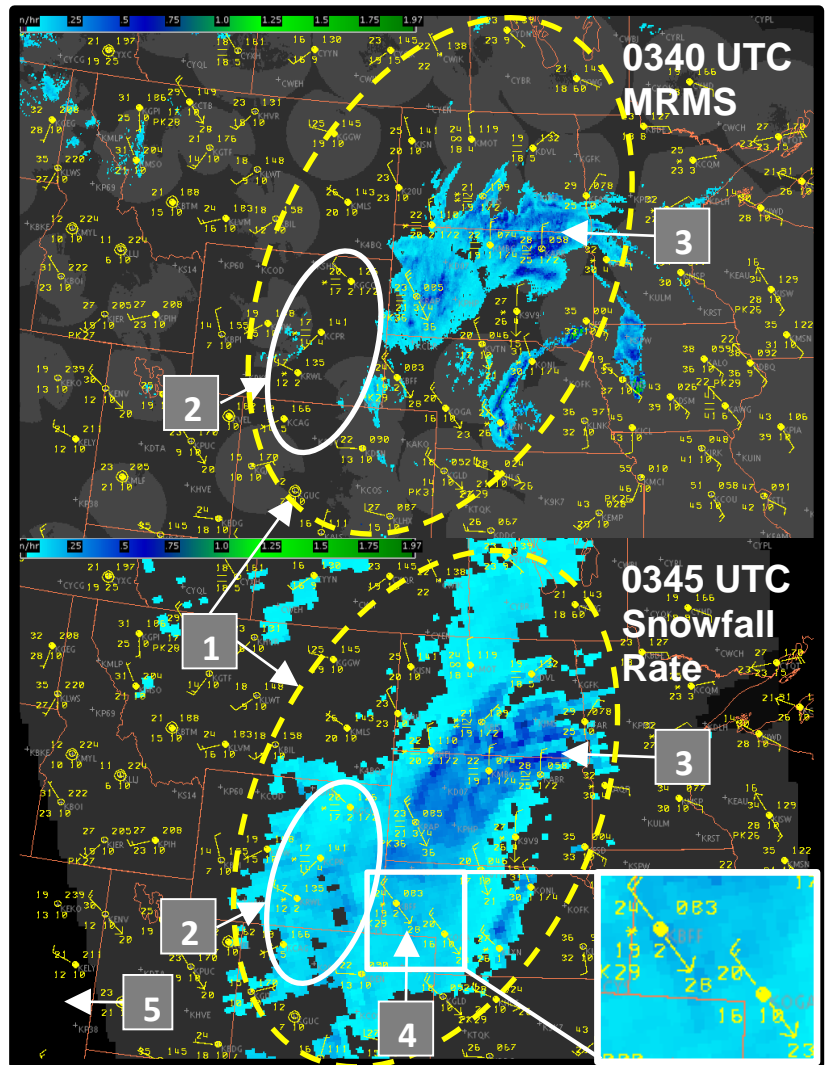
1 SFR swath data may show much broader extent of snowfall occurring aloft than radar data alone indicate (yellow dashed oval) as shown in this example.

2 SFR data show presence of snowfall occurring outside of the range of the ground based radar network for detecting snowfall in low to mid-level clouds, and thus fill gaps in areas in between radar coverage, as shown in this example from eastern Wyoming and northern Colorado.

3 SFR data typically have sufficiently high resolution to show banded mesoscale precipitation structures observed in TROWALS and frontogenesis events, and will often match closely with available radar data where available.

4 Surface observations may or may not indicate the presence of snow and corroborate the SFR observations. Remember, SFR detects precipitation aloft, which may have yet to fall to the surface, or may be experiencing sublimation.

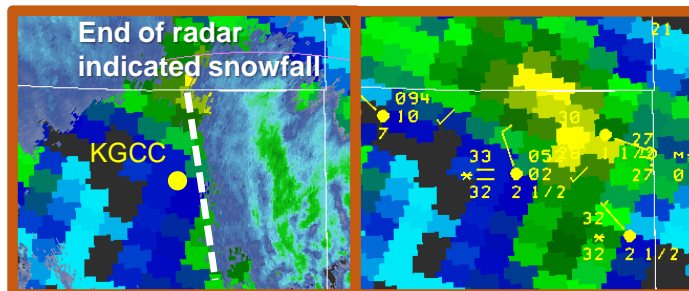
5 SFR is colored gray within the swath and black outside of the swath domain



MRMS precipitation (top) at 0340 UTC 16 Dec 2015 and Snowfall Rate (10:1 ratio, bottom) at 0345 UTC, 16 Dec 2015.

SFR Fast Facts

- Two main SFR products:
 - SFR (swath data only)
 - Merged SFR (mSFR, CONUS only), merged with MRMS instantaneous precipitation data.
- SFR and mSFR data output:
 - Liquid equivalent (in/hr)
 - 10:1 liquid to snowfall ratio
 - 18:1 liquid to snowfall ratio
 - 35:1 liquid to snowfall ratio



Comparison to other products:

Example from 16 March, 2018 showing KUDX radar observations overlaying SFR data (left) and SFR data with observations (right). Note the differences in resolution and that KGCC is reporting snowfall observed by SFR but not radar.

Resources

CICS-MD Snowfall Rate Imagery and Archive
[CICS-MD Snowfall Rate Imagery](#)

OSPO Snowfall Rate Imagery
[Snowfall Rate Imagery](#)

NASA SPoRT
[NASA SPoRT JPSS Page](#)

Hyperlinks not available when viewing material in AIR Tool