

## Why ICVS Severe Event Watch (iSEW)?

- NOAA JPSS STAR Integrated Calibration and Validation System (ICVS) provides near real-time satellite spacecraft and sensor data records (SDRs) performance monitoring (<https://www.star.nesdis.noaa.gov/icvs>);
- ICVS provides a unique opportunity to combine different SDR observational capabilities from multi-sensors in closely observing global severe events;
- ICVS Severe Event Watch (iSEW) provides innovative use of multi-sensor SDRs in monitoring severe weather and hazardous events, such as hurricanes, wild fires, dust storms, flooding, oil spills, etc.;
- iSEW not only provides valuable JPSS satellite observations to facilitate decision making, but also gives us creative ideas in advancing new technologies and developing new algorithms;
- As a pilot study using applications for SDR Cal/Val, iSEW features also assist SDR and Environmental Data Record (EDR) product developers and users in better validating product quality.

## iSEW Framework Design

- iSEW consists of two integral parts:
- Routine global RGB images with different combinations that are capable of highlighting global daily weather and hazardous events during both daytime and nighttime;
  - Customized event-driven interface that conducts in-depth close looks into particular severe events for native resolution sensor imagery and animations such as Hurricane Watch and Wild Fire Watch

## iSEW

Wild Fire, Volcano, Hurricane, Tornado, Heat Wave, Snow Storm, Oil Spill, Dust Storm .....

### Global Routine Monitoring

- Different RGB Combinations Imaging
- DNB Imaging
- I- and M-Band Imaging
- Support both day and night images
- Support both S-NPP and NOAA-20
- Multiple resolution displays
- Global coverage, Operational monitoring

Host: JSTAR-MAPPER side by side with EDR images

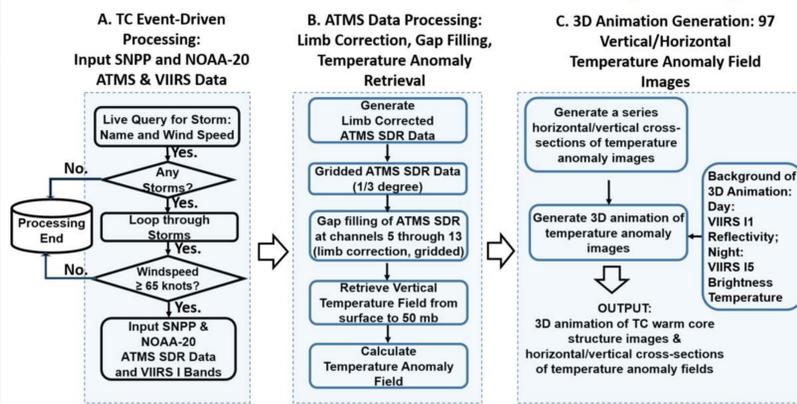
### Event Driven Monitoring

- Different RGB Combinations Imaging
- DNB Imaging
- I- and M-Band Imaging
- Support both day and night images
- Support both S-NPP and NOAA-20
- Support 3D Animation by multi-sensor data synergy
- Native resolution
- Customized regions
- Event monitoring

Host: designated iSEW Web Portal

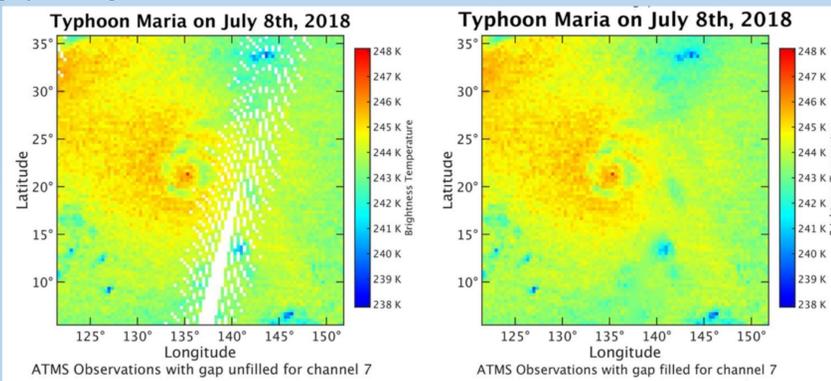
## iSEW Hurricane Watch

### Automatic 3D Hurricane Warm Core Structure Animation System Diagram



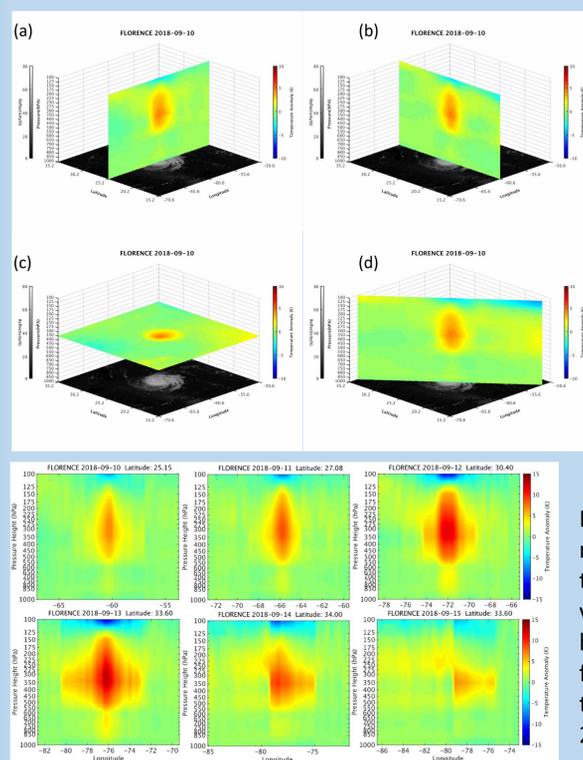
## Gap Filling of the ATMS observations

For better hurricane warm core observations, iSEW Hurricane Watch uses the data smoothing technique to conduct the data gap filling for the ATMS observations (Yan et. al., 2019). See the example figure below for the ATMS observations with/without gap filling for channel 7.



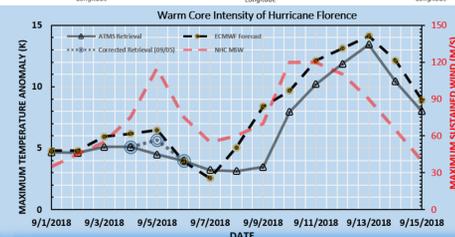
## Case Study: Hurricane Florence

ICVS iSEW system can be utilized for more comprehensive data analysis on hurricane event (Yan et. al., 2019). We took Hurricane Florence as an example for the event analysis and warm core illustration.



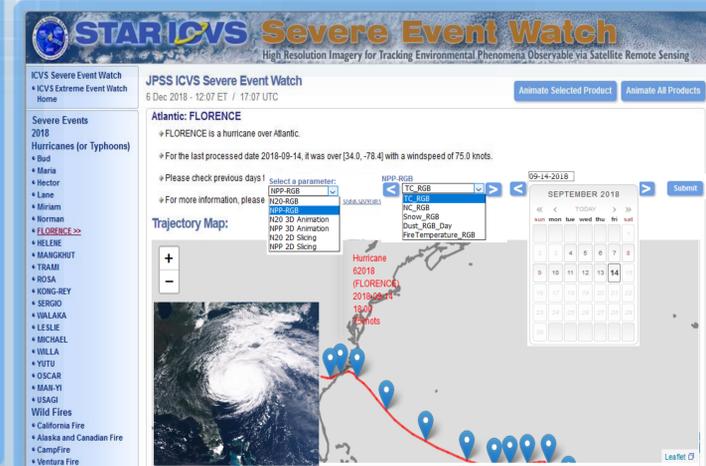
Four cross-sections of 3D temperature anomaly structure image animation for hurricane Florence on September 10, 2018.

Evolution of ATMS-retrieved atmospheric temperature anomaly vertical structures for hurricane Florence event from 10 September through 15 September 2018



Time series of ATMS retrieved and ECMWF-forecast maximum temperature anomalies on the level of 350 hPa for hurricane Florence spanning from 1 September through 15 September 2018 (Yan et. al., 2019)

## iSEW Web Portal



## Summary

1. ICVS Severe Event Watch (iSEW) is designed as a pilot study of using applications for SDR Calibration/Validation and multi-sensor data synergy;
2. iSEW is developed and automated to provide global and event high resolution imaging services by maximizing the ICVS's strength of JPSS multi-sensor SDR monitoring capability;
3. Multiple applications of the iSEW system were demonstrated, such as 2018/2019 Atlantic Hurricanes and Western Pacific Typhoons, and California wild fires;
4. iSEW Hurricane Watch is capable of synergizing both VIIRS and ATMS observations to illustrate upper level warm core 3D structures and intensifying/dissipating processes;
5. Multi-sensor SDR data synergy for severe event monitoring was explored and demonstrated;
6. Inter-sensor SDR were compared in severe event monitoring applications;
7. Global display of iSEW routinely produced images was tested and will be hosted on JSTAR-Mapper;
8. iSEW Web Portal is developed to provide a unique platform for JPSS multi-sensor images and animations that are valuable for specific severe event monitoring and scientific exploration.

## Future Work

1. More imaging products are needed for broader event applications, such as oil spill etc.
2. Multi-sensor data synergy can be further explored for application purposes;
3. iSEW system efficiency should be improved to meet operational needs.

## Reference

B. Yan, D. Liang, W. Portr, eJ. Huang, N. Sun, L. Zhou, T. Zhu, M. Goldberg, D. Zhang, and Q. Liu, "Gap Filling of Advanced Technology Microwave Sounder Data as Applied to Hurricane Warm Core Animations," submitted to J.G.R., 2019.

## Acknowledgement

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