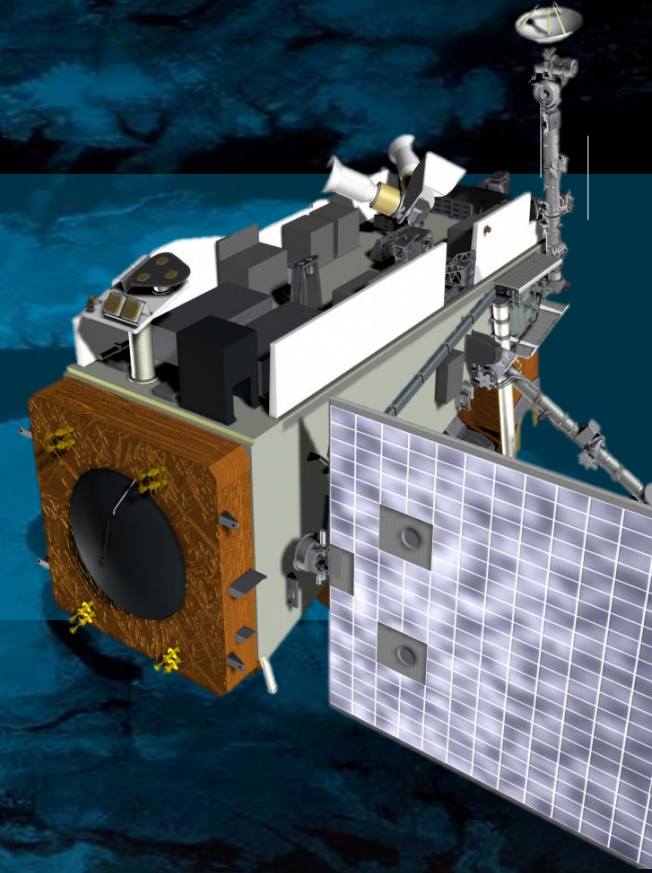


Joint Polar Satellite System (JPSS)

Game Changing Applications of Polar Orbiting Satellite
Data for Flight Planning and Operations



Jeffrey Weinrich, Science and Technology Corporation (STC)



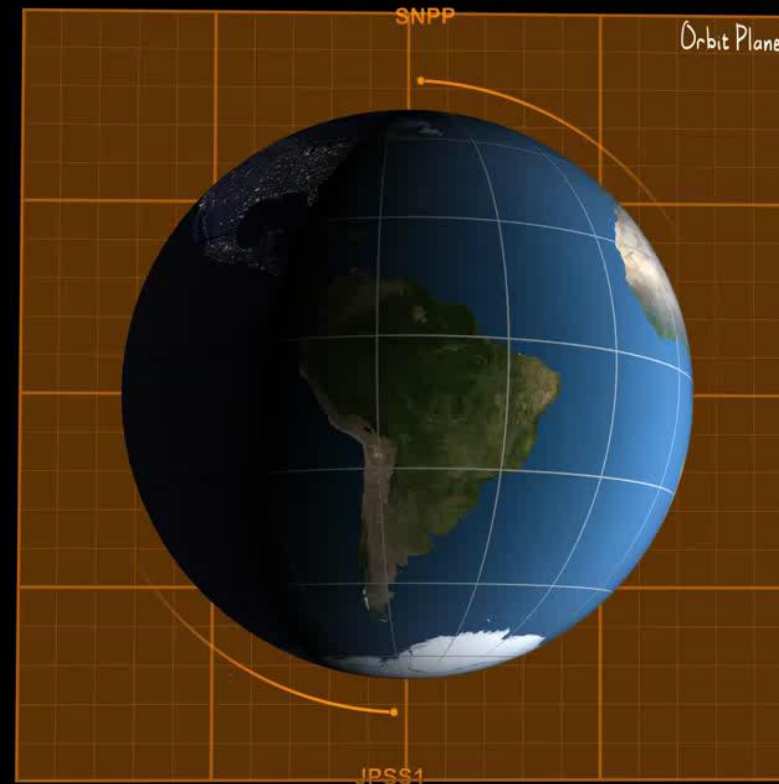
GLOBAL **DATA.**
LOCAL **WEATHER.**



JPSS: Improving Forecast Accuracy & Timeliness

JPSS satellites:

- Two satellites circle the Earth from pole-to-pole and cross the equator 14 times daily in the afternoon orbit—providing full global coverage twice a day.
- Provide critical data to the numerical forecast models that produce 3- to 7-day mid-range forecasts.
- Provide support for zero to 3-day operational forecasting in Polar Regions (where other observational data are sparse).



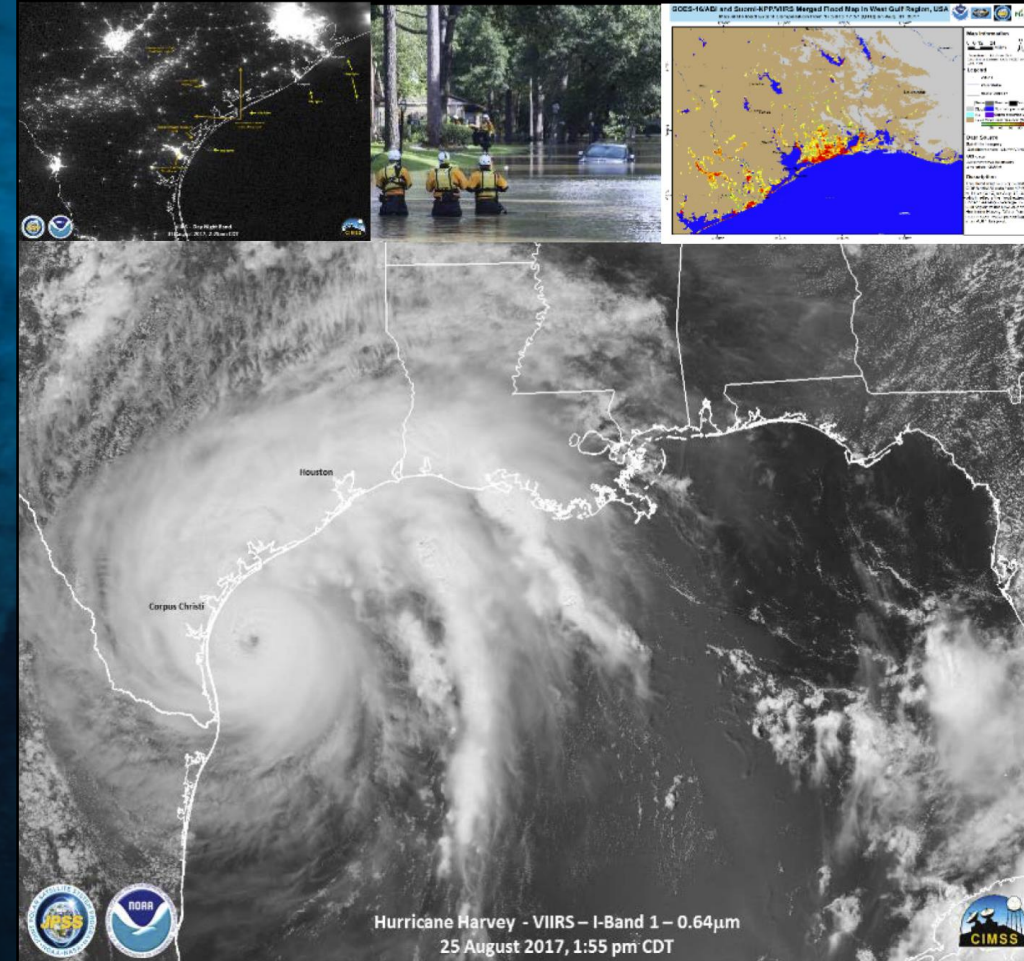


The JPSS Initiatives

The initiatives comprise of a team of developers and users working together to improve an application in a testbed environment providing assessments of utility from the users and feedback to the developers.

- Arctic
- Aviation
- Fire and Smoke
- Hurricanes and Tropical Storms
- Hydrology
- Numerical Weather Prediction (NWP)
- Oceans and Coasts
- River Ice and Flooding
- Atmospheric Sounding
- Volcanic Hazards

JPSS Proving Ground Portfolio 2018 - 2021



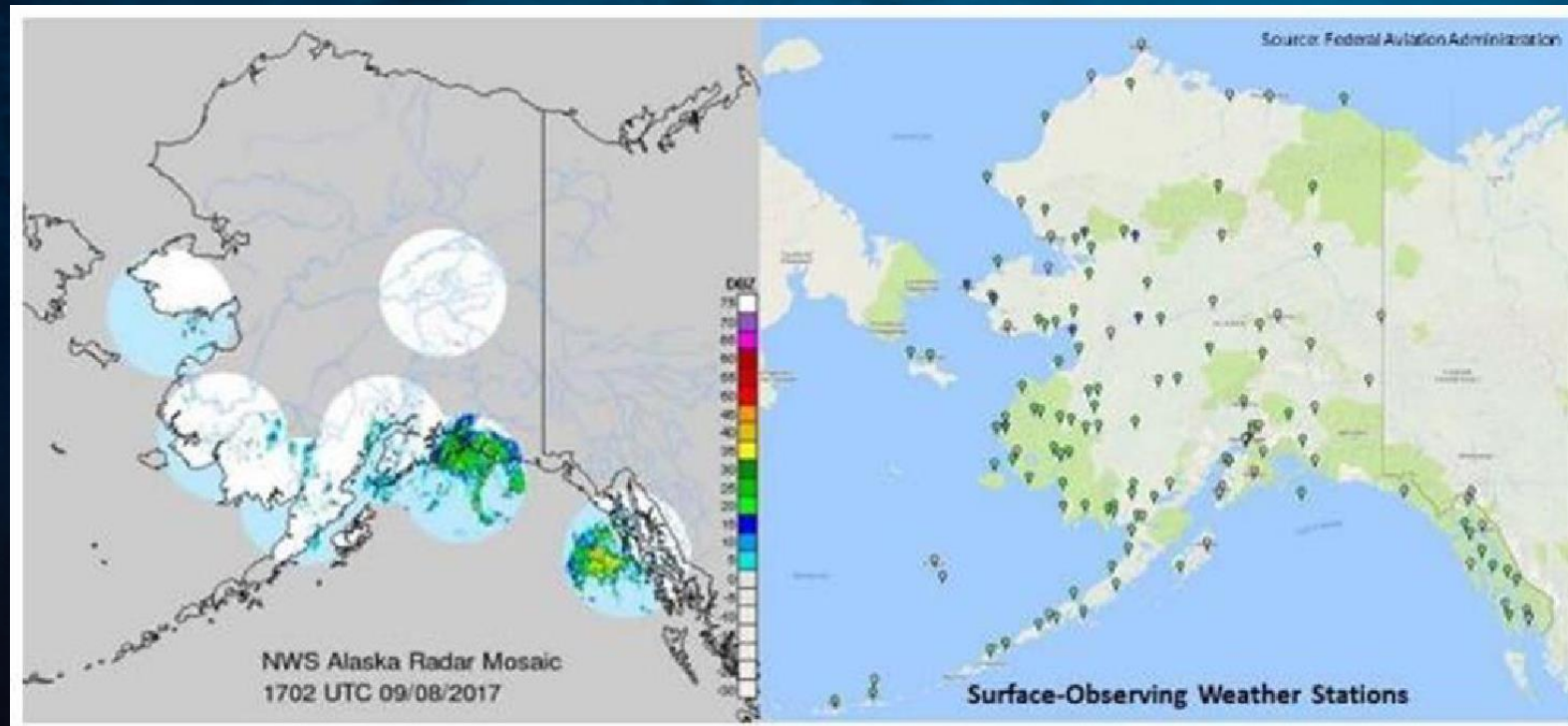


JPSS Aviation Initiative

- Started in 2018 with the Alaska aviation community
 - There is more general aviation than any other state in the nation. The only way to travel in some cases is general aviation (mail, hospital, food delivery)
- Focused on Alaska at first due to limited conventional observational data sources
- Demonstrated how polar satellite data improves diagnosis and forecast of aviation hazards
- Expanded utility in the CONUS and international users
- Showcased experimental products for future applications



Limited Data in Alaska





Hope, Alaska Airport





JPSS Aviation Initiative Users and Participants

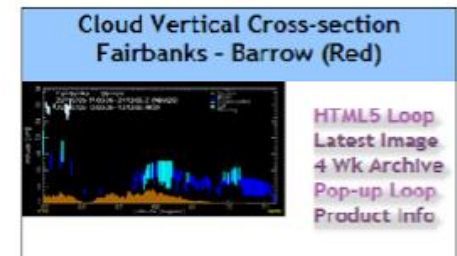
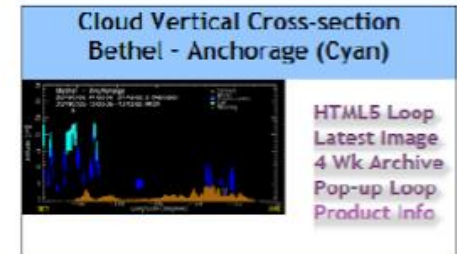
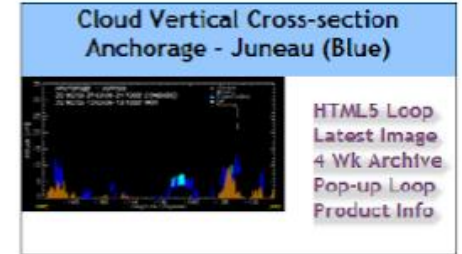
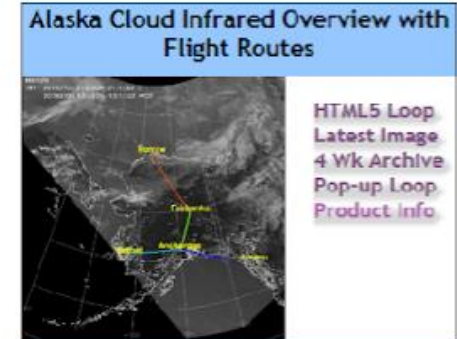
Federal Aviation Administration	International	National Weather Service	Pilots/Others
<i>FAA Headquarters</i>	<i>German Weather Service</i>	<i>Alaska Aviation Weather Unit</i>	<i>Alaska Airmen's Association</i>
<i>FAA Command Center</i>	<i>Iceland Weather Service</i>	<i>NWS Anchorage</i>	<i>Aircraft Owners and Pilots Association</i>
<i>FAA Air Traffic Control Center – Anchorage, Kansas City, Houston</i>	<i>Environment Canada</i>	<i>NWS Juneau</i>	<i>National Transportation Safety Board (NTSB)</i>
<i>FAA Flight Service</i>		<i>NWS Phoenix</i>	<i>Southwest Airlines</i>
		<i>Aviation Weather Center</i>	<i>National Center for Atmospheric Research (NCAR)</i>



VIIRS Cloud Vertical Cross-section products over Alaska

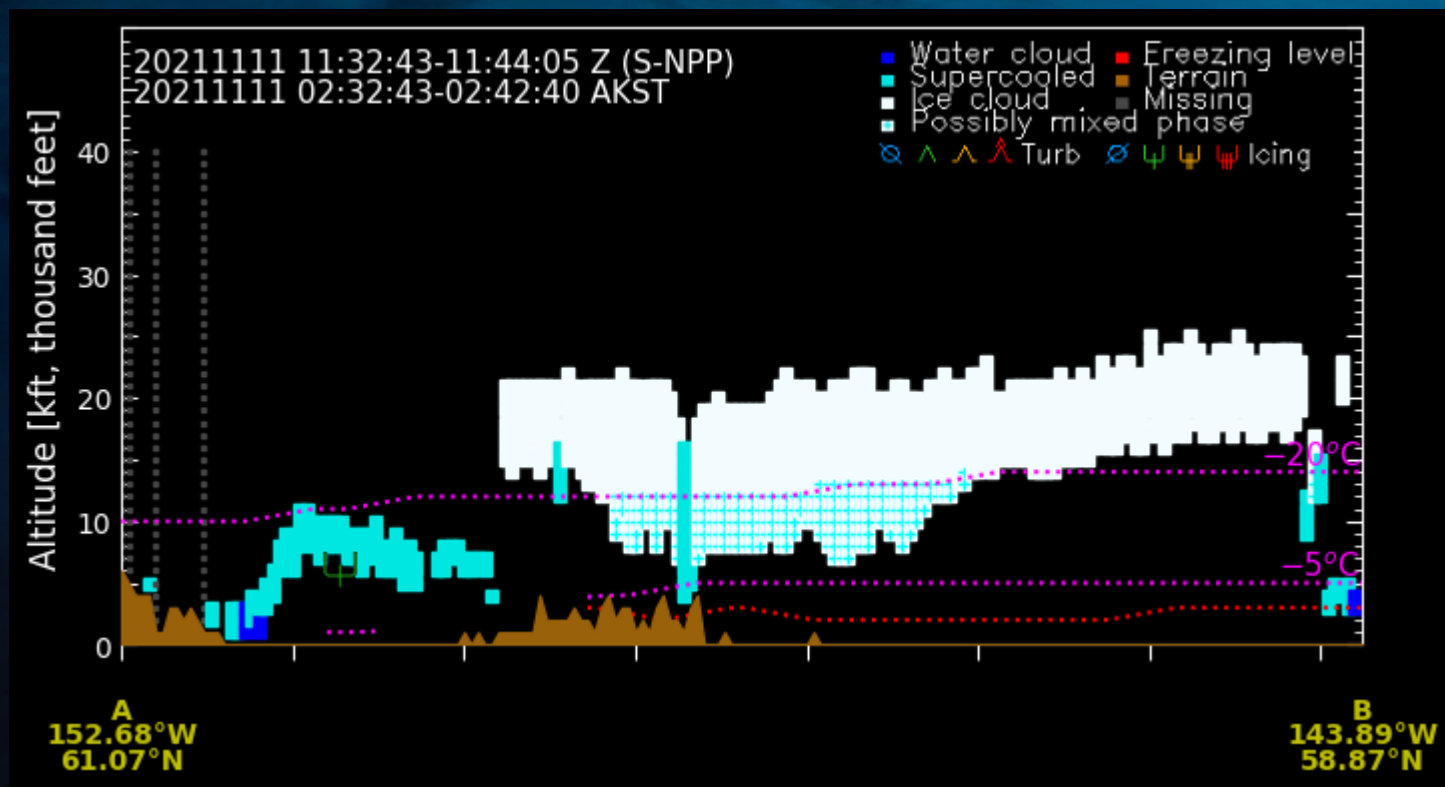
- Experimental products for aviation users
- Cloud Vertical Cross-sections (CVC) along flight routes over AK are obtained by connecting Cloud Top and Base Heights derived from S-NPP and NOAA-20 VIIRS data
- Colors corresponding to Cloud Top Phase
- Improved display based on user feedback
- Ongoing efforts for improved nighttime and multilayer clouds due to degraded cloud retrieval products

Alaska - Aviation Products





JPSS Cloud Cross Sections





Real Life Operational Meteorologist Example

FAI UA /OV FAI320050/TM 1746/FL100/TP C208/TA M2/IC MOD RIME/RM ZAN=

FAI = Fairbanks

UA = Routine

OV = Location of the PIREP

TM = 1746 Greenwich Mean Time

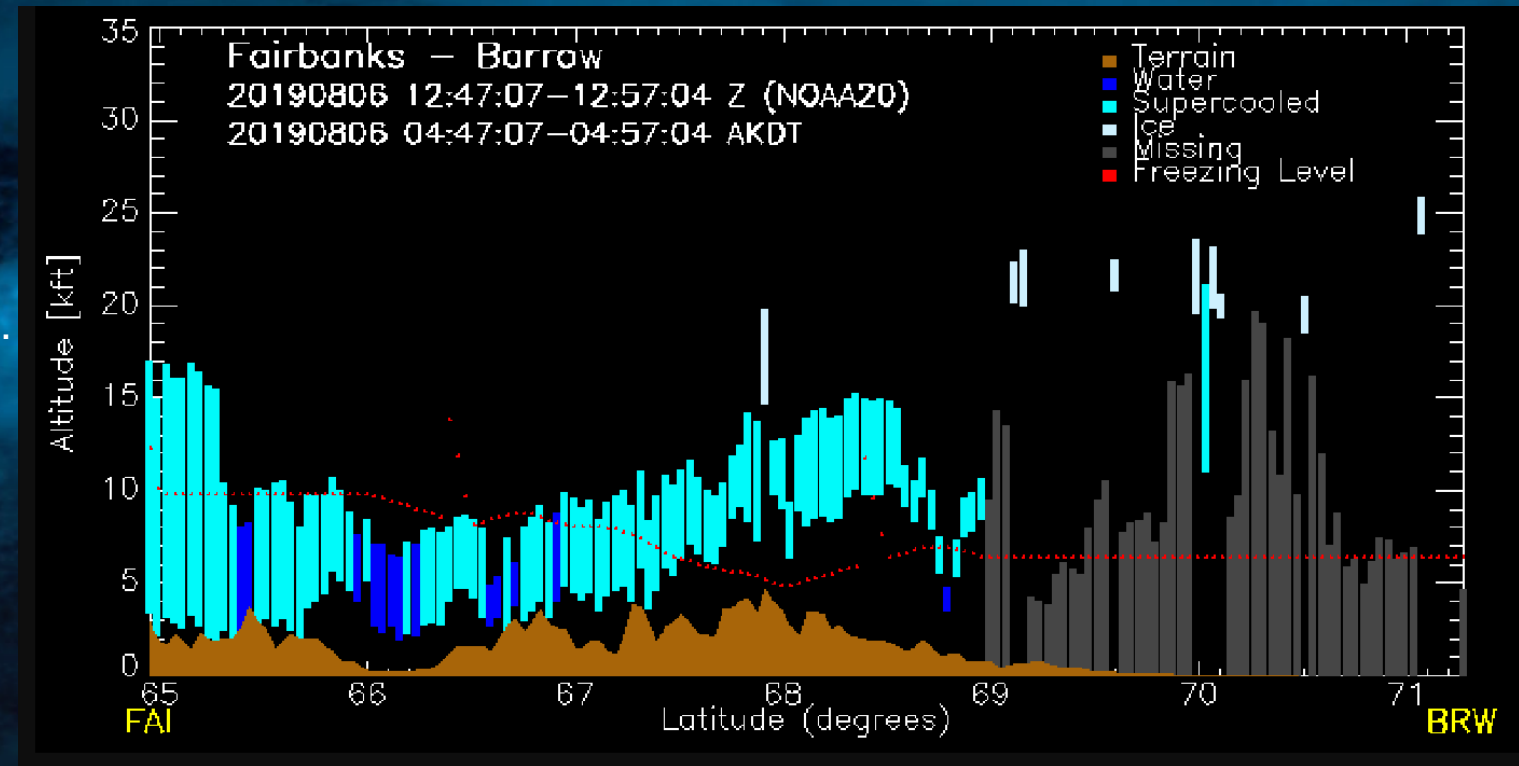
FL 100 = Flight Level 10,000 ft

TP C208/TA = Aircraft Type, Cessna 208 Caravan.

TA M02 = Temperature -02 Celsius

IC MOD RIME = Moderate Rime Ice

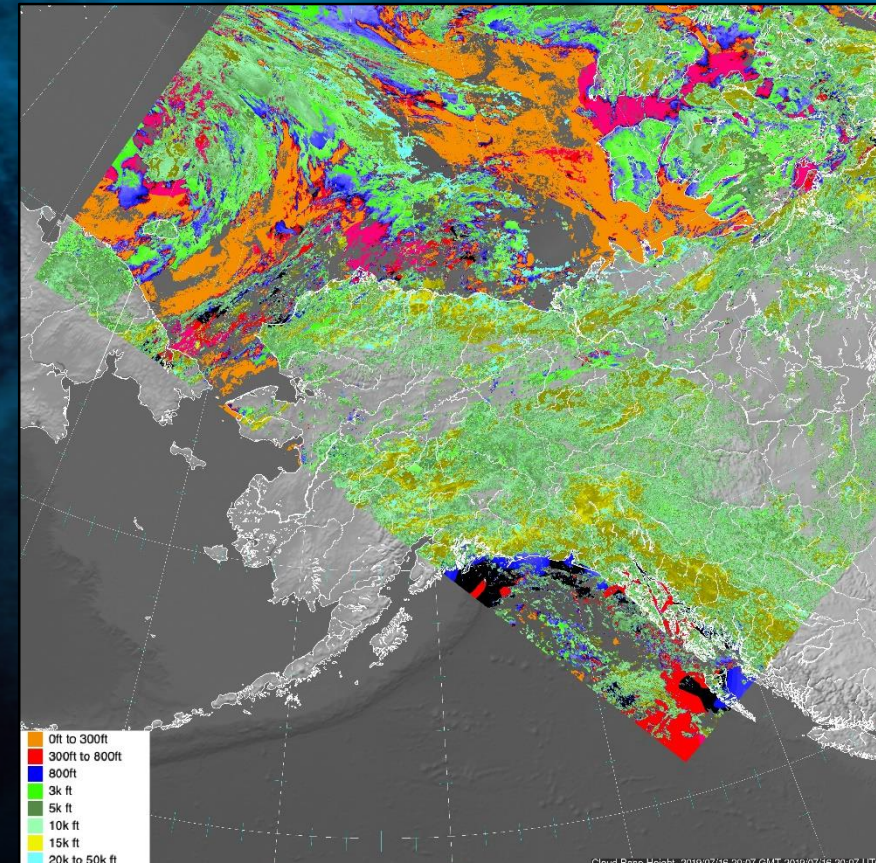
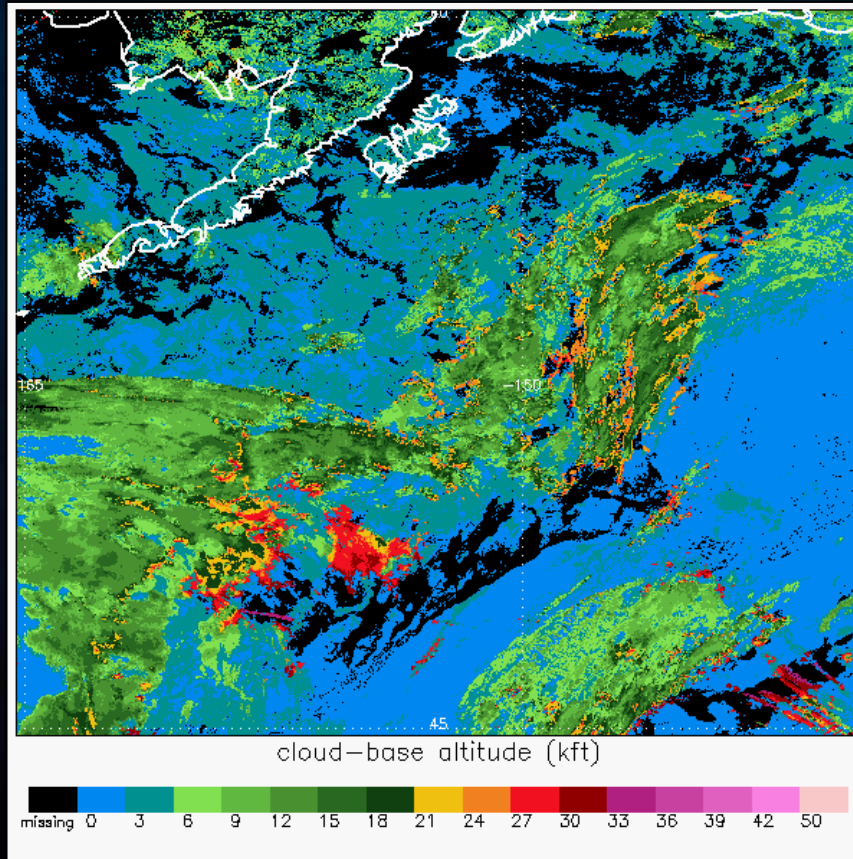
RM ZAN = Remarks, Anchorage



“We had an icing PIREP this morning south of FAI that matched up nicely with your cloud product.” Gail Weaver, Center Weather Service Unit Anchorage”

Cloud Base Altitude

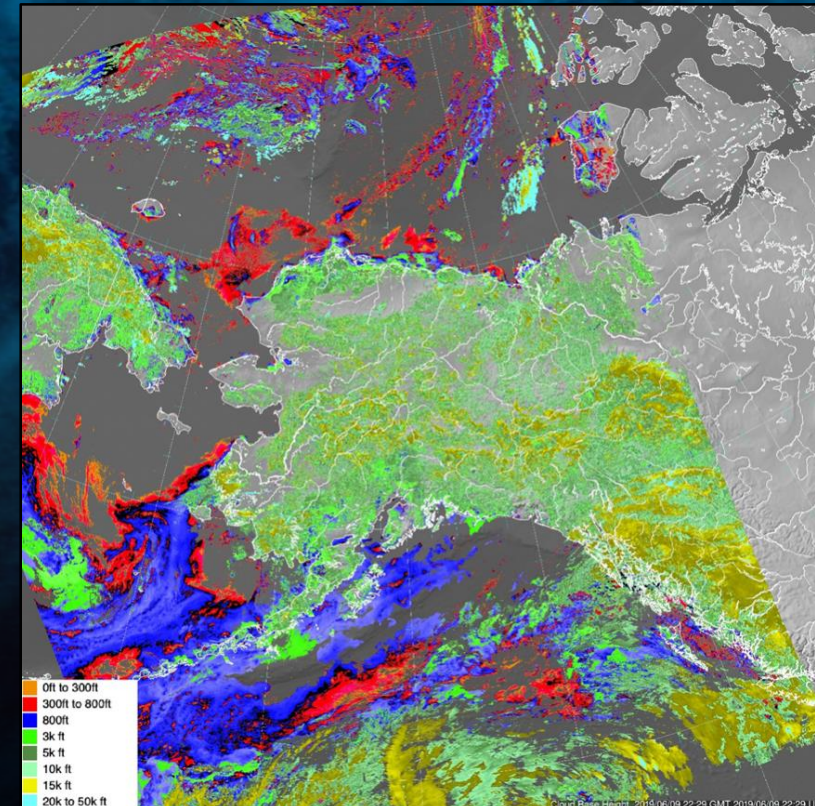
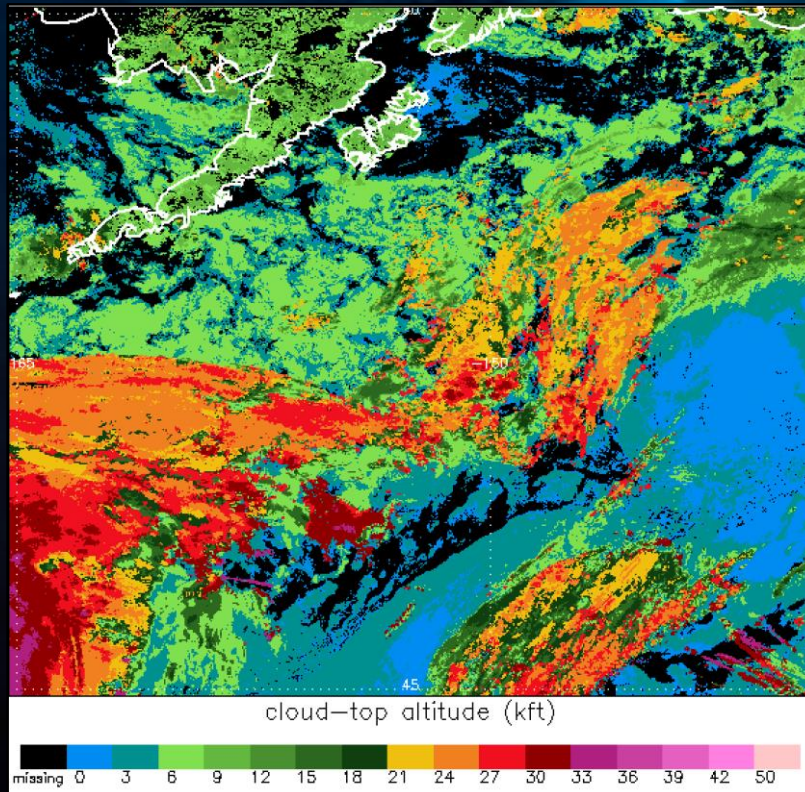
- Identifies the Highest Lower level
- Used to create vertical cross sections
- Display of product updated based on feedback
- Pilots are better able to distinguish where the bottom cloud layer is located





Cloud Top Altitude

- Used to as a tool for cloud top rising
- High Frequency between satellites overpasses in high latitudes
- Used in conjunction with Numerical Weather Prediction
- Display of product updated based on feedback
- Pilots are better able to distinguish where top layer is



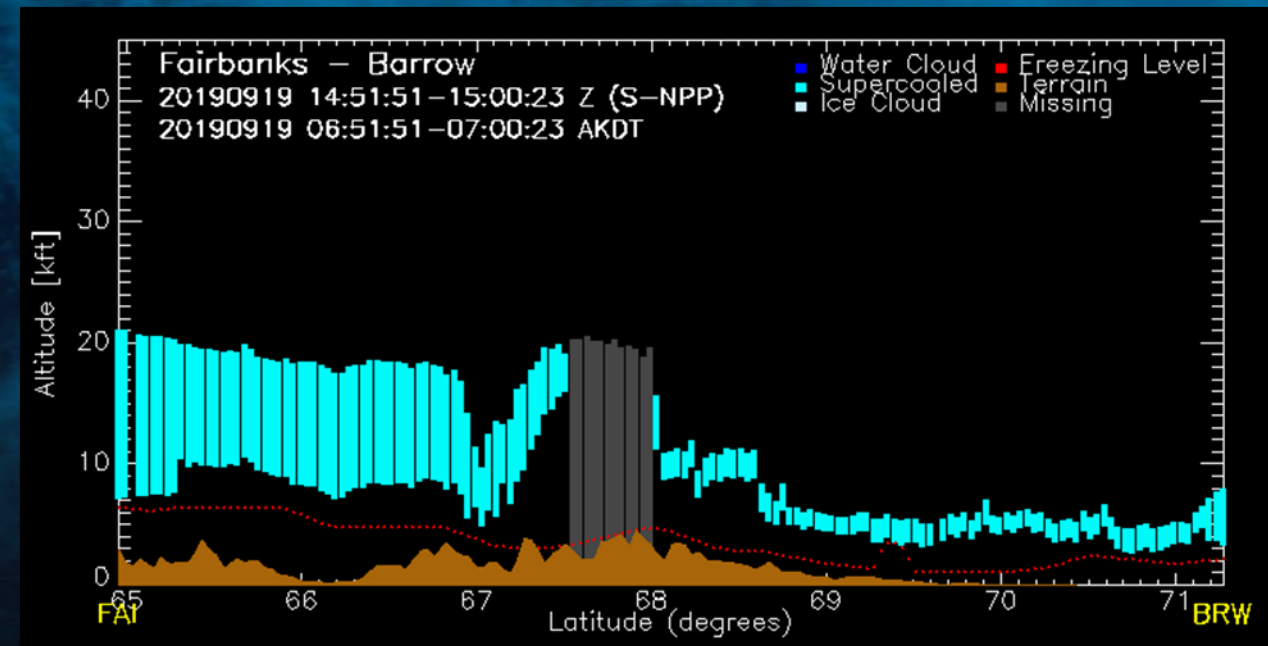
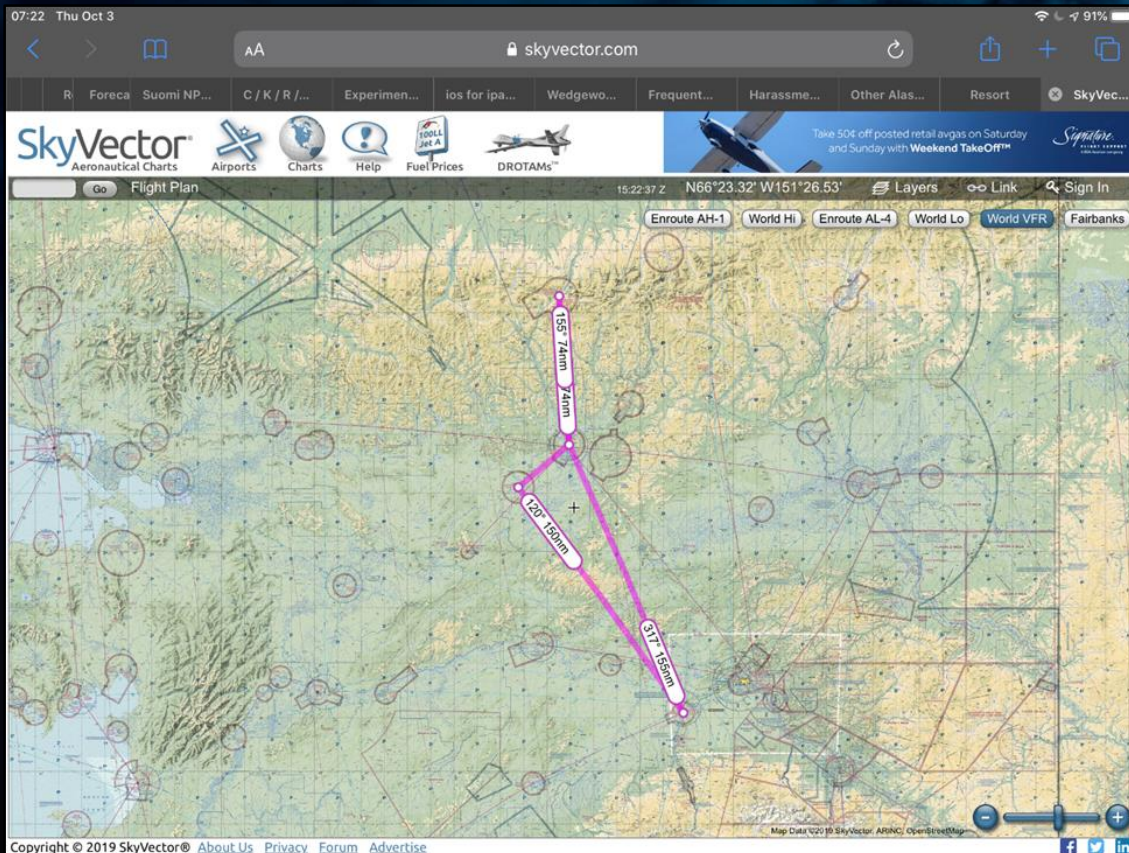


Real Life Operational Pilot Example

- Adam White, Alaska Airmens Association, Example of real life use of JPSS Cloud Cross Section.

“While there is some weather reporting at these airports and a weather observer at Bettles there is still a lot of distance between these locations with no data and very hostile terrain features.”

“The test product was helpful to get an idea what I might encounter, especially in the PABT-PAKP-PFAL section of the trip as I was in the Brooks Range.”





2021-2022 Demonstration

- New CIRA Website
 - <https://io.cira.colostate.edu/aviation/view-custom-cross-section/xbfkecfabfihcnhyklcjkkakmcfjzA,B>
- 1. Are you a pilot, dispatcher/flight planner, forecaster, or other (please specify)?
 - a. If pilot:
 - i. Are your flights primarily IFR, VFR, or both?
 - ii. What levels do you primarily fly at? Sfc-10kft, 10kft-18kft, 18kft+
 - iii. Are your flights primarily conducted under Part 91, Part 135, or Part 121?
 - iv. Does your aircraft have de- or anti-icing equipment?
- 2. Did you use a pre-defined flight path or did you create a custom path on the Cloud Cross Section product?
 - a. If you used the custom route, rate ease of creating a custom path (1 = Very Difficult ; 5 = Very Easy)
- 3. Describe how you incorporate the Cloud Cross Section product with the information you usually use to make flight decisions.
- 4. Rate how easy you found the Cloud Cross Section Product to interpret and use. (1 = Very Difficult ; 5 = Very Easy)
- 5. How did using the Cloud Cross Section Product impact your flight operations? (Chose not to fly, made alterations to flight plan, confirmed initial flight plan, changed time of flight, other)
- 6. Did you or the pilot experience (includes PIREP) clouds diagnosed by the Cloud Cross Section Product at the time of flight?
- 7. If applicable, rate the quality of PIREPS on the Cloud Cross Section Product (1 = Difficult to read ; 5 = Easy to read)
 - a. Additional comments about the PIREP display
- 8. What features of this Product did you like most/least?
- 9. How would you like to see this Product modified or improved?
- 10. In the future, how often will you use the JPSS Cloud Cross Section product, either in your own preparation for flight or to assist pilots? (1 = Not At All ; 5 = All of the Time)
- 11. Any comments on website design; comments on the new cross section generator?



Data Access and Resources

- New CIRA Website
 - <https://aviation.cira.colostate.edu/>
- JPSS data products over Alaska: <http://hippy.gina.alaska.edu/distro/aviation/>
- Polar Slider: <https://rammb-slider.cira.colostate.edu>



Summary

- Accomplishments:
 - 17 new user groups added that did not use JPSS Cloud Products before
 - Creation of JPSS Cloud Cross Sections
 - Changes in overall display of Cloud Products to indicate more levels at the lower layers for general aviation pilots
 - Supercooled liquid water added
 - Global Forecast Model (GFS) Freezing Level Temperature added
 - Dynamic global cross section capability where a user can point and click and get a cross section created on demand.
 - Added -5 and -20 temperature line based on feedback so forecasters can identify icing
 - Added satellite measurement of temperature based on feedback instead of GFS temperature

Upcoming

- Using these features to the rest of the world
- Incorporating GOES-R for the lower 48



Acknowledgements

Gail Weaver (NWS), Emily Berndt (NASA/SPoRT), Kris White (NWS, and NASA/SPoRT), Jack Dostalek (CIRA), Brad Zavodskey (NASA/SPoRT) and Nadia Smith (STC)

Andy Heidinger, YJ, and the Cloud Team

Carl Dierking (GINA), Carrie Haisley (CWSU), Tom George (AOPA), Arron Layns (JPSS), Becca Mazur (Arctic Test Bed), Andrew McClure (FAA), Jeff Osiensky (AAWU), Bonnie Reed (JPSS/STC), Jorel Torres, Adam White, CIRA and all the users for their help!



THANK YOU!

For more information visit: www.jpss.noaa.gov

Please contact me to get involved! Jeffrey.weinrich@noaa.gov

CONNECT WITH US!



/NOAASATELLITES



@NOAASATELLITES



@NOAASATELLITES



/NOAASATELLITE
S