Alaska Aviation Weather Unit – Final Evaluation

Project Title: 2016 GOES-R/JPSS AAWU Demonstration

Organization: NOAA's Alaska Aviation Weather Center (AAWU)

Evaluator(s): Alaska Aviation Weather Unit forecasters and Anchorage Central Weather Service Unit forecasters

Duration of Evaluation: 1 January 2016 – 31 December 2016

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1. Summary

The 2016 demonstration at the Alaska Aviation Weather Unit (AAWU) and Center Weather Service Unit (ZNC) in Anchorage, AK, took place from 1 January – 31 December 2016, it's purpose two-fold: (1) to provide a pre-operational environment in which to test and evaluate new GOES-R/JPSS proxy products, and (2) to train and familiarize aviation forecasters in Alaska with the capabilities of our next generation GOES-R/JPSS satellite series. This demonstration stemmed from a request at the 2015 OCONUS Satellite meeting in Anchorage to further integrate the AAWU and ZNC into the GOES-R/JPSS Proving Ground activities, and was a collaborative effort between the Aviation Weather Testbed and the High Latitude Proving Ground. Participation included forecasters from the AAWU and ZNC. Additionally, the U.S. Air Force meteorologists from the Joint Base Elmendorf-Richardson and the 17th Operational Weather Squadron showed peripheral interest in aviation related Proving Ground activities. The following report details the activities and results of the entirety of the 2016 GOES-R/JPSS demonstration.

2. Introduction

The High Latitude Proving Ground, hereafter referred to as HLPG, has existed [many years] in Alaska and there have subsequently been smaller scale evaluations of products from various cooperative institutions in conjunction with the HLPG. However, 2016 marks the first formal demonstration period focused specifically on aviation forecasting in Alaska. This period focused on the operational responsibilities of the AAWU, which is responsible for delivering accurate, consistent, and timely weather information for safe and efficient flight across the Alaskan airspace system. Main met-watch responsibilities are unique and widely varied, ranging from cargo and commercial carriers surrounding the three larger terminals (Anchorage, Fairbanks, and Juneau) to a plethora of general aviation operations; helicopters, floatplanes, and other small aircraft included.

As a sister center to the Aviation Weather Center (AWC) in Kansas City, MO, and similarly assigned its requirements by the Federal Aviation Administration, the AAWU issues many of the same products as the AWC. These responsibilities are divided between a north and south Alaska region desk and include the FA text forecast, AIRMETs, SIGMETs, and upper level Significant Weather (SigWx) charts. FA text forecasts and AIRMETs are issued roughly every 6 hours and provide a 0, 3, 6, 9, and 12-hour forecast of low-level wind shear, freezing level, mountain obscuration, IFR conditions, icing, and turbulence (Fig. 1). SIGMETs (if necessary) are also issued for the above listed hazards, as well as convection, dust, and volcanic ash.

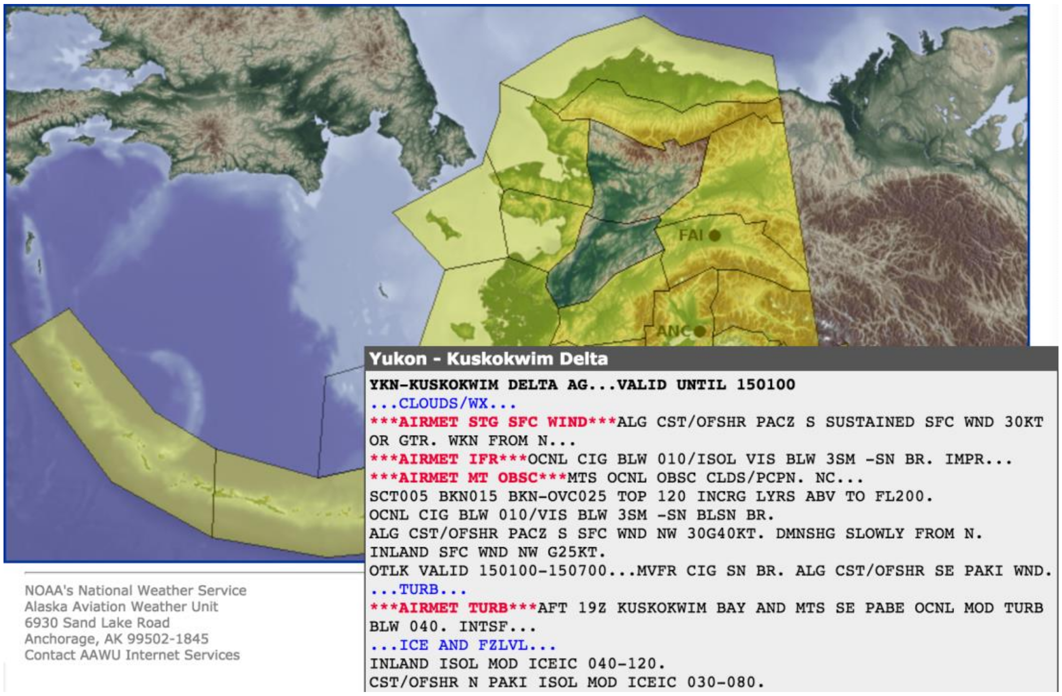

Figure 1. Sample G-AIRMET and text FA output

The SigWx charts provide a 12 and 24-hour forecast of convection, icing, and turbulence, as well as jets and tropopause heights. Flight planners, particularly those mapping flight routes over the greater Alaska region, use this information to find the safest and most cost efficient path for commercial flights and trans-Pacific flights (Fig. 2). These charts follow the same ICAO standards as those issued by the international branch forecasters at the AWC, and in fact, the AWC provides back up for these charts should the need arise.

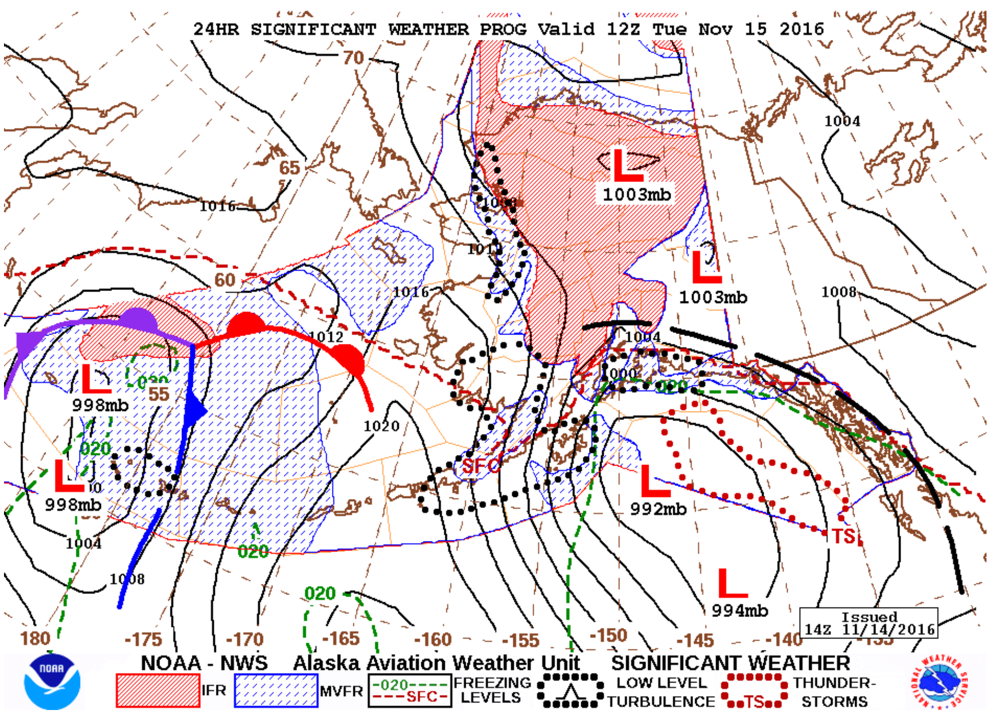

Figure 2. Sample SigWx chart for Alaska

Despite the similarities between the AAWU and AWC, the AAWU also has several additional forecast responsibilities unique only to Alaska Region. The first is the issuance of gridded prognostic forecasts. These forecasts are more detailed than AIRMETs and provide guidance on icing conditions that may exceed AIRMET thresholds and require a SIGMET in the future. Where an AIRMET provides a broad region of probable MOG icing conditions, for example, the prognostic forecasts add additional guidance within that region on frequency (isolated, occasional, or continuous) and intensity (moderate or severe). An example is shown below in Figure 3. Currently these prognostic forecasts are issued for icing, turbulence, and IFR/MVFR only.

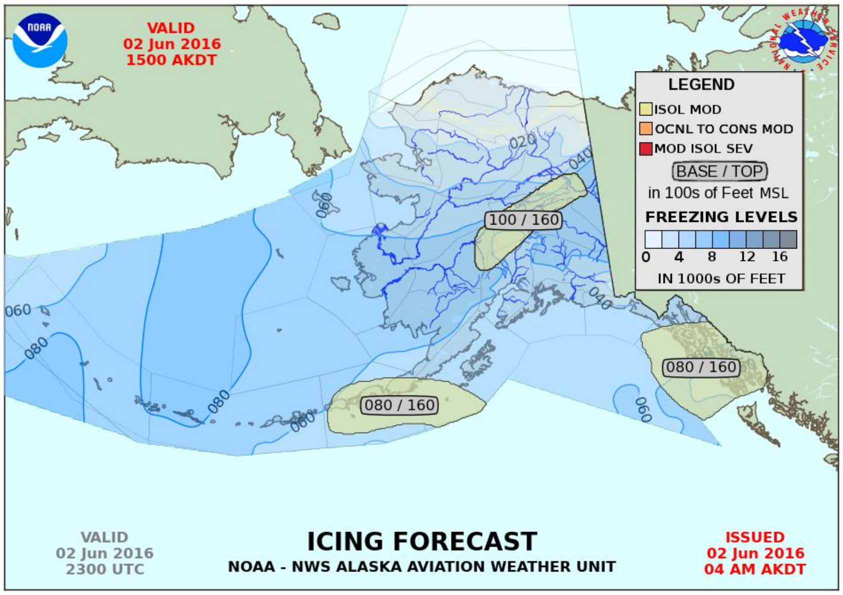

Figure 3. Sample graphical icing product in Alaska

The other forecast responsibility unique to the AAWU is its role as the Alaska Volcanic Ash Advisory Center (VAAC). There are many active volcanoes in and around the Alaska region area. In the event of an eruption or other volcanic activity, AAWU forecasters double as VAAC forecasters. They are responsible for issuing advisories on eruptions as well as the locations of spreading volcanic ash within Anchorage VAAC region. (Figure 4).

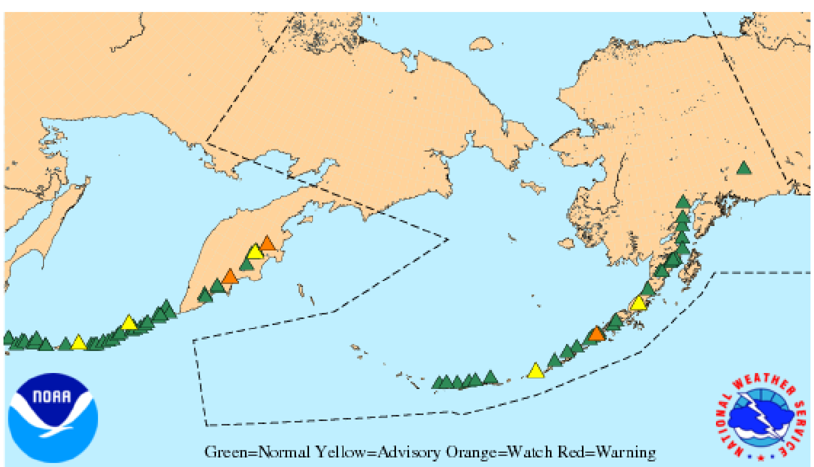

Figure 4. Sample VAAC advisory graphic of various volcanoes

Beyond these unique forecasting responsibilities, the AAWU is also different in how their products are issued. Currently, the main production platform is the Interactive Calibration of Four Dimensions (IC4D). IC4D is similar to GFE and is used to generate aviation forecast grids across the Alaska Region (Figure 5). Forecasters can manipulate four dimensions (three in space, plus time) and has also been built to produce derived fields from various aviation parameters. It does not, however, have the capability to display observations or other real time data. AAWU forecasters utilize AWIPS-2 for this purpose, ingesting all satellite and other data into D2D (Figure 5).

Herein lies another challenge of the AAWU. Alaska Region contains both the RFC AWIPS-2 system as well as the WFO AWIPS-2 system. Because of their various forecast responsibilities as both the AAWU and the VAAC, the AAWU has the capability to switch between these two configurations. As such, any new product installation must occur on both systems for consistency in operations. Alongside all of this, the AAWU also has one N-AWIPS workstation (Figure 5), on which they issue their text FA forecasters. The latter should be retired fairly soon per FAA order, and it is expected that N-AWIPS will be removed shortly thereafter.

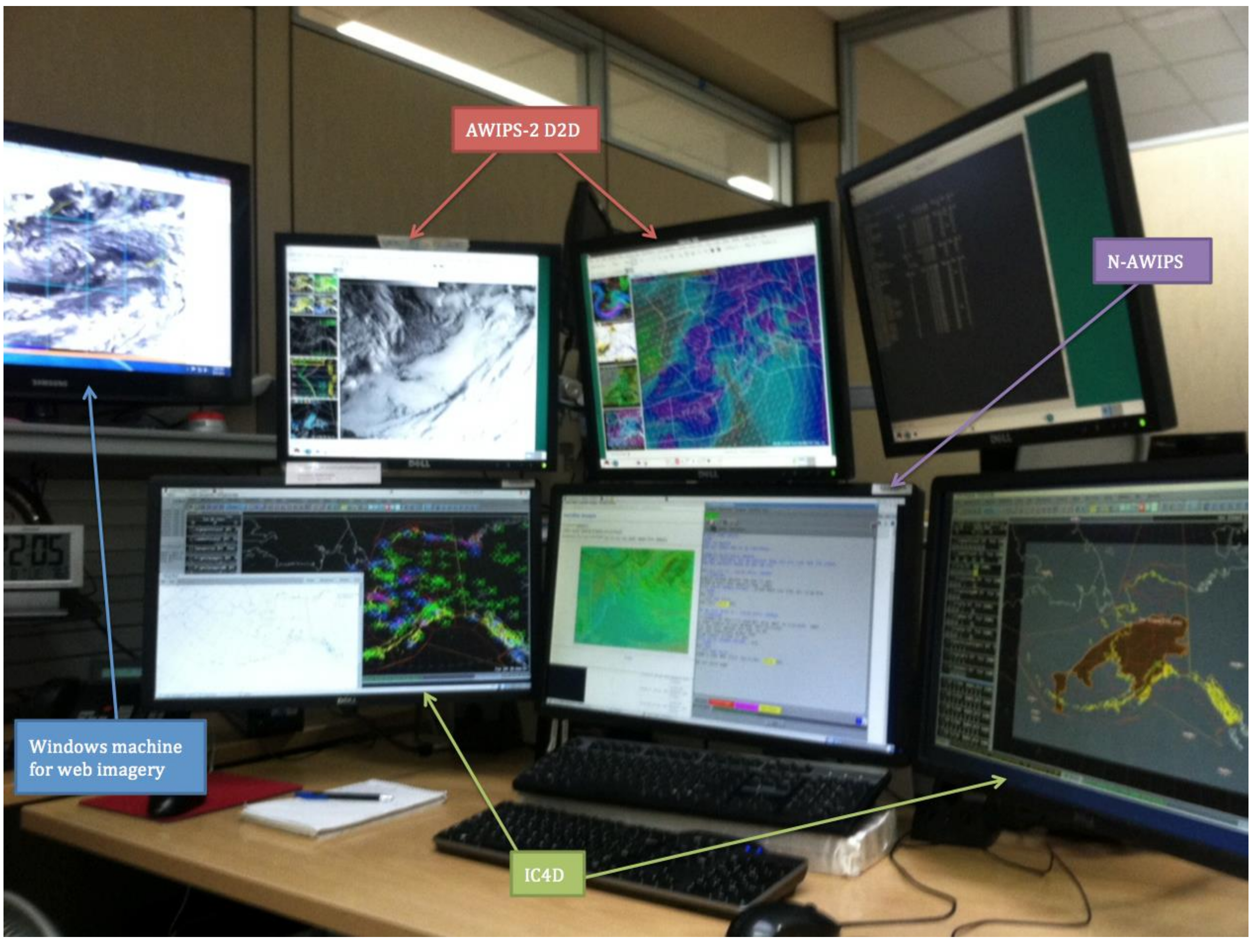

Figure 5. AAWU operational workstation containing IC4D, AWIPS-2 D2D, and N-AWIPS screens along with one Windows monitor for web displays

The 2016 demonstration and all satellite product evaluation took place in AWIPS-2 D2D. Many GOES-R/JPSS products were previously installed in the Satellite menu for Alaska Region forecasters. Given the AAWU's peripheral view of the Proving Ground in past years, forecasters requested training on those products, specifically the multitude of RGB recipes along with the Fog and Low Stratus and various Day/Night band displays. These products were examined with a focus on use in ceiling and visibility forecasts. The only new product chosen for the AAWU demonstration was the Flight Icing Threat. This product was installed on both AWIPS-2 systems and evaluated for use in the prognostic icing forecasts issued via IC4D.

Because the AAWU has no onsite liaison, training took place on a variety of platforms. Group training sessions were provided both via conference call and in person, and one on one training and discussion was conducted at the AAWU several times a year. This training was supplemented with product quick guides (provided by UAF-GINA) and multiple case study discussions on various products. Additionally, a regular phone discussion was established in between the semi-yearly in person training. This call was hosted by the liaisons and provided time for new product introduction, interesting case study overviews, direct discussion with product developers, and allowed forecasters to pose any questions, comments, or concerns they might have regarding anything satellite related in their operations. What began as a forum for AAWU forecasters slowly expanded to the CWSU forecasters, and then further to Air Force forecasters from the Joint Base Elmendorf-Richardson and the 17th Operational Weather Squadron. It has provided an extremely valuable venue in which to maintain communications with aviation weather forecasters in Alaska while also collecting feedback on a regular basis, and it is anticipated to continue into the 2017 demonstration period.

Feedback was also collected via an online Google Form. This short survey allows forecasters to jot down some quick notes about an interesting case they might have noticed during their shift or provide a more in detail evaluation if they wish. Some challenge still remains in the best way to encourage forecasters to provide this feedback given the time constraints of an operation shift. However, this method has provided useful as a way to collect thoughts in lieu of the more valuable in person discussion with forecasters and seems to slowly be improving. Ways to continually mitigate this challenge will be pursued for the 2017 demonstration.

3. GOES-R/JPSS Products Evaluated

A number of products were evaluated during the 2016 demonstration and are listed below in Table 2. Providers were the University of Wisconsin's Cooperative Institute for Meteorological Satellite Studies (CIMSS), the Cooperative Institute for Research in the Atmosphere (CIRA), NASA Langley Research Center (NASA LaRC) and NASA's Short-term Prediction Research and Transition Center (SPoRT). Baseline products, those products that are implemented as part of the GOES-R initial continuity operational product set, and Future Capabilities products, those that offer new capabilities made possible by ABI and VIIRS, were utilized in the demonstration.

The Fog and Low Stratus is a Future Capability nearing the end of the process to become a Baseline product. The VIIRS Day/Night band was also evaluated as a Baseline product. Future Capabilities products included the Aircraft Flight Icing Threat, which was new in 2016, and various RGB recipes that were previous available in AAWU operations; the Nighttime/24-hour Microphysics, the Natural Color, and the Snow/Cloud RGB.

Table 1. GOES-R/JPSS products evaluated within the 2016 Demonstration

GOES-R Demonstrated Product	**Category**
Aircraft Flight Icing Threat	Future Capability
Fog and Low Stratus	Future Capability/NOAT priority (2)
JPSS Demonstrated Products	**Category**
Aircraft Flight icing Threat	Future Capability
Fog and Low Stratus	Future Capability/NOAT priority (2)

<table>
<tr><td>VIIRS Day/Night band</td><td>Baseline</td></tr>
<tr><td>Nighttime/24-hour Microphysics</td><td>Future Capability</td></tr>
<tr><td>Natural Color and Snow/Cloud RGBs</td><td>Future Capability</td></tr>
<tr><td colspan="2">Category Definitions:
Baseline Products - GOES-R products providing the initial operational implementation
Future Capabilities Products - New capability made possible by ABI
Risk Reduction – Research initiatives to develop new or enhanced GOES-R applications and explore possibilities for improving current products</td></tr>
</table>

3.1 Aircraft Flight Icing Threat – University of Wisconsin Cooperative Institute of Meteorological Satellite Studies (UW-CIMSS) and NASA's Langley Research Center (LaRC)

The Flight Icing Threat (FIT) integrates various cloud properties from the GOES-R baseline DCOMP algorithm to generate a probability and intensity of icing conditions. It is composed of three components including (1) an icing mask available day and night which discriminates regions of possible icing, (2) an icing probability, estimated during the daytime only, and (3) a two-category intensity index which is also derived during the daytime only. While it is difficult to validate a product such as this given the lack of icing PIREPs and other methods of ice measurement, it has been shown to have skill in identifying areas of more significant icing conditions.

Unlike CONUS aviation concerns, which focus first on convection, Alaskan aviators are more concerned with such hazards as icing. Widespread thunderstorms are a rarity and the colder climate and complex terrain create an extended season in which icing is likely. For this reason, the Flight Icing Threat was chosen as a new product to introduce into AAWU operations. It was installed in both the WFO and RFC AWIPS-2 D2D systems and was generated for GOES-W and MODIS imagery, the latter imagery provided by the UAF-GINA's direct broadcast antenna.

The Flight Icing Threat was used mainly to supplement graphical icing forecasts at the AAWU's north and south desks, particularly in data sparse areas with few observations. One such case occurred on May 6th, 2016 in the North Slope area (Fig. 6). Icing conditions were expected in this region and the Flight Icing Threat index was able to detection more specific locations, particularly around Deadhorse. A number of PIREPs reporting moderate or greater icing occurred in the same area.

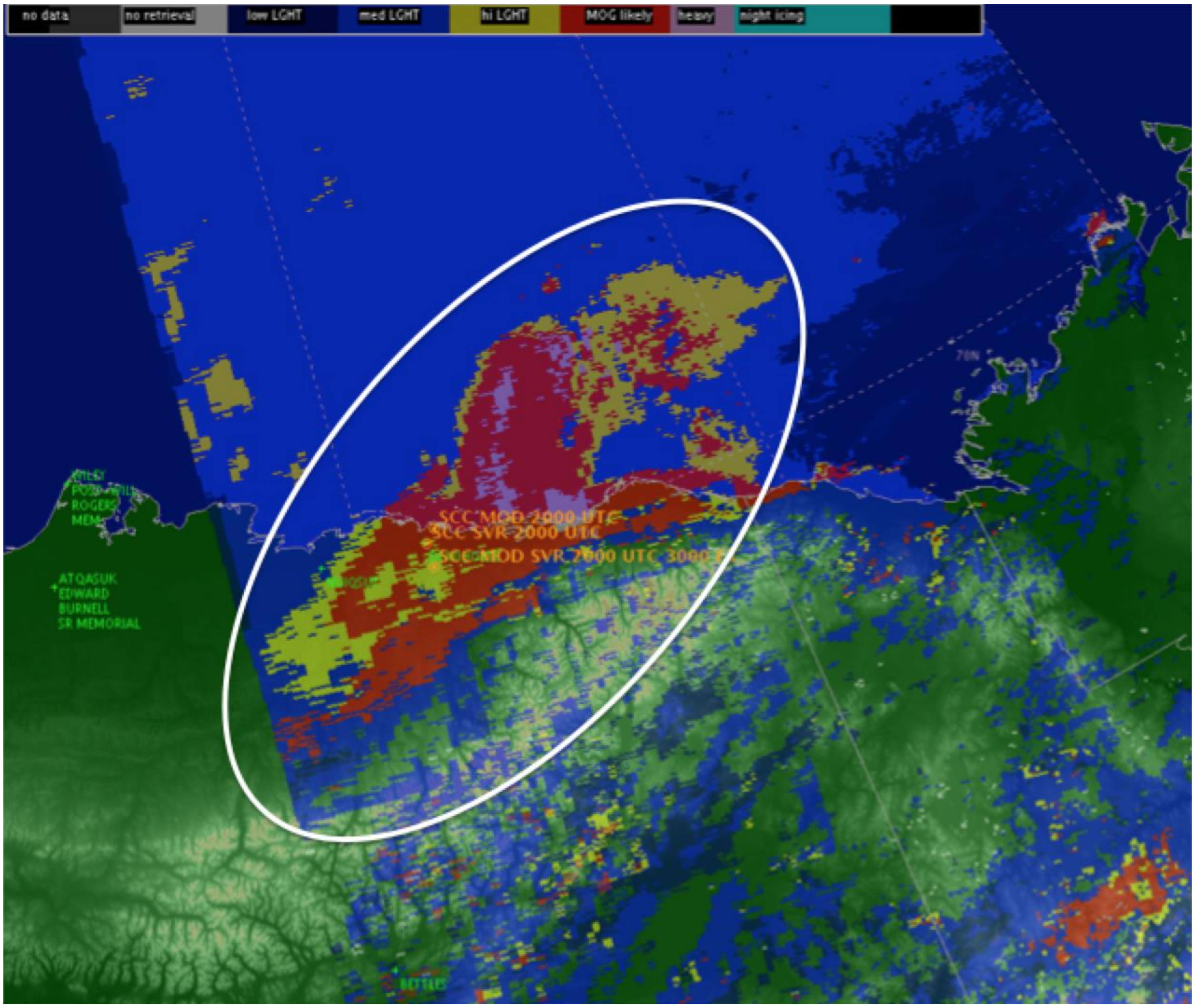

Figure 6. May 6th, 2016, Flight Icing Threat over Deadhorse, AK. Red indicates areas likely moderate or greater (MOG) icing, light icing likely in yellow, and heavy (i.e. severe) in pink. Note MOG PIREPs in the direct vicinity of the terminal corresponding with those FIT identified heavy and MOG areas.

Overall, feedback for the Flight Icing Threat was positive. Forecasters requested continued evaluation of the product and also provided some suggestions for improvement of the algorithm. Firstly, the algorithm was designed and trained in a CONUS environment. Alaska contains its own unique terrain and various mesoscale climates. The Flight Icing Threat performed relatively well but it was noted that accuracy might improve if it were better tuned to Alaska. For example, adjusting the thresholds triggering icing detection to improve intensity estimates (which tend to be overestimated in Alaska), and tuning the cloud layering to improve retrievals in multi-layer cloud scenarios (which are plentiful and frequent in Alaska).

Adding additional imagery was also suggested. GOES-W imagery is available at the 15-minute refresh rate, but the high latitudes make the product difficult to use north of Fairbanks because of extreme viewing angles. MODIS imagery is also available but the passes of the Terra and Aqua satellites are relatively limited. They are rather piecemeal at times as well due to the nature and location of the antenna hardware and processing at GINA. Forecasters requested the product also be generated on AVHRR (NOAA and MetOp) as well as VIIRS. Funding was recently awarded in order for this work to be completed and this imagery is expected to be available for installation in AWIPS-2 D2D in 2017.

A third suggestion was in the nighttime retrievals of the algorithm. Currently there are no icing intensities or probabilities available at night given the lack of optical properties. Instead it provides a 'yes/no' icing mask, simply highlighting clouds that are or are not liking to contain some icing conditions. This is useful only on a broad scale and has actually been used by some AAWU forecasters as a generic idea of where icing may be occurring. However, it is limited. This is a particular challenge in Alaska, where low sun angles in the winter result in half of Alaska being under the nighttime mask for a long stretch. While there is no easy solution to this problem, the VIIRS day/night band may provide some insight. Research will continue on exploring the day/night band for potential intensity and probability retrievals at night.

The Flight Icing Threat algorithm also contains estimates a top and base of the identified areas of icing conditions. All aviation forecasts currently require a top and base along with areas of concern, making these tops and bases particularly useful. With the ability of AWIPS-2 D2D to sample, these heights have been relatively useful for forecasters and fairly accurate even in multi-layer cloud scenarios. There was however, one suggestion regarding the aesthetics of the product. Currently the product highlights every 1000 feet up to 5000 feet, after which time it increases to increments of 5000 feet. Forecasters requested that the colormap be redesigned to continue at 1000 or 2000 foot increments up through at least 15000 feet. This would allow them to visually have a more detailed icing cloud height analysis. An improved colormap is anticipated for the 2017 demonstration period.

To supplement all of the above-mentioned improvements of the Flight Icing Threat, past case studies will be examined and provided as quick overviews. Various AAWU forecasters collected these cases over the past year and Flight Icing Threat imagery will be rerun for each and made accessible to them. Aside from continuing to familiar forecasters with the imagery, these cases studies will also provide valuable information on the performance of the algorithm over Alaska.

3.2 Fog and Low Stratus – University of Wisconsin Cooperative Institute of Meteorological Satellite Studies (UW-CIMSS)

The Fog and Low Stratus algorithm is a fused product using satellite and NWP model data from the Rapid Refresh (and GFS outside of CONUS) as predictors to quantitatively identify clouds that produce low through marginal instrument flight rule conditions (as defined by the FAA). Additionally the physical thickness of water cloud layers is estimated in the Water Cloud Thickness product and Cloud Phase is also estimated. During the day, the 0.65, 3.9, and 11 µm channels (in various ways) along with boundary layer relative humidity information from the NWP model are used as predictors (a similar approach is utilized at night without the 0.65 µm channel). Ceilometer based surface observations of cloud ceiling are used to train the algorithm. Currently these products are being produced via GOES-W and MODIS for Alaska, and are available for the AAWU in AWIPS-2 D2D.

Currently the FLS probabilities and thicknesses are used as at times as guidance when producing the flight category grids. This is of particular use in the vast data sparse areas of Alaska. Often the VIIRS Day/Night Band (DNB) is used in conjunction with the FLS as an extra level of verification. While the FLS does show improvement over the legacy 3-9-11 µm channel difference in Alaska, forecasters continue to note the struggle of the GOES-W IFR probabilities. At times the product will falsely indicated broad areas of higher IFR probabilities when there are none. This is likely associated with viewing angles of GOES-W in the high latitudes of Alaska as the MODIS FLS imagery does not experience these issues. Using the DNB as verification of the clear sky conditions in those areas revealed this issue and one such case is show below in Figure 7.

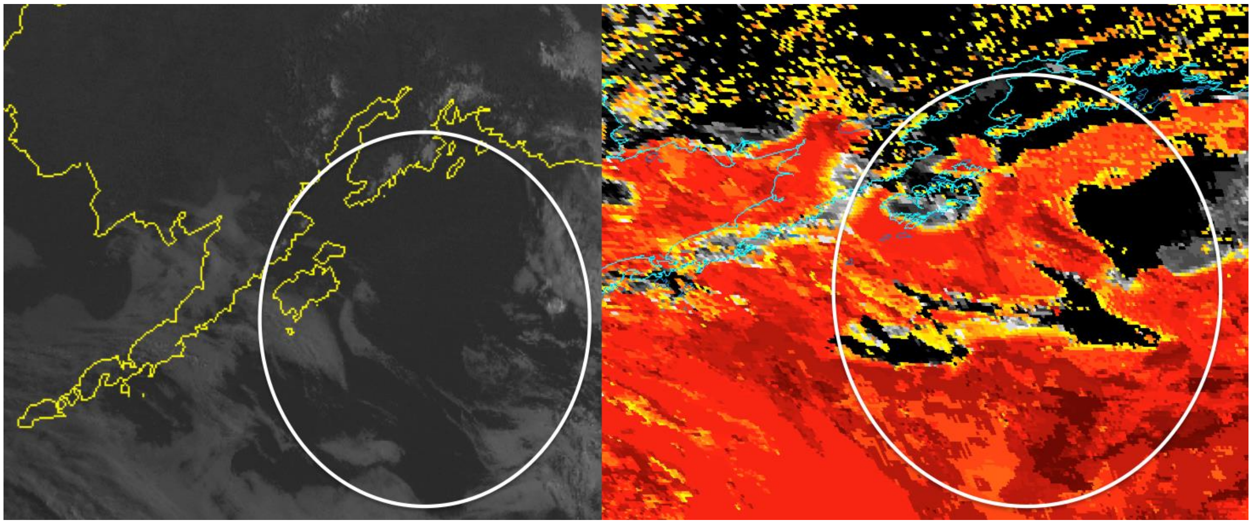

Figure 7. An example of the GOES-W FLS IFR probabilities indicating a broad area of higher probabilities (right) where the VIIRS Day/Night band shows clear sky (left). This occurred on August 30th, 2016.

The FLS has also been useful for icing conditions, specifically the Cloud Phase piece of the suite. Before the introduction of the Flight Icing Threat (and still after its inception), CWSU forecasters utilized the Cloud Phase imagery to pick out areas of supercooled or mixed phase clouds. Comparing these areas with regional soundings provided some insight into the likelihood of icing conditions and the thickness of the layer. This process will supplement the Flight Icing Threat imagery in the future.

3.3 Red-Green-Blue Composite Imagery – NASA's Short Term Prediction and Research Transition Center, Geographic Information Network of Alaska, Cooperative Institute for Research in the Atmosphere, Cooperative Institute for Meteorological Satellite Studies

The number of channels on modern satellites continues to expand with the advancement of technology. Subsequently the amount of data a forecaster must examine and attempt to absorb has morphed into the proverbial fire hose. One method to manage this flow of information efficiently is the development of Red-Green-Blue imagery. These multi-spectral products combine two or more single-channel satellite images into one product and can be specifically designed to emphasize various meteorological features such as dust or volcanic ash. By utilizing multiple channels, forecasters can take in a large amount of data in one single product, while also emphasizing certain meteorological phenomena of interest.

Alaska Aviation Weather Unit and CWSUs have a multitude of RGBs available to them within their AWIPS-2 systems, including True Color, Natural Color, Snow Cloud, Volcanic Ash, Day/Night Band Reflectance and Radiance, 24-Hour Microphysics, Nighttime Microphysics, and Dust. AAWU forecasters understand the underlying value of this composite imagery and anticipate an increase in the development of RGBs in the future. However, they also noted that true operational usefulness gets overshadowed simply by not knowing which RGB to use in which forecast situation. For example, if there were low ceilings affecting Nome, should they utilize the 24-Hour Microphysics, or True Color, or DNB?

The answer here lies in personal preferences. Each of these RGBs presents the same information, only in a different and unique way. One may appreciate the intuitive nature of a Day/Night RGB, while another might prefer the more complex multi-cloud layer identification provided in the 24-Microphysics. For this reason, AAWU forecasters simple requested consistent training on each available RGB in their operational arsenal. Proving case studies showing the use of the RGBs in various situations continually refreshes the knowledge of the imagery itself and also how to better interpret RGBs in general. During the

2016 demonstration, this training began and with encouragement from forecasters, will continue into future demonstrations.

With the inherent learning curve presented in RGBs, requiring users to become accustomed to the 'ingredients' to understand the whole, progress has been slow but steady. Shown below in Figures 8a and 8b is an example of the True Color RGB being utilized in AAWU operations.

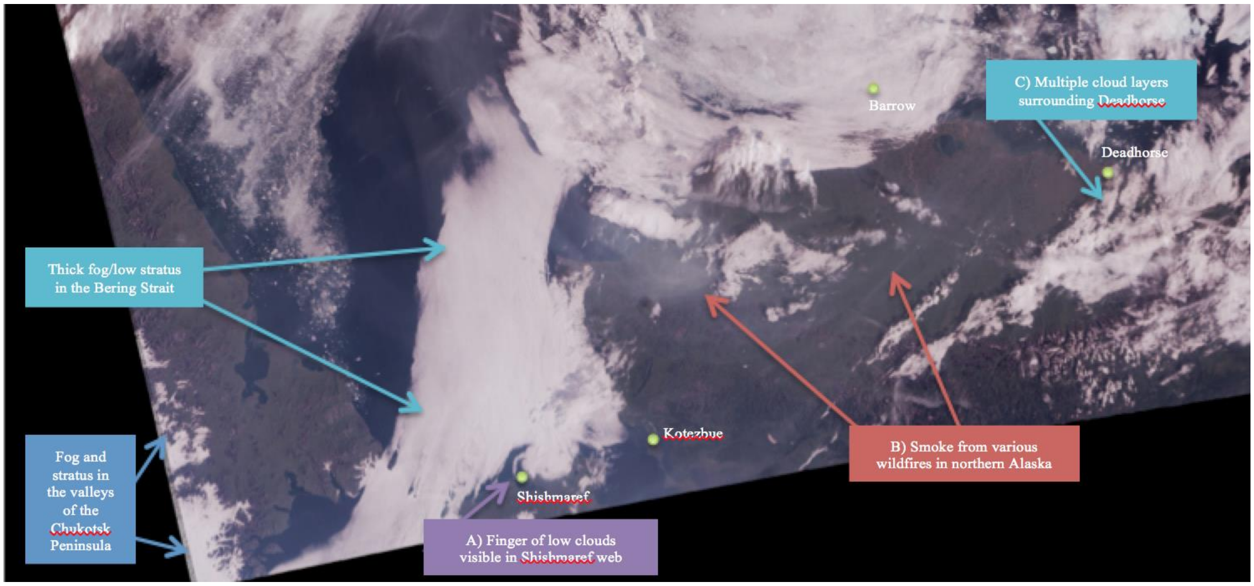

Figure 8a. True Color RGB imagery from July 7th, 2016 over northern Alaska at 1657 UTC revealing various aviation hazards monitored by AAWU forecasters. The finger of fog to the SW of Shismaref and then broader area of fog to the NW correspond to the webcams in A) below. Smoke over the North Slope corresponds to various wildfires noted on the Alaskan fire weather page in B) below. Multiple layers of clouds over Deadhorse were noted in the sounding for the same area in C) below. This image is courtesy of the GINA Puffin Feeder page.

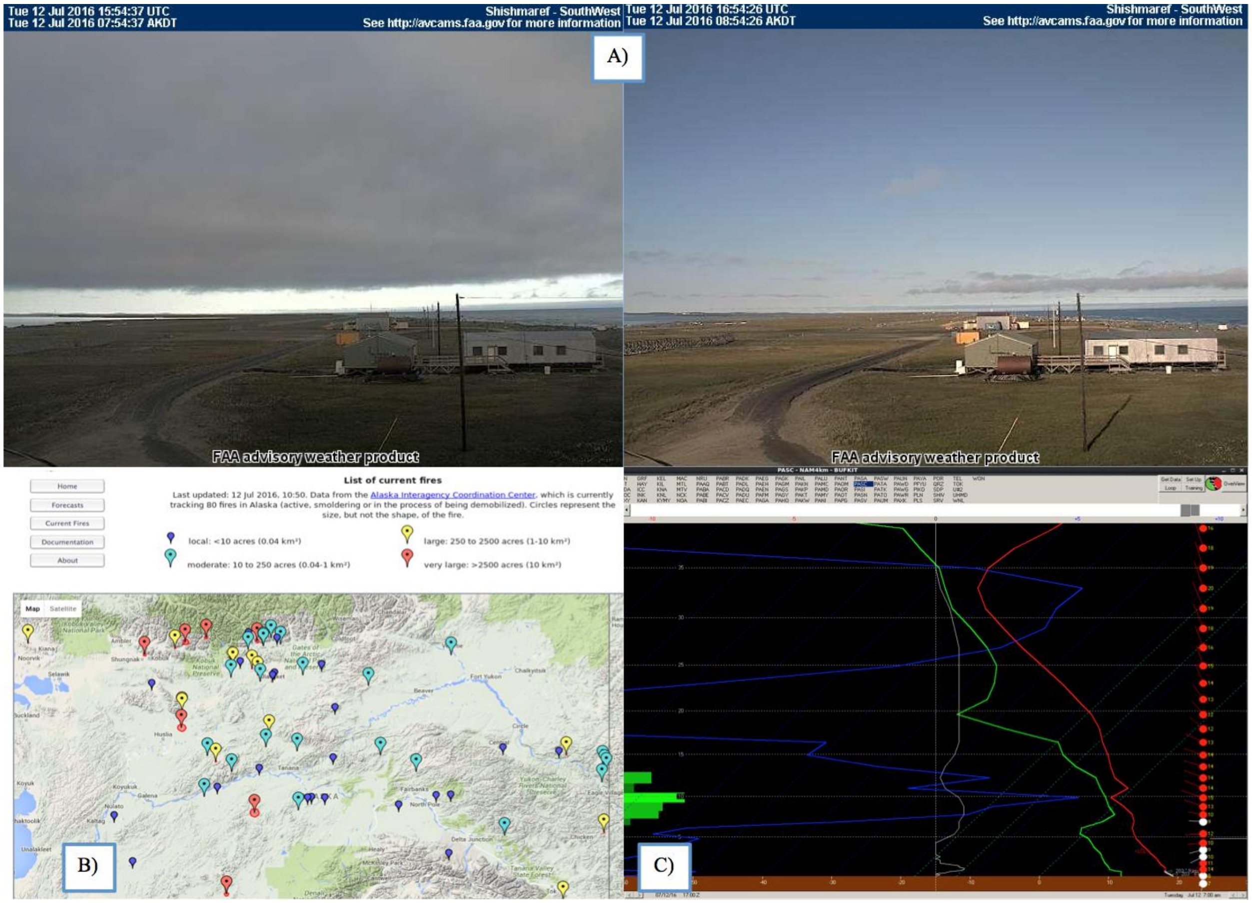

Figure 8b. A) Webcams looking SW of Shismaref. at 1555 and 1654 UTC B) Alaskan fire weather webpage showing multiple fires over northern Alaska. C) Sounding from Barrow, indicating multiple levels of clouds (noted by moist layers).

In this case, the True Color imagery was able to be used for a number of aviation hazards; fires and smoke over the North Slope of Alaska, determination of various cloud layers, including low clouds that might impact flights in and around Barrow, and low clouds in western Alaska and the Bering Straight around Kotezbue and Shishmaref.

Another RGB that is slowly becoming common practice to utilize at the AAWU is the Volcanic Ash RGB. This RGB is a version of a False Color RGB that has been specifically designed to highlight areas of volcanic ash or plumes. It is often used in conjunction with legacy 11-12 µm band difference to identify location and movement of the ash. As the AAWU doubles as the Alaska VAAC, both of these images are very valuable. Shown below in Figure 9 is an example of a case in which these images were utilized in the eruption of Kluchevskoi in the Kamchatka Peninsula of Russia.

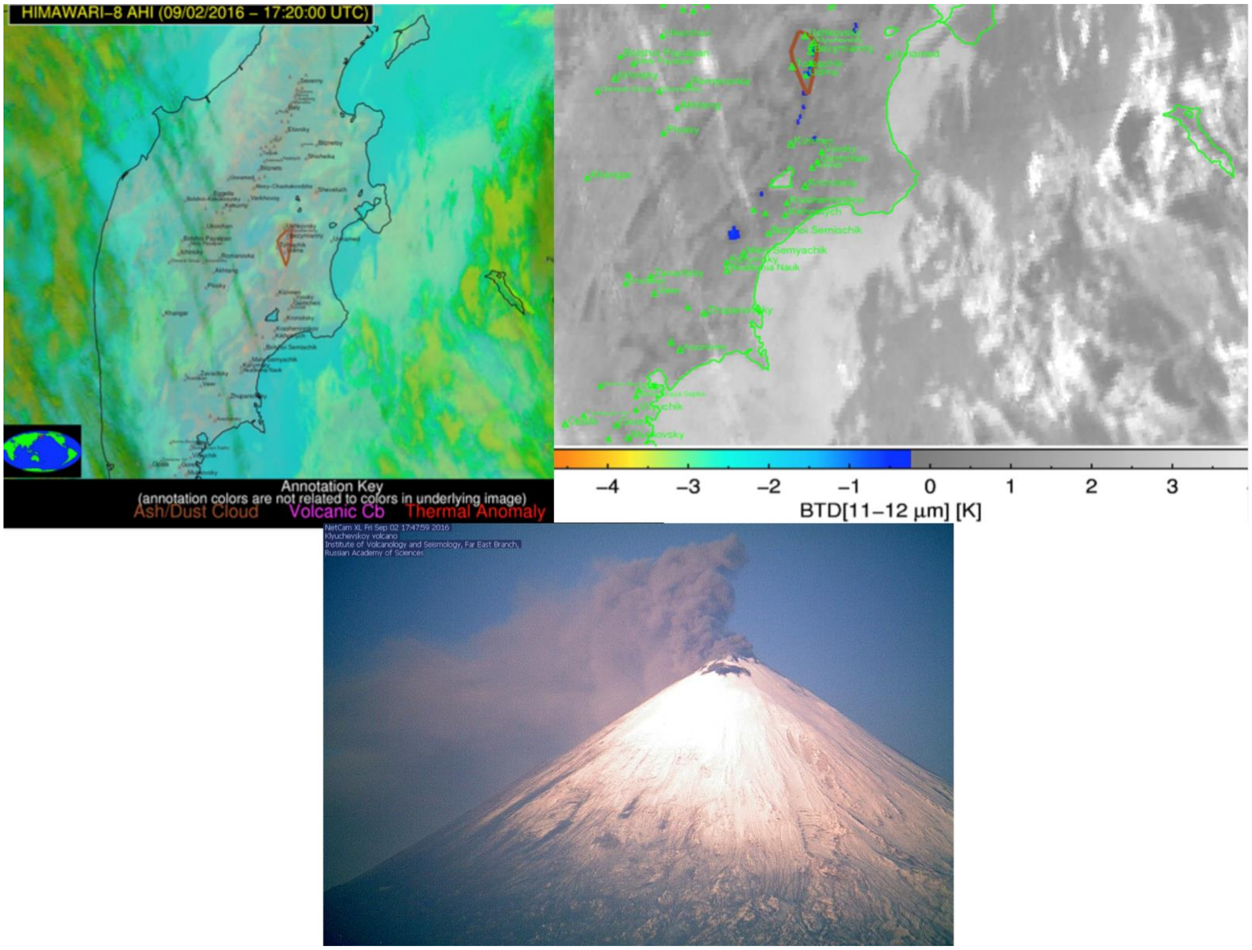

Figure 9. Eruption of Kluchevskoi in Kamchatka on September 2nd, 2016. The Volcanic Ash RGB (top left) and legacy 11-12 brightness temperature difference (top right) were utilized to forecast location and movement of volcanic ash. This was used for VAAC advisories as well as Volcanic Ash SIGMETs issued in the surrounding area. A webcam view of Kluchevskoi showed the eruption occurring at roughly the same time ash was indicated on both of the RGBs.

The Volcanic Ash is fairly intuitive. It along with those such as Dust and Snow Cloud were created specifically to better identify a single meteorological phenomenon. Others such as the True Color, 24-Hour Microphysics, and Natural Color could be used in a variety of situations. Again, it is here where the AAWU forecasters requested additional training in an effort to continually familiarize themselves with the recipes and in which situations these RGBs are best used. This training will continue in the 2017 demonstration.

The 2017 demonstration will also continue the push towards client side RGBs. As mentioned above, the selection of which RGBs to use and even the colors of the display (in some cases) becomes largely a personal preference. Additionally, forecasters have expressed an interest in being able to build and design their own RGB imagery. The continual advancement of the AWIPS-2 display system will make this possible and Alaska has been at the forefront of this effort. Instead of sending already built RGBs, Alaska systems will have the various spectral bands at their disposal. Using an AWIPS-2 D2D tool, they will be able to take these ingredients and create their own imagery combinations should they desire. Again, this would allow them to design their own imagery, generate their own color schemes (which is particularly valuable for those who are colorblind), and overall lean on their own personal preferences. It also opens the door for forecasters to become innovative in their forecast operations.

From a technical standpoint, there are several improvements in AWIPS-2 that could support the push to client side while also improving the current developer generated combinations. Firstly, forecasters recommended continued work on the sampling capability of RGBs. Some effort has been done on this already; using the sampling tool in D2D to provide the contributions of Red, Green, and Blue for each pixel. This tool would be possible only with client side RGBs, where the ingredients of each are available locally.

Secondly, forecasters have constantly lodged complaints about the state of the Satellite menu in D2D, particularly for polar RGB imagery. Being in the high latitudes gives Alaska the benefit of receiving multiple polar passes from multiple polar satellites. Imagery from VIIRS, MODIS Aqua and Terr, and AVHRR from three NOAA satellites and two European MetOp satellites, are all collected and used to generate RGBs over Alaska Region. Currently the menu contains multiple menus for multiple satellites and imagers, making it very cluttered and difficult to navigate. Additionally, while polar swaths from various satellite may occur relatively near to one another both spatially and temporally, the state of the menus require forecasters to dig through and pull the most recent images from a variety of locations.

Several solutions have been devised to create a more intuitive menu system. The most straightforward would be to simply create product specific directories for the RGBs, collecting all swaths into a single menu for each. The second, and perhaps better solution, is to create a mosaic of polar imagery. This would take the most recent polar swaths of an RGB from all of the polar satellites and create one single image. New swaths would be stitched in as they arrive, while the oldest is removed. Not only would this remove the challenge of navigating multiple menus to find the most recent imagery, it would also improve spatial coverage and provide much better temporal continuity of various cloud features. Work will continue on this effort in 2017 for RGBs as well as other polar products (such as the Flight Icing Threat).

4. Summary and Conclusions

The Alaska Aviation Weather Unit issues forecasts for a variety of aviation weather hazards in the unique climate and terrain of Alaska, while also doubling as the Alaska VAAC. The 2016 demonstration marked the first Proving Ground effort specifically tailored towards aviation operations in Alaska. It took place as a collaborative effort between the Aviation Weather Testbed in Kansas City and the High Latitude Proving Ground in Alaska Region. AAWU forecasters were the main participants and Anchorage CWSU forecasters also participated peripherally. Products evaluated were chosen based on forecaster needs and included the Flight Icing Threat, the Fog and Low Stratus, and various RGB imagery. The demonstration was a long-term evaluation from January 1st – December 31st, 2016, and included several in person visits by the AWT and HLPG liaisons.

The Flight Icing Threat was the only new product introduced. The GOES-W and MODIS versions were installed in the Alaska Region WFO and RFC AWIPS-2 D2D in spring of 2016, and forecasters from both the AAWU and Anchorage CWSU forecasters subsequently received training. Feedback was relatively consistent throughout the demonstration period and resulted in a number of valuable improvements to the algorithm over Alaska. Additionally, the collection of this feedback resulted in the successful push to gain funding. This funding will be used in the 2017 demonstration to generate the FIT products on both VIIRS and AVHRR (MetOp and NOAA).

The remaining products, the FLS and RGBs, were those that already exist in both AWIPS-2 systems, but on which forecasters requested additional and continual refresher training. This training was provided throughout the year, supplemented by various cases studies. AAWU forecasters are slowly gaining confidence in the RGB concept and are beginning to utilize them more often in operations. This has reemphasized the RGB discussion in Alaska Region regarding client-side RGBs. Now that AAWU forecasters are becoming more comfortable with RGBs, they are joining the voice of other Alaska Region forecasters supporting the desire to build their own. With the capability being built into the latest versions of AWIPS-2, it appears that this future will become a reality fairly soon. The 2017 demonstration at the AAWU will continue to explore this road.

All of the feedback in the above sections was collected in three main ways. 1) The AWT and HLPG liaison conducted biannual visits to the AAWU and Anchorage CWSU. During this time, in depth discussions were conducted with both forecasters and managers from the AAWU and CWSU. In between these visits, communication was continued through 2) a regular collaboration call and 3) an online feedback form. The collaboration call was established as an open forum to give case study overviews on events pointed out by forecasters, to provide a glimpse of potential new satellite capabilities the forecasters might be interested in, and allow forecasters to voice thoughts, questions, issues, etc., regarding their satellite operations. These calls included AAWU and CWSU forecasters, Alaskan military forecasters, and occasionally product developers. A plethora of positive feedback came out of these calls and they are anticipated to continue in 2017.

To supplement these calls, an online feedback form was provided via Google Forms. It consisted of four simple questions regarding which desk was worked, the date and region of interest, the event of interest, and any feedback forecasters might have on a particular event. This type of open-ended form was preferred by forecasters in lieu of more in depth questions because of the often-busy shift schedule. Additionally, as this was the first year of the AAWU demonstration, it allowed forecasters to re-familiarize themselves with the products available to them. While forecasters still prefer the in person discussions and forum phone calls, they did respond fairly well to the feedback form and identified some very useful cases, particularly for the Flight Icing Threat. The form will continue to be available in 2017 with some minor improvements, such as including an optional blank to include a name or email address if a forecasters wishes to receive feedback on a particular comment.

Additionally, a new goal in 2017 is to collect cases identified via this form as well as in other discussions with forecasters, and create a collection of quick case studies. These would consist of no more than seven or eight slides overviewing a case and the performance of a specific satellite product. If requested, the cases could be formatted more like an articulate presentation and contain a recording. All cases studies will be uploaded into a locale such as Google Drive, easily accessible to forecasters. This concept will be continually explored throughout 2017 and future demonstration.

5. References

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