Challenges Forecasting at
WFO Fairbanks
Part 2: Examples

OCONUS Satellite Proving Ground
June 20, 2013

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Overview

• Observational Limitations
  – Maps

• Stratus and Dense Fog
  – March 11, 2013: North Slope Dense Fog Event
  – May 4, 2013: West Coast Dense Fog Event
  – May 9, 2013: North Slope and West Coast Stratus and Dense Fog Event

• Sea Ice and Winter Weather
  – May 17, 2012: Seas Ice breakup in Norton Sound
  – November 17-19, 2012: Marine Stratus on North Slope (Jiang, et al.)

• Hydrologic – River flooding
  – May 27-30, 2013: Fort Yukon River at Galena
  – May 28-29, 2013: Koyukuk River at Hughes and Huslia

• Convective Weather
  – June 4, 2012: Hail producing Thunderstorms east of Fairbanks

• Fire Weather and Air Quality (Brader) – Smoke Plumes
  – June 16-18, 2013: Lime Hill and Moore Creek Wildfire (Anchorage CWA)
  – June 17-19, 2013: Chisana River Wildfire
• **Forecast Process**
  - Improve Numerical Models
  - Ingest new satellite data in GFE
  - Create and use GFE Smart Tools to produced better forecast product.
Observational Limitations

Public zone 205 is comparable to a medium sized CWA in the Lower 48 with only 5 RAWS sites.
Stratus and Dense Fog

• March 11, 2013: North Slope
  – Highlight the MODIS IFR probability product and the SNPP VIIRS Fog Product

• May 4, 2013: West Coast and North Slope
  – Dense fog recorded in Public Zone 207 particularly at Shismaref (PASH) and Point Hope (PAPO).
  – Highlight images of the MODIS IFR/LIFR Probability, GOES-W IFR/LIF probability, and HRPT IR images.

• May 9, 2013: West Coast and North Slope
  – VIIRS DNB provides sensitivity to reflected moonlight over winter allowing for detection of low cloud features at night.
NORTHERN ALASKA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE FAIRBANKS AK
1258 PM AKDT MON MAR 11 2013

NORTH SLOPE...THE SUOMI NPP VIIRS SATELLITE FOG PRODUCT WAS INDICATING A DECENT LAYER OF STRATUS ALONG THE NORTH SLOPE. OBSERVATIONS ACROSS THE AREA GENERALLY INDICATED 1 TO 2 MILES IN VISIBILITY WITH FLURRIES AND FOG. THE IFR CONDITIONS ALIGN VERY WELL WITH THE HIGHER PROBABILITIES OF MODIS IFR PRODUCT. THERE ARE SOME VERY ISOLATED POCKETS OF HIGHER PROBABILITIES OF THE MODIS IFR CONDITIONS. THESE CONDITIONS SHOULD REMAIN THROUGH TUESDAY EVENING OR WEDNESDAY MORNING AS THE SURFACE HIGH PRESSURE REMAINS WITHIN THE AREA. BY WEDNESDAY MORNING THE SURFACE PRESSURE GRADIENT BEGINS TO TIGHTEN...PROVIDING AN INCREASE IN WINDS AND PERHAPS A BREAK IN SOME OF THE FOG.
HRPT IR Satellite
May 4, 2013 at 1210Z
1145Z on May 4, 2013: Shismaref (Point A) and Point Hope (Point B)
Here's a great satellite view of the sea ice in Norton Sound and the Northern Bering Sea! The ice is breaking up within Norton Sound and ice is traveling through the Bering Strait.
Convective Weather

- North Pole and Chena Hot Springs Road received 0.50 size hail
- VIIRS IR brightness temperature of -64°C

SPECIAL WEATHER STATEMENT
NATIONAL WEATHER SERVICE FAIRBANKS AK
507 PM AKDT MON JUN 4 2012

...THUNDERSTORMS WITH HAIL IN THE INTERIOR...

A LINE OF THUNDERSTORMS OVER THE TANANA YUKON UPLANDS JUST NORTHEAST OF FAIRBANKS ARE CAUSING HAIL AS LARGE AS ONE HALF INCH ALONG WITH BRIEF HEAVY RAIN AND WINDS GUSTING TO 30 MPH. THE HAIL COULD COVER THE GROUND AND RAIN COULD BE UP TO ONE HALF INCH. THE HAIL AND WINDS COULD CAUSE DAMAGE. THERE HAVE BEEN NUMEROUS REPORTS OF ONE HALF INCH SIZE HAIL IN NORTH POLE AND ALONG CHENA HOT SPRINGS ROAD.

AT 500 PM THE THUNDERSTORMS WERE IN A BAND STRETCHING FROM CHICKEN TO NORTH POLE TO LIVENGOLD. THIS BAND IS MOVING WEST AT ABOUT 15 MPH AND WILL MOVE WEST ACROSS THE CITY OF FAIRBANKS IN THE NEXT HOUR.

THE THUNDERSTORMS HAVE HAD TOPS AS HIGH AS 40,000 FEET WHICH IS VERY HIGH FOR INTERIOR ALASKA THUNDERSTORMS.

SNPP VIIRS 0.64um VIS at 2341z on June 4, 2012

SNPP VIIRS 11.45um IR at 2341z on June 4, 2012
PUBLIC INFORMATION STATEMENT
NATIONAL WEATHER SERVICE FAIRBANKS AK
556 PM AKDT SUN JUL 15 2012

...FIRST THUNDERSTORM IN BARROW SINCE 2004...

A LINE OF THUNDERSTORMS DEVELOPED JUST EAST OF BARROW LATE
THIS AFTERNOON. A FEW RUMBLES OF THUNDER WERE HEARD AT THE
NATIONAL WEATHER SERVICE OFFICE IN BARROW BETWEEN 515PM AND
535PM. THE ALASKA FIRE SERVICES LIGHTNING DETECTION NETWORK
RECORDED FEW STRIKES JUST SOUTHEAST OF DEASE INLET.

THIS IS THE FIRST THUNDERSTORM AT BARROW SINCE JULY 3RD 2004.

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RT JUL 12

PUBLIC INFORMATION STATEMENT
NATIONAL WEATHER SERVICE BARROW AK
1206 PM AKDT FRI JUN 14 2013

...THUNDERSTORM OCCURRED AT BARROW...

HIGH TEMPERATURE OF 66 DEGREES HELPED FUEL
A THUNDERSTORM AT 1105 PM AKDT UNTIL 1132 PM
AKDT ON JUNE 13.

THE LAST THUNDERSTORM IN BARROW WAS JULY 15 2012
WITH A HIGH TEMPERATURE FOR THE DAY OF 65 DEGREES.

OVER THE LAST TEN YEARS MOST THUNDERSTORMS OCCURRED
DURING JULY. THE YEAR 2003 WAS THE BIG YEAR FOR
STORMS WITH ONE OCCURRING IN EACH MONTH OF JUNE...
JULY...AND AUGUST.

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DZB JUN 13
Fire Weather

- Koybuk Sand Dunes
- Nogahabara Sand Dunes
- Fire Scares
- Moore Creek and Takotna Fires
- Lime Hill Fire
- Chisana River, Edge Creek and Bruin Creek Fires
Fire Weather

Lime Hills Wildfire

June 18, 2013: Image courtesy Ivan Rinck via Alaska News Source, Lightning and growing to more than 12K acres and located 12 miles north of Lime Village

SNPP VIIRS 3.74um BT and 0.64um VIS at 2211Z on June 17th

SNPP VIIRS 3.74um BT and 0.64um VIS at 2354Z on June 17th
Chisana River Wildfire and newly Edge Creek and Bruin Creek Wildfires

June 17, 2013: Chisana River is 25K acres and grew 17K in size between June 17th and June 18th.
River Flooding

Yukon River at Ft Yukon on May 20, 2013

Ice Jam Continues to Block the Yukon River

- Light blue indicates Yukon River ice still in place down river
- Dark blue indicates extensive flooding behind ice jam

Credit: NASA/GSFC, MODIS Rapid Response May 20, 2013 (Image is enhanced to highlight flooding)

SNPP VIIRS 0.64um VIS at 2255Z on May 19th

SNPP VIIRS 0.64um VIS at 2056Z on May 20th
River Flooding

Flood Warnings in Effect for Galena, Koyukuk, and Nulato on the Yukon River

River Watch Team Report:
- As of 9pm yesterday, the entire ice jam was moving downstream with the ice stretched from Bishop Rock and Galena.
- The highest water was with the heavy run of ice and estimated moving down Yukon River past Koyukuk and Nulato through the morning.

Galena
- Major flooding continues with water up to 6 feet deep.
- Water levels will slowly fall.

Koyukuk
- Water will continue to rise through the morning.
- Some houses and low lying areas of Koyukuk will be flooded.

Nulato
- Water levels will continue to rise through the afternoon.
- Houses and roads in low lying areas of Nulato will be flooded.

Know BEFORE You Go!
Stay Tuned for Weather Updates:
www.weather.gov/fairbanks

Image from May 29, 2013 from the Suomi NPP VIIRS Satellite
River Flooding

May 27, 2013 at 2026Z

May 27, 2013 at 2205Z

SNPP VIIRS 1.61um Reflectance
River Flooding

May 27, 2013 at 2347Z

May 28, 2013 at 1512Z

SNPP VIIRS 1.61um Reflectance
River Flooding

May 28, 2013 at 007Z

May 28, 2013 at 2146Z

SNPP VIIRS 1.61um Reflectance
River Flooding

SNPP VIIRS 1.61um Reflectance

May 28, 2013 at 2327Z

May 29, 2013 at 2308Z

Hughes Ruby Huslia Nulato Koyukuk Galena Kaltag
• Limited numerical weather guidance and can be poor:
  – Temperatures – Models handle the best among other elements, but models and guidance struggle in winter and year-round with minimum temperature.
  – Dew Point Temperatures and Relative Humidity – all guidance is poor.
  – QPF – NAM12 is overdone and GFS40 is underdone for winter time precipitation. However, the models tend to do better in winter season due to the synoptic scale events.
Forecast Process: GFE Tools

- GFE Smart Tools and Ingest Satellite Data
  - Sky Grid Element
    - use latest satellite data for short/near term forecasting and interpolate to synthetic satellite imagery
      - KEY is good modeling of RH field!
  - Wx Grid Element
    - better methods using satellite data to generate Fog and Stratus weather grid.
Forecaster Comments/Questions

• Looping images from polar orbiting satellites are great, but need to be able to distinguish the real satellite image from the blended ‘reality’ images.

• *Water Vapor Imagery previously taught was not useful for 60N due to paralax or other issues. Still the case?*

• SNPP VIIRS VIS/IR channels are very useful!
  – *How accurate are the temperatures in IR Channel?*

• HRPT images over the pole are very useful for tracking storms and stratus/fog in that data void region.
  – *Does the IR images have issues with temperatures?*

• GOES products: This seems to be the most useful tool due to the animations, but have limitations due to the latitude.
  – *Many of these the paralax issues have may have been overcome with computer software....what are limitations to keep in mind?*