



JPSS Proving Ground and Risk Reduction

Responding to Real-World Severe Weather Events!

10th Annual Symposium on Future Operational Environmental Satellite Systems
5 Feb 2014

Bill Sjoberg

Global Science & Technology Contractor to the JPSS Program



Outline

- Introduction
- JPSS Proving Ground and Risk Reduction (PGRR) Background
- PGRR Project Details
- PGRR Program Highlights



JPSS Proving Ground and Risk Reduction (PGRR) Background



NOAA Mission

NOAA'S MISSION

Science, Service, Stewardship

- To understand and predict changes in climate, weather, oceans and coasts
- To share that knowledge and information with others, and
- To conserve and manage coastal and marine ecosystems and resources

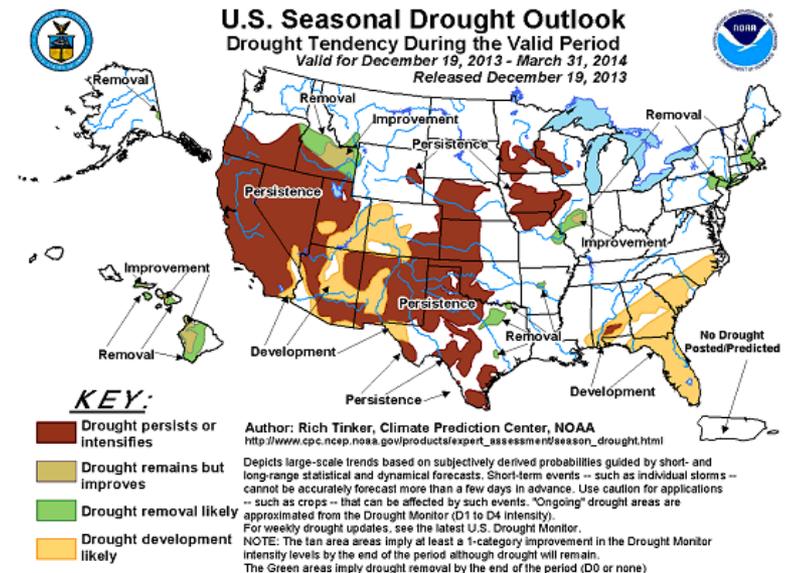
NESDIS MISSION

Dedicated to providing timely access to global environmental data from satellites and other sources to promote and enhance the Nation's economy, security, environment and quality of life:

- Acquires and manages the Nation's environmental satellites
- Operates the NOAA National Data Centers
- Provides data and information services including Earth system monitoring
- Performs official assessments of the environment and conducts related research

Information Drives Decisions

- A bad environmental decision can impact lives, property and segments of the economy for years.
- What if there were no weather warnings or forecasts, tsunami and flood alerts, fire and drought reports and predictions, ice monitoring or harmful algal bloom assessments?
- Better information is usually tied to better observations, modeling and computer resources.
- Decision support tools are essential and information must be easy to comprehend.





JPSS Proving Ground and Risk Reduction

Background

- The PGRR Program was established in 2012, following the launch of the Suomi National Polar Partnership (SNPP) satellite.
- Nearly 100 proposals went through a rigorous user-led selection - over 30 projects selected for funding.
- These projects have been instrumental in assisting NOAA users in their efforts to evaluate new JPSS capabilities in an operational environment.
- Project leads work with the users to determine how best to use new JPSS data, and to quickly transition these capabilities to operations.
- Based on the success of the PGRR Program additional work was funded in 2013



PGRR Project Details



JPSS Proving Ground and Risk Reduction Background





JPSS Proving Ground and Risk Reduction Projects

Principal Investigator	PI Office	Title
Dr. William Blackwell	MIT (Students at CIRA, CIMSS and CICS)	NAST-M Campaign Support
Dr. Sid Boukabra Dr Jim Jung	STAR	JCSDA - improvements to data assimilation
Dr. Chris Brown	STAR/CICS	Comparison of 4DVAR and LETKF in Assimilating JPSS-derived Sea-surface Temperature in the Chesapeake Bay Operational Forecasting System
Dr. Naira Chaouch	STAR/CREST	River and Lake Ice mapping using NPP/JPSS VIIRS sensor To support NOAA NWS
Dr. Bernie Connell	STAR/CIRA	CIRA Support of NOAA's Commitment to the Coordination Group for Meteorological Studies: Enhancing the Virtual Laboratory
Dr. Ivan Csiszar	STAR/CICS	A rapid delivery system of enhanced VIIRS active fire data for fire management and fire weather applications
Dr. Mark DeMaria	STAR/CIRA	Application of JPSS Imagers and Sounders to Tropical Cyclone Track and Intensity Forecasting
Dr. Mark Eakin	STAR	Application of NPP and JPSS for High-Resolution SST and Coral Bleaching Products for Resource Management
Dr. Alex Gilerson	STAR/CREST	Development of Neural Network algorithms for retrieval of chlorophyll-a in the Chesapeake Bay and other coastal waters based on JPSS-VIIRS bands
Dr. Irina Gladkova	STAR/CREST	Combining JPSS with Geostationary Imager data for Fused Earth Observation Parameters (Vegetation Index products)
Dr. Andy Harris	STAR/CICS	Assimilation of VIIRS SSTs and Radiances into Level 4 Analyses
Dr. Andy Heidinger Dr Andy Walther	STAR/CIMSS STAR/CIRA	Advancing Nighttime VIIRS Cloud Products with the Day/Night Band
Dr. Allen Huang	UW	Community Satellite Processing Package
Kent Hughes	STAR	Global VIIRS Ocean Color Pre-Operational User Expansion, User Specified Independent Quality Assessment, Product Development/Support, and Next Generation Distribution Portal Deployment

Principal Investigator	PI Office	Title
Dr. Eugenia Kalnay	UMD	QC JPSS data assimilation (Use of LETKF sensitivity to improve QC of data from JPSS polar orbiting instruments and to detect the origin of the NCEP "5-day forecast skill dropouts")
Dr. Jeff Key	STAR/CIMSS	Development, Generation, and Demonstration of New JPSS Ice Products in Support of a National Ice Center JPSS Proving Ground and Risk Reduction Activity
Dr. Shobha Kondragunta	STAR	Application of NPP/VIIRS Fire and Aerosol Optical Thickness (AOT) Products as Evidence for EPA's Exceptional Events (EEs) Rule (Alaska Region focus)
Dr. Jun Li	STAR/CIMSS	Near real-time assimilation system development for improving tropical cyclone forecasts with NPP/JPSS sounder measurements
Dr. Huan Meng	STAR/CICS	ATMS Derived Snowfall Rates to Support Weather Forecasting
Dr. Paul Menzel	STAR/CIMSS	Scientific Support and Concept Study to Extend HIRS Clouds with CrIS
Dr. Steve Miller	STAR/CIRA	'Seeing the Light': Exploiting VIIRS Day/Night Band Low Light Visible Measurements in the Arctic
Dr. Ralph Petersen	STAR/CIMSS	Improving very-short-range forecasts for the NWS Alaska Region using objective tools designed to optimize the retention of Hyperspectral Infrared and Microwave Moisture LEO Soundings
Dr. Hank Revercomb (Daniel Tobin)	STAR/CIMSS	Scan His Campaign Support
Dr. Donglian Sun	STAR	Application of NPP/JPSS Data for Enhanced Flood Mapping and Inundation Area Estimates



JPSS Proving Ground and Risk Reduction Projects

Principal Investigator	PI Office	Title
Dr. Daniel Tong	STAR	Development and validation of a marine Isoprene emission product for the US National Air Quality Forecasting Capability (NAQFC)
Dr. Elizabeth Weisz (Bill Smith)	STAR/CIMSS	Hyperspectral Retrievals from Polar-Orbiting Sounders for Use in the NWS Alaska Region Forecasting Applications
Dr. Fuzhong Weng	STAR	Improve Hurricane Structure Monitoring and Intensity Forecast Using NPP ATMS and GCOM-W AMSR2
Dr. Fuzhong Weng	STAR/CICS	Global Satellite InterCalibration System (GSICS)
Dr. Bob Yu	STAR	Monitoring Land Surface Vegetation Phenology from VIIRS
Dr. Jerry Zhan	STAR/CICS	Enhance Agricultural Drought Monitoring Using NPP/JPSS Land EDRs For NIDIS
Ingrid Guch	STAR	STAR FEE
Dr. Tom Heinrichs	GINA	High Latitude Proving Ground - Improving forecast and warnings by leveraging GOES-R investment to deliver and test NPP/JPSS data in support of operational forecasters
Dr. Rich Jefferies (Spangler)	COMET	The COMET Program Spending Plan for FY13 Activities
Dr. Pingping Xie	CPC	Infusing JPSS PMW Retrievals to CMORPH Precipitation Estimates for Improved Weather, Climate, and Water Applications
Tom Schott (Walter Wolf)	OSD	JPSS Risk Reduction VIIRS ABI algorithms
Dr. Howard Diamond	NCDC	Howard University Support of NOAA's commitment to the Global Climate Observing System (GCOS) Reference Upper Air Network (GRUAN)
Dr. Chris Elvidge	NGDC	Estimating flared gas volumes and CO2 emissions with VIIRS data

Principal Investigator	PI Office	Title
Dr. Cara Wilson	NMFS	Facilitating end-user access to VIIRS data
Dr. Nancy Baker	NRL	NRL/JPSS Coordinated Assimilation of CrIS/ATMS Observations from NPP and ATMS Calibration/Validation
Dr. Jeff Hawkins Dr. Tom Lee	NRL	Education and Training for the NPP/JPSS Missions
Dr. Jeff Hawkins Dr. Arunas Kuciauskas	NRL	Using the Next Generation Satellite (NexSat) Webpage to Demonstrate and Apply NPP Sensor Products During the NPP/JPSS Missions
Dr. Gary Jedlovec	NASA	SPORT Proving Ground Support
Dr. Allen Larar	NASA	NAST-I Campaign Support
Ferraro (NOAA/STAR), Meng (NOAA/STAR), Rudlosky (NOAA/STAR), Kuligowski (NOAA/STAR), Xie (NOAA/NWS), Mahoney (NOAA/ESRL), Cifielli (NOAA/ESRL), Gourley (NOAA/NSSL), Kongoli (CICS), Wang (CICS)		Linking the GPM PG with NOAA's HMT to demonstrate and evaluate multi-sensor precipitation products
Csiszar (NOAA/STAR), Schroeder (UMD), Lorenz (DLR), Rucker (ZEBRIS)		Scientific Exchange Between DLR/Berlin and NESDIS/STAR Fire Scientists Using the German FireBird Small Satellite Constellation in Support of GOES-R/ABI and Suomi NPP/VIIRS Fire Product Validation
Key (NOAA/STAR), Heinrichs (NWSFO - AK)		Collaboration with NWS Alaska and UA-Fairbanks on JPSS Snow and Ice Products for Operations and Research
Liu (CIMSS), Miller (CIRA)		Studying Arctic sea-ice with the VIIRS Day/Night band low light visible measurements



PGRR Program Highlights



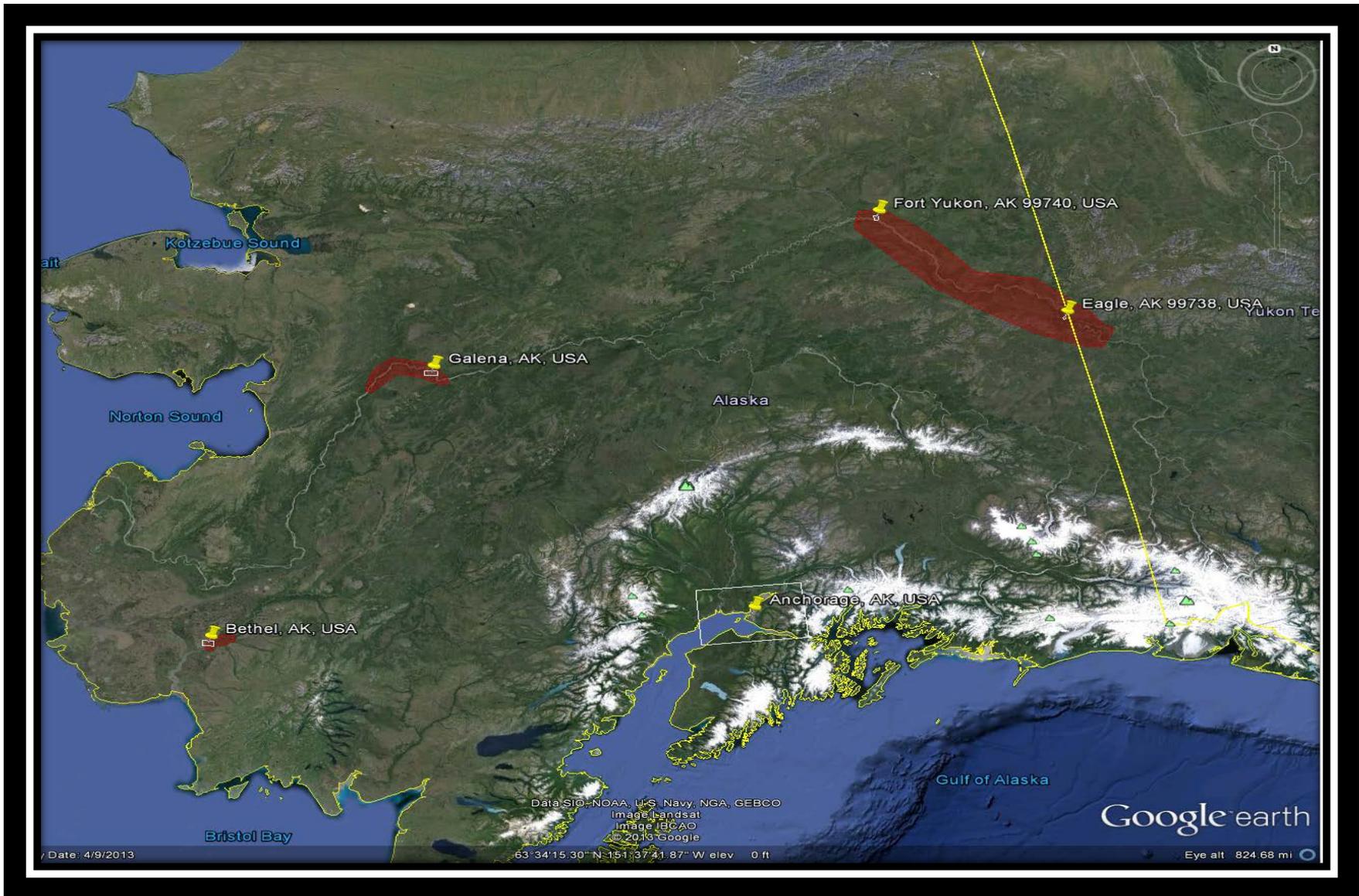
River Ice and Flooding Product Initiative

Background

- Stakeholders
 - CCNY – River Ice Product
 - GMU – Flooding Product
 - CSPP – Direct Broadcast
 - GINA – Facilitate support to AK and provide counsel to North Central Region
 - NWS Alaska and Pacific River Forecast Center (APRFC)
 - NWS North Central River Forecast Center (NCRFC)
- The JPSS, CCNY, and GMU team engaged the APRFC during the Galena Flood May 2013 and provided information on PG River Ice and Flooding Products
- JPSS had further discussions about these products with APRFC at 2013 OCONUS Meeting
- Strong APRFC support for a formal River Ice and Flooding Product initiative resulted in NCRFC joining the initiative



Alaska Pacific River Forecast Center Areas of Interest



Alaska Pacific River Forecast Center

Areas of Interest

Eagle (Yukon River), 11/07/2013



- Local Forecasts by City, State, Zip
- Rivers & Hydrology
- River conditions
- Forecasts & Info
- Quick Briefing
- 48hr Flood Pot
- 5-Day Flood Outlook
- Nat'l AHPS page
- Precip & Weather
- Observed Precip
- Precip Analysis
- Forecast Precip

River Notes Database Search Results

These are unofficial remarks which may not have been quality controlled.

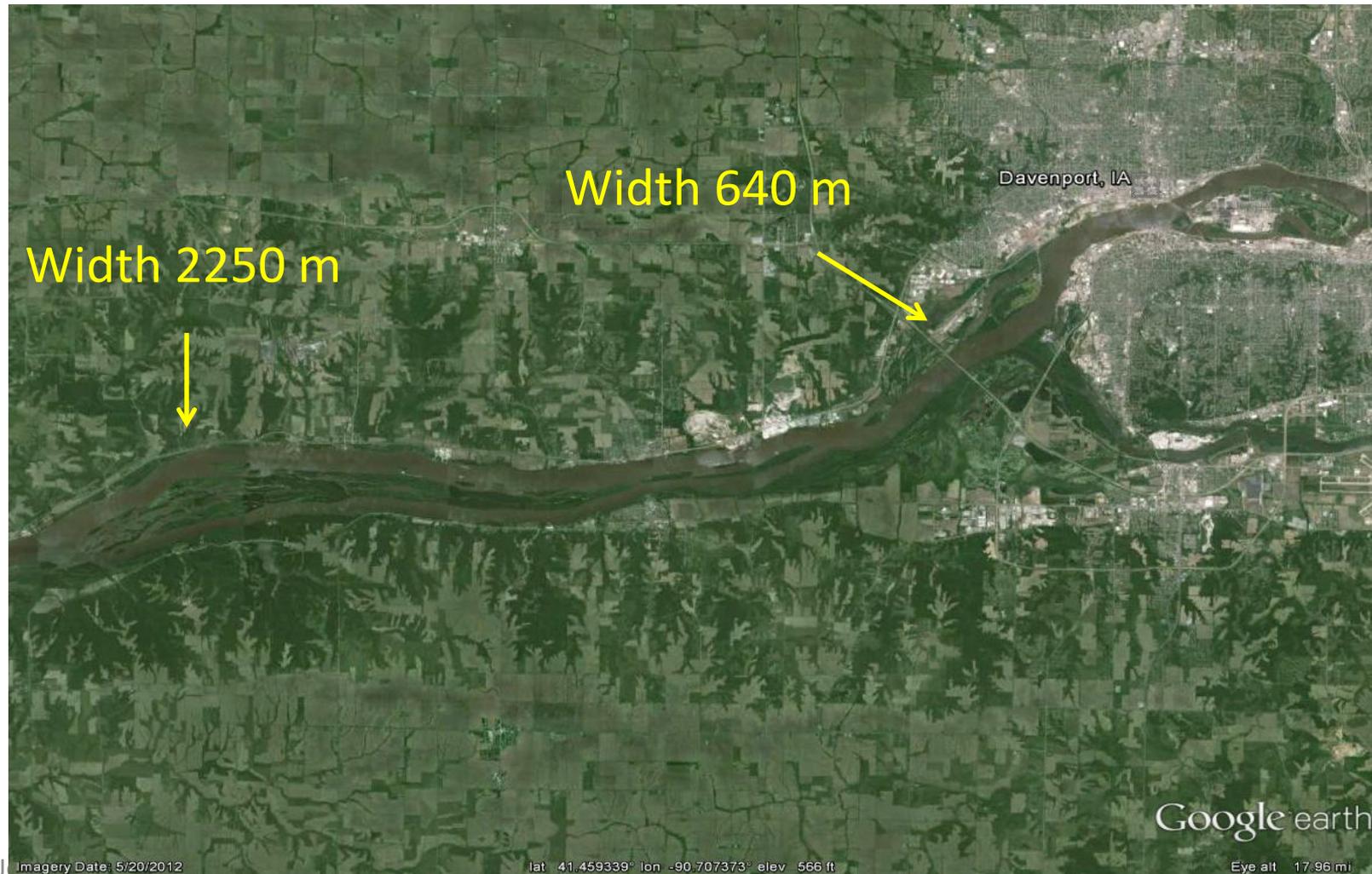
Number of records found: 50

Date	Time	River	Location	Remarks - Pirep Times in UTC (-Shrs for ADT)
2013-11-07	16:00:00	Yukon	Eagle	EGLA2 - Ice flows continue...no more river gauge readings until spring.
2013-11-04	16:00:00	Yukon	Eagle	no ice in the river
2013-10-31	16:00:00	Yukon	Eagle	no ice flowing



North Central River Forecast Center

Mississippi River at Davenport, IA

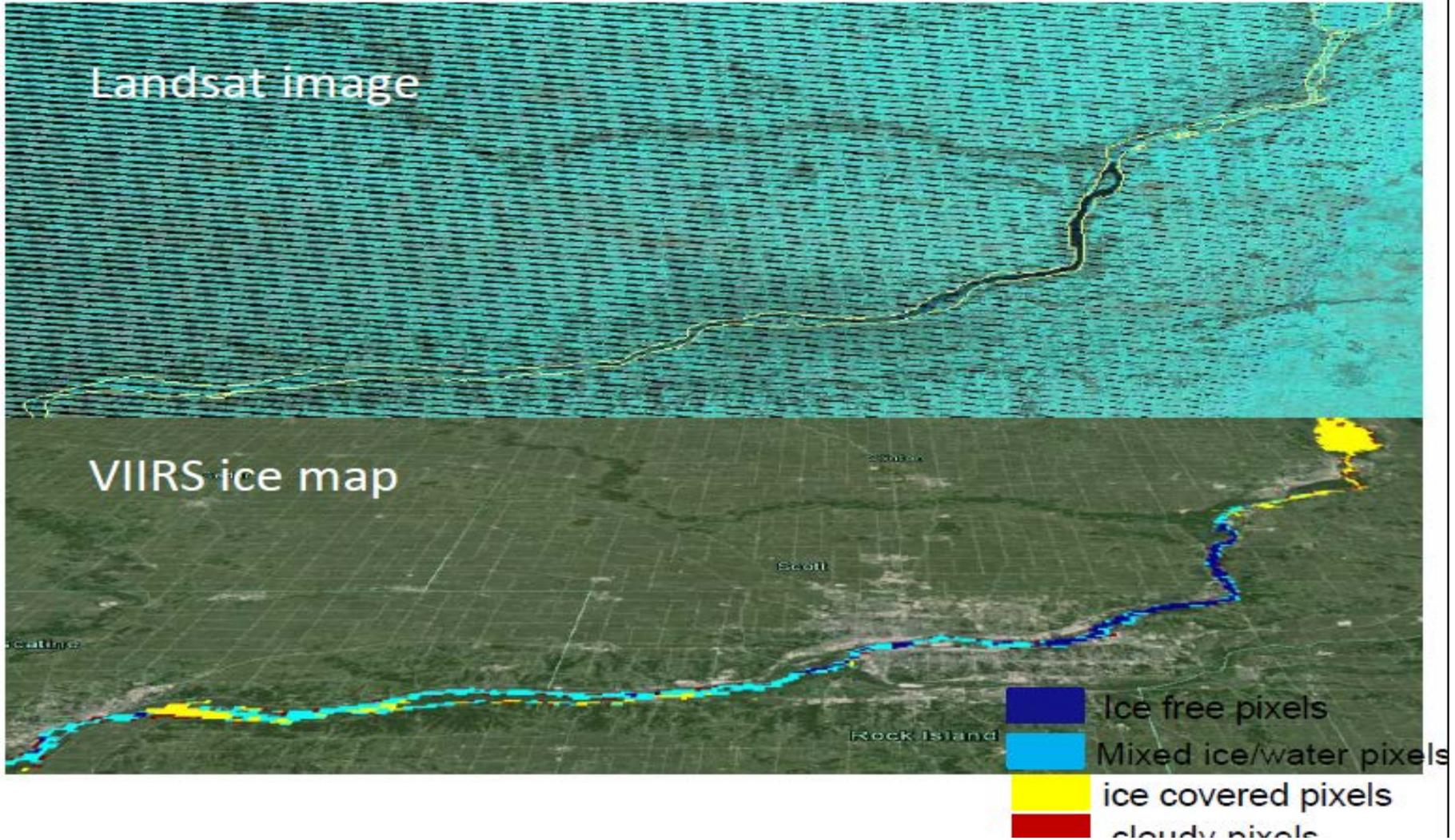




North Central River Forecast Center

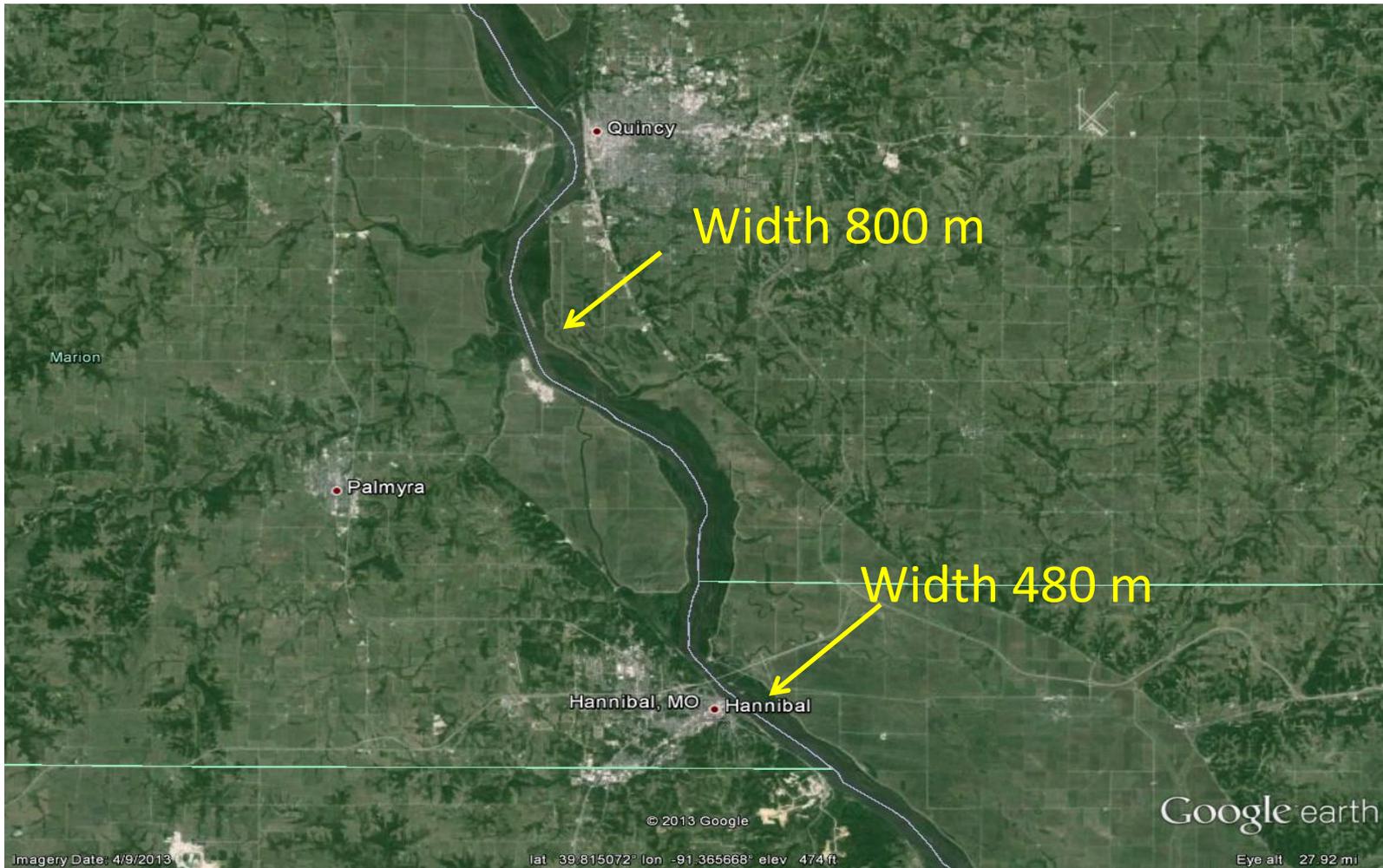
Mississippi River at Davenport, IA

Davenport, 01/25/2014



Mississippi River at Hannibal, MO

Channel Width 480 meters

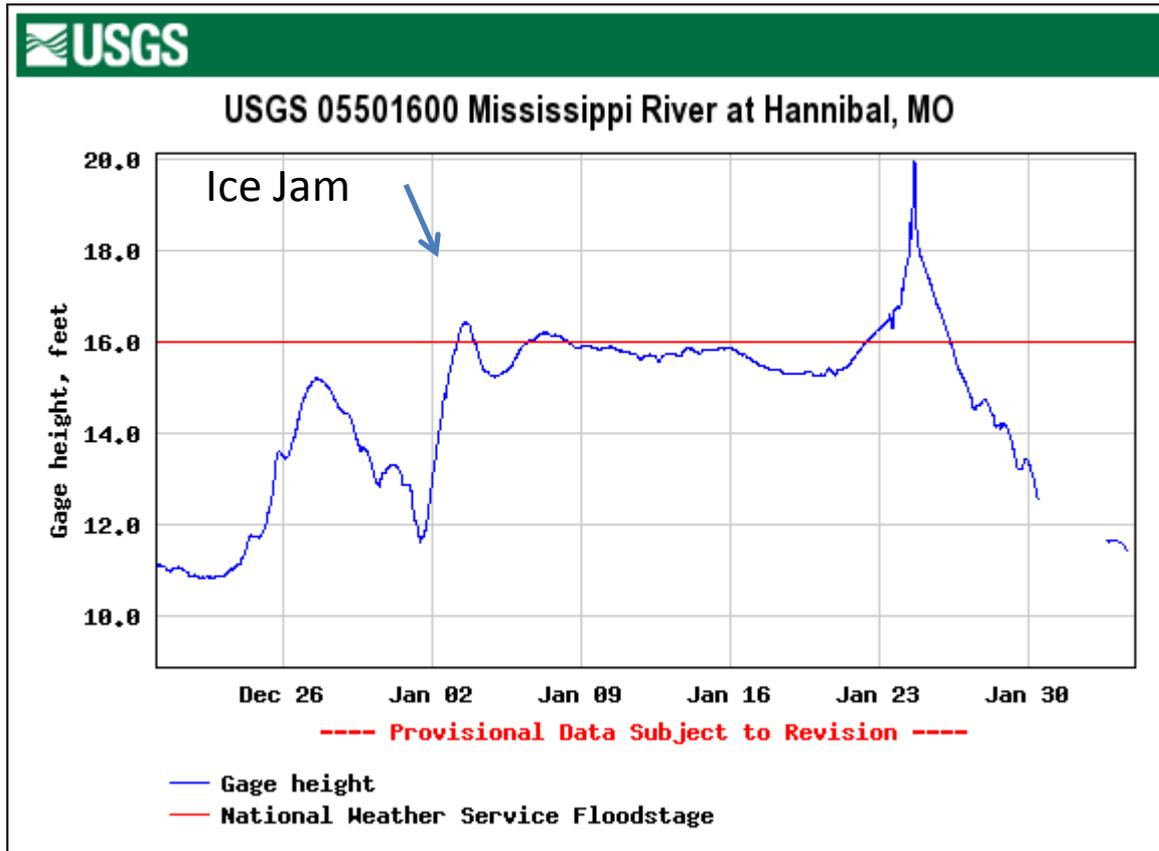




Mississippi River at Hannibal, MO

Channel Width 480 meters







Extent of Colorado Floods on Sep. 17, 2013 observed by Suomi NPP/VIIRS (note product still under evaluation)



(note product still under evaluation)

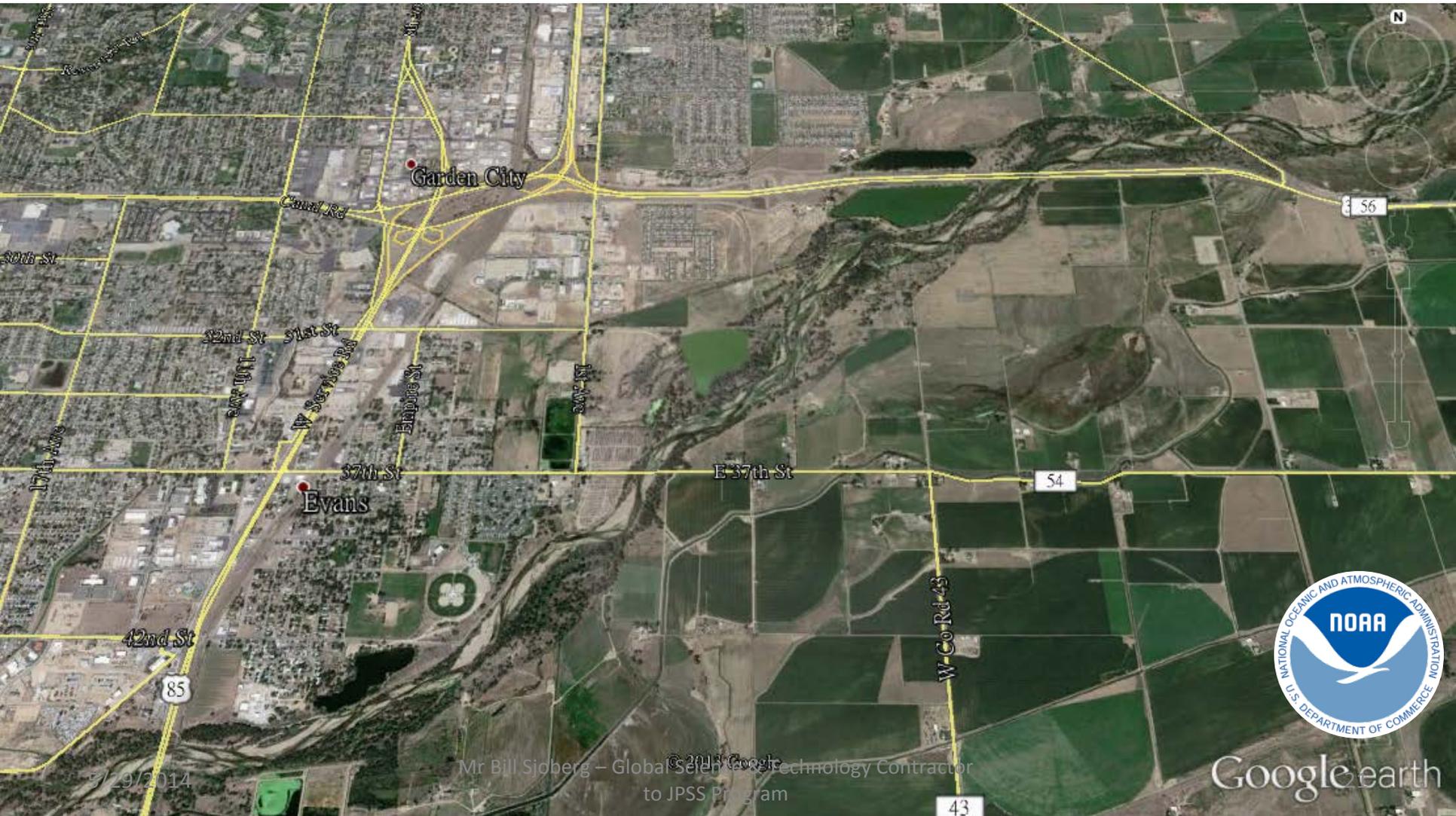


Image Landsat
5/29/2013
Mr. Bill Sjoberg - Global Earth Observation Technology Contract
to JPSS Program

Google earth



Before flooding near Evans and Garden City



5/29/2014

Mr Bill Sjoberg – Global Search Technology Contractor to JPSS Program

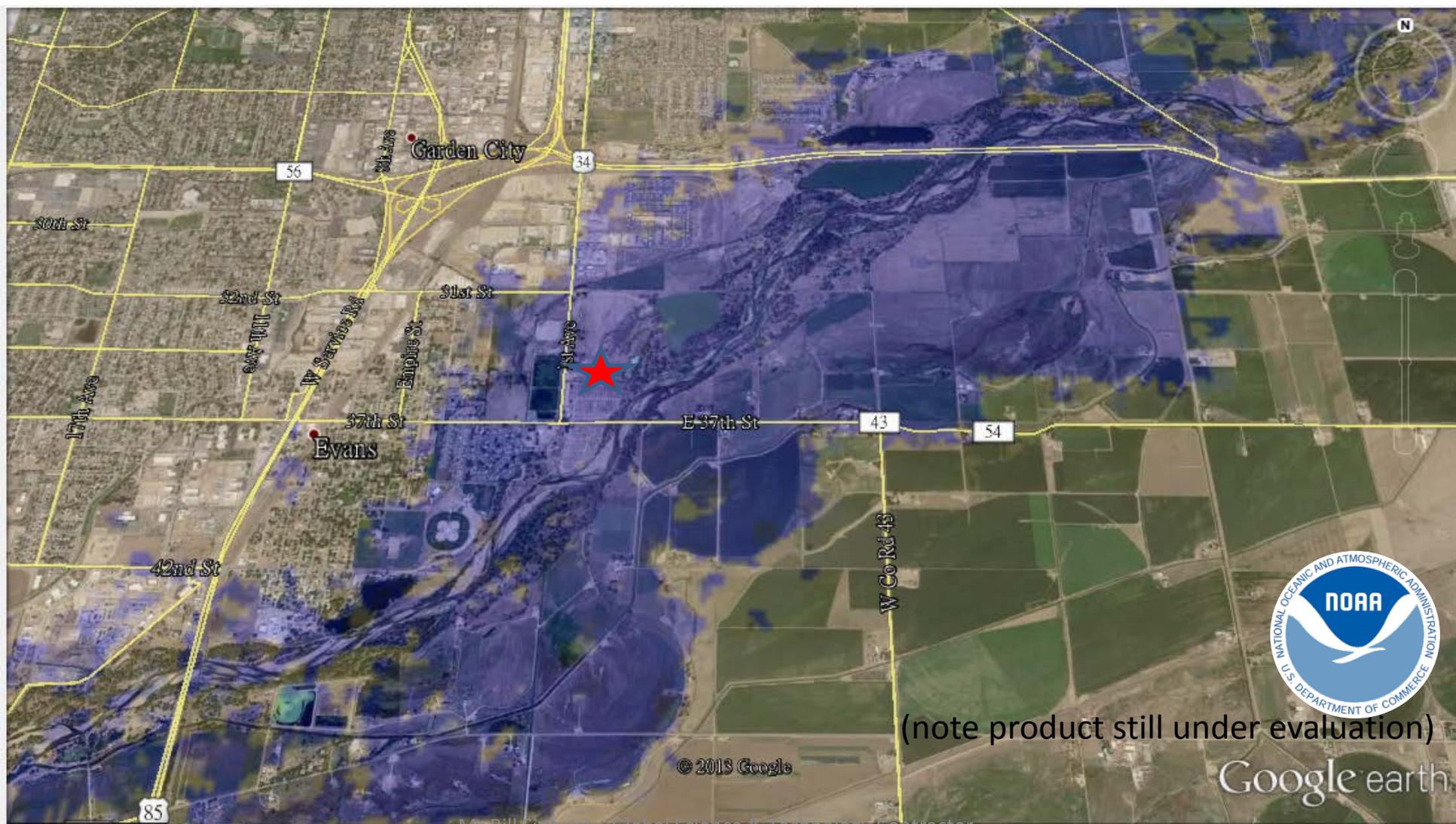


Google earth



Flood near Evans and Garden City

– the VIIRS spatial resolution is enhanced with use of 30 meter digital elevation map



(note product still under evaluation)

Google earth

Compare with ground truth in Evans



EVANS, CO

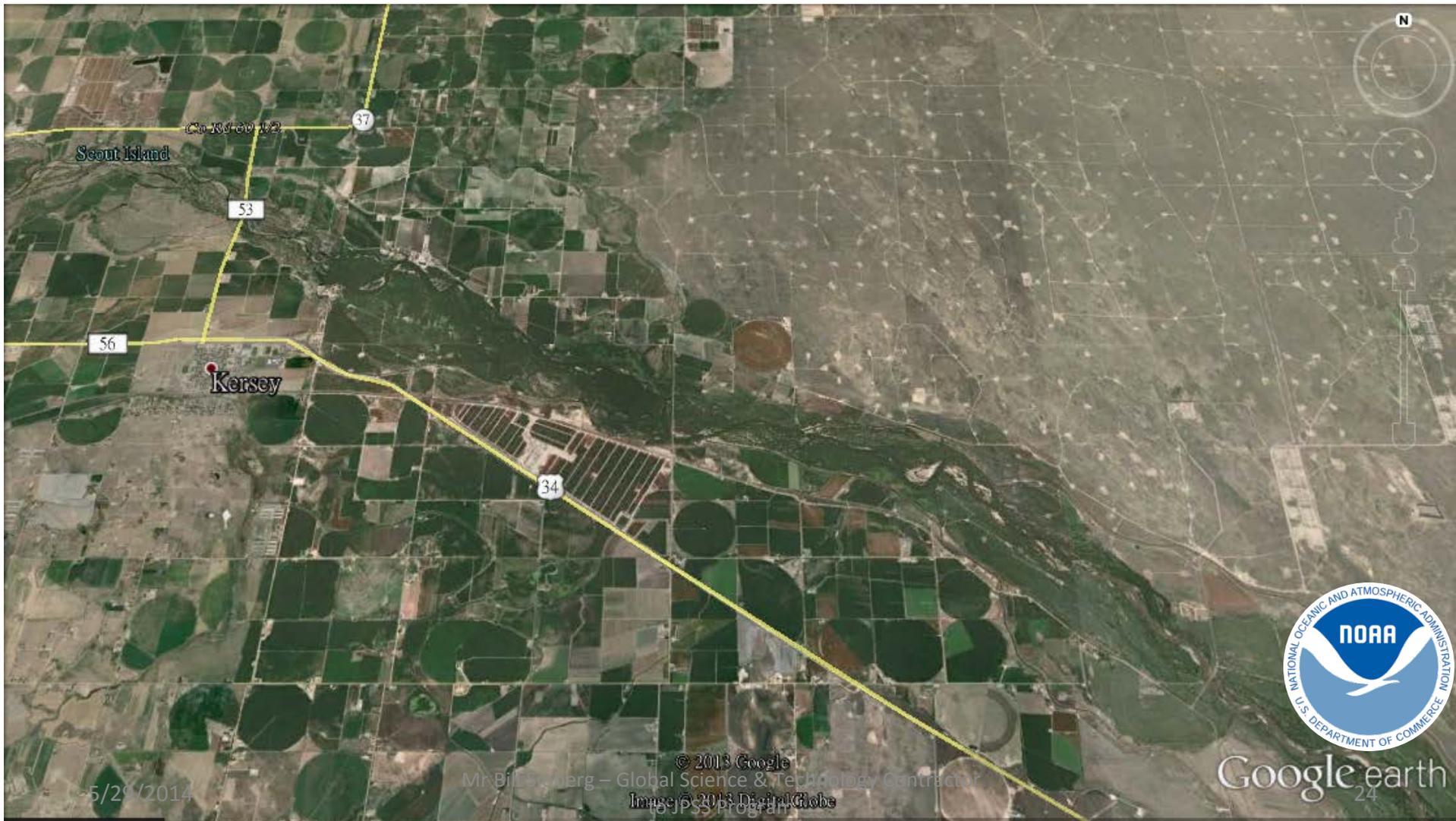
Junk Yard



Cars in a junk yard on 37th street in Evans Colorado Flooded BY THE South Platte River.

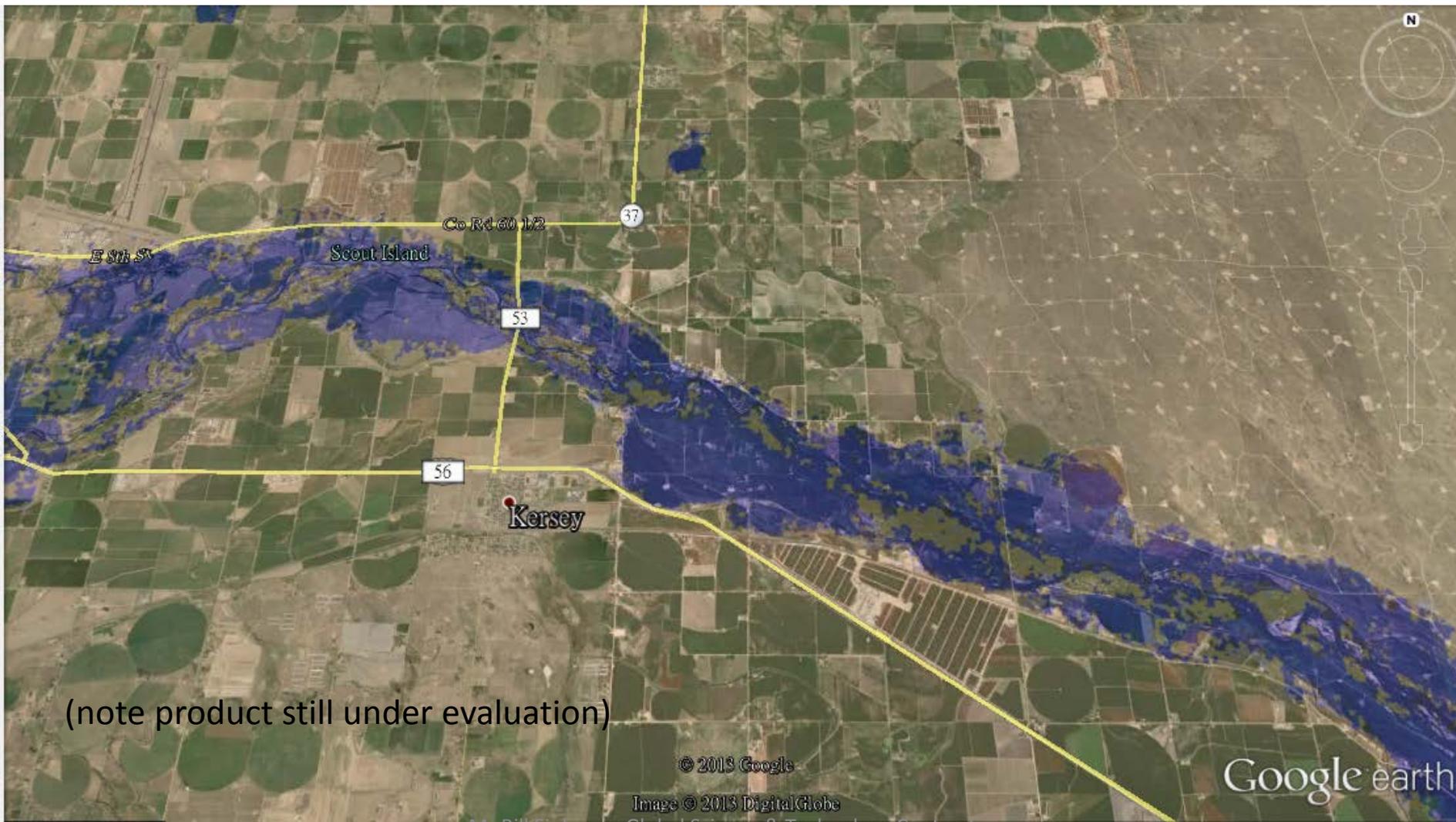


Before flooding near Scout Island





Flood near Scout Island



(note product still under evaluation)



Before flooding near Orchard



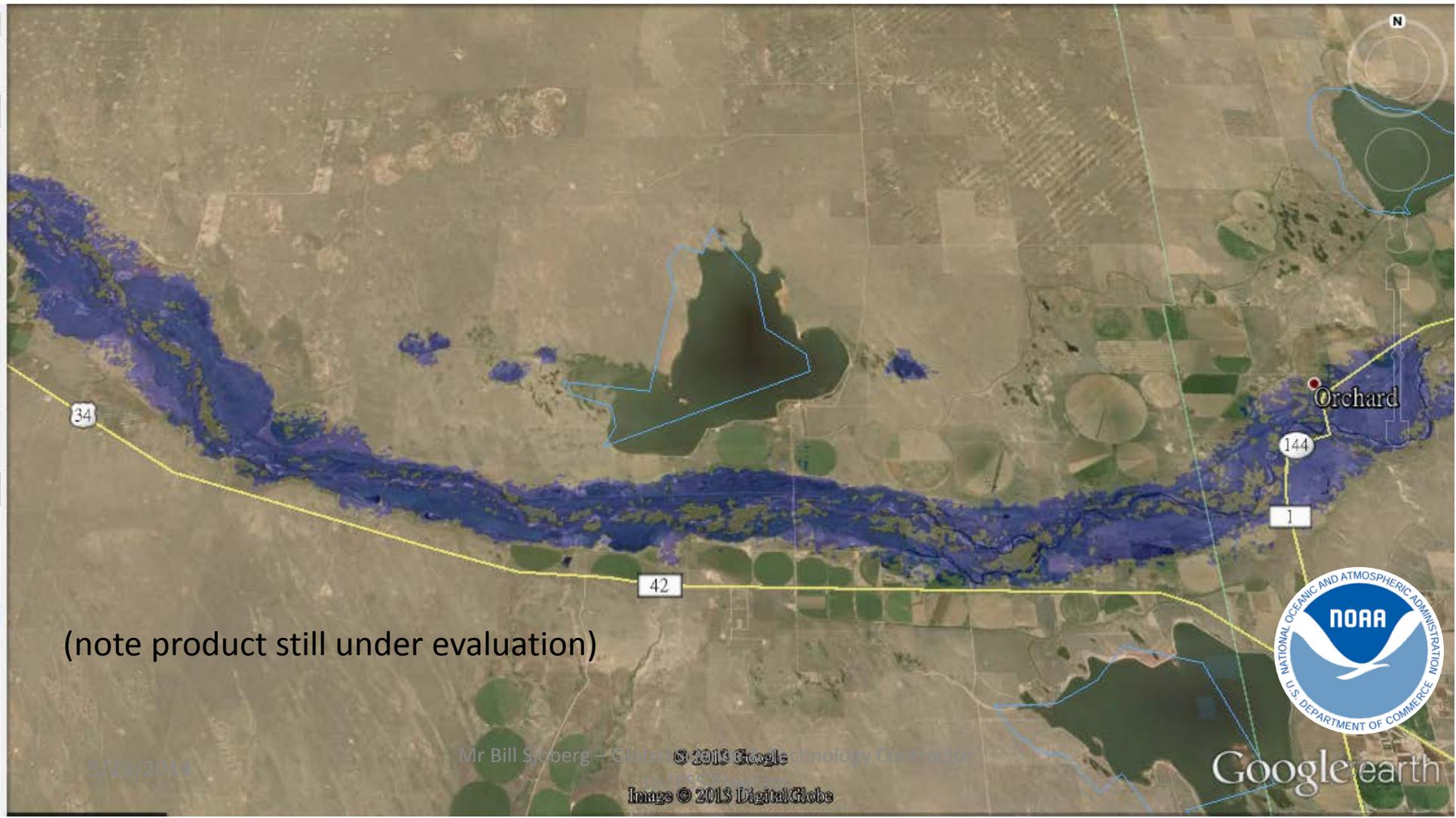
5/29/2014

Mr. Bill Sjoberg - Global Technology Contractor
Image © 2013 DigitalGlobe

Google earth



Flood near Orchard



(note product still under evaluation)

5/29/2014

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Image © 2013 DigitalGlobe

Google earth



Before flooding near Weldona



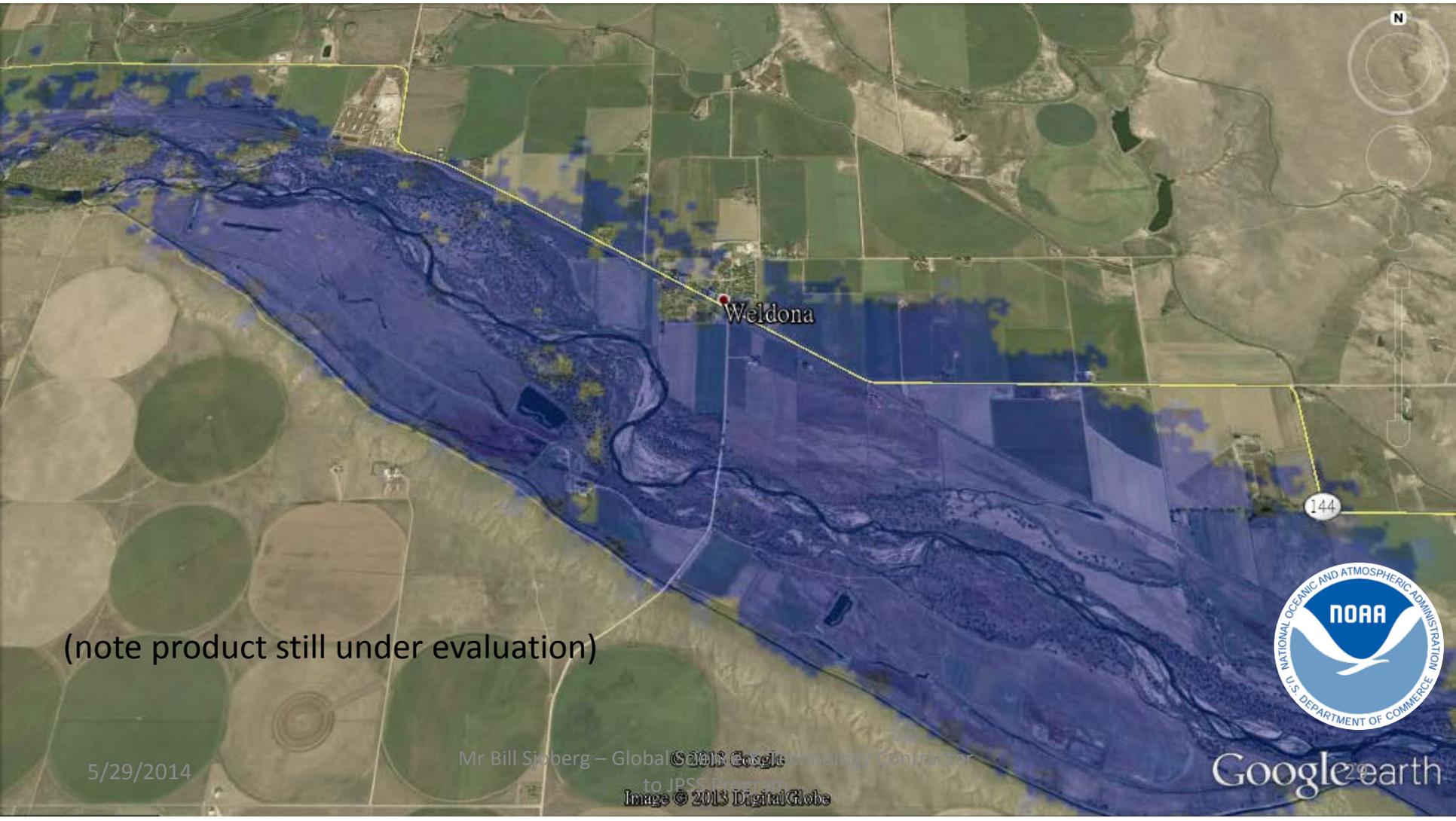
5/29/2014

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Google earth



Flood near Weldona



(note product still under evaluation)

5/29/2014

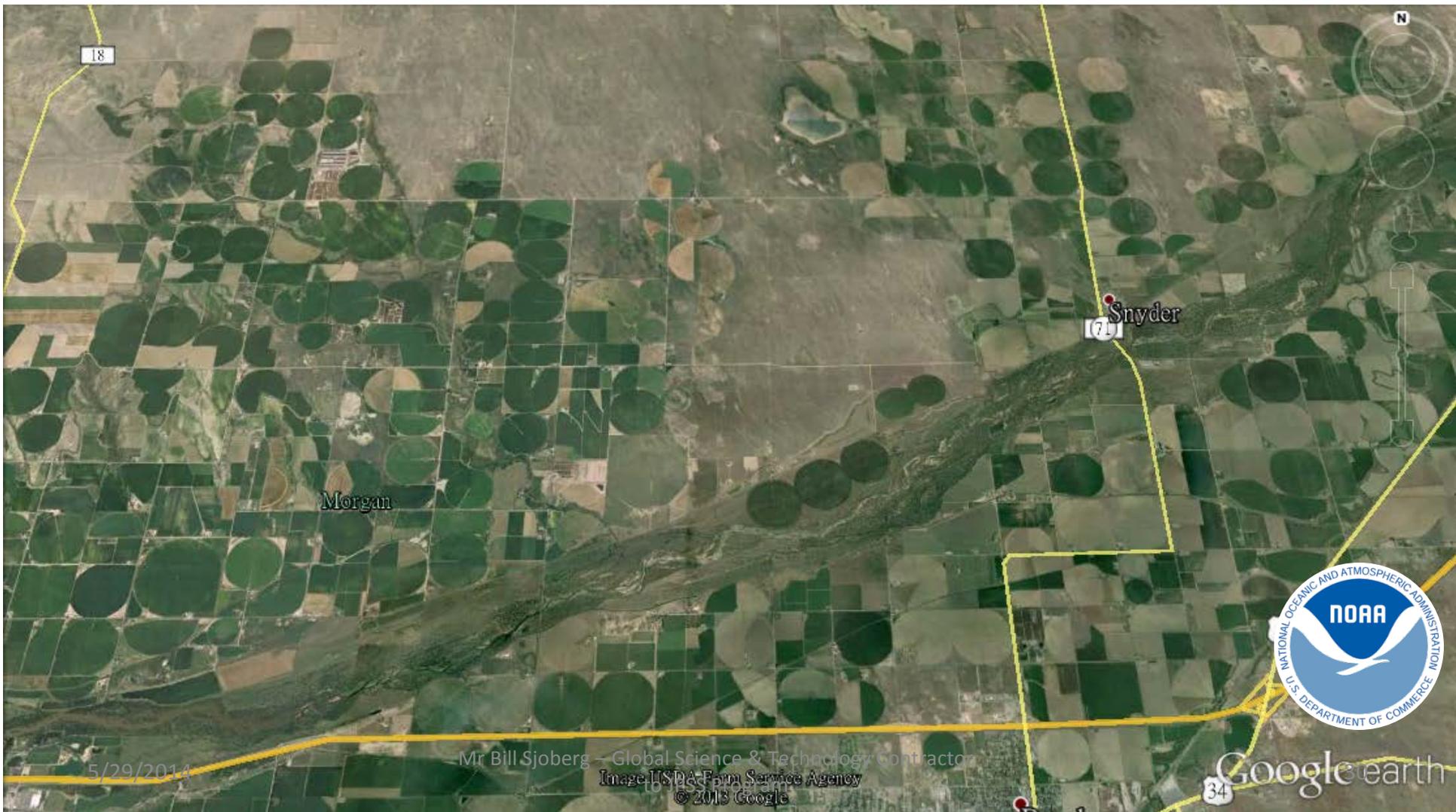
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Image © 2013 DigitalGlobe



Google earth



Before flooding near Snyder



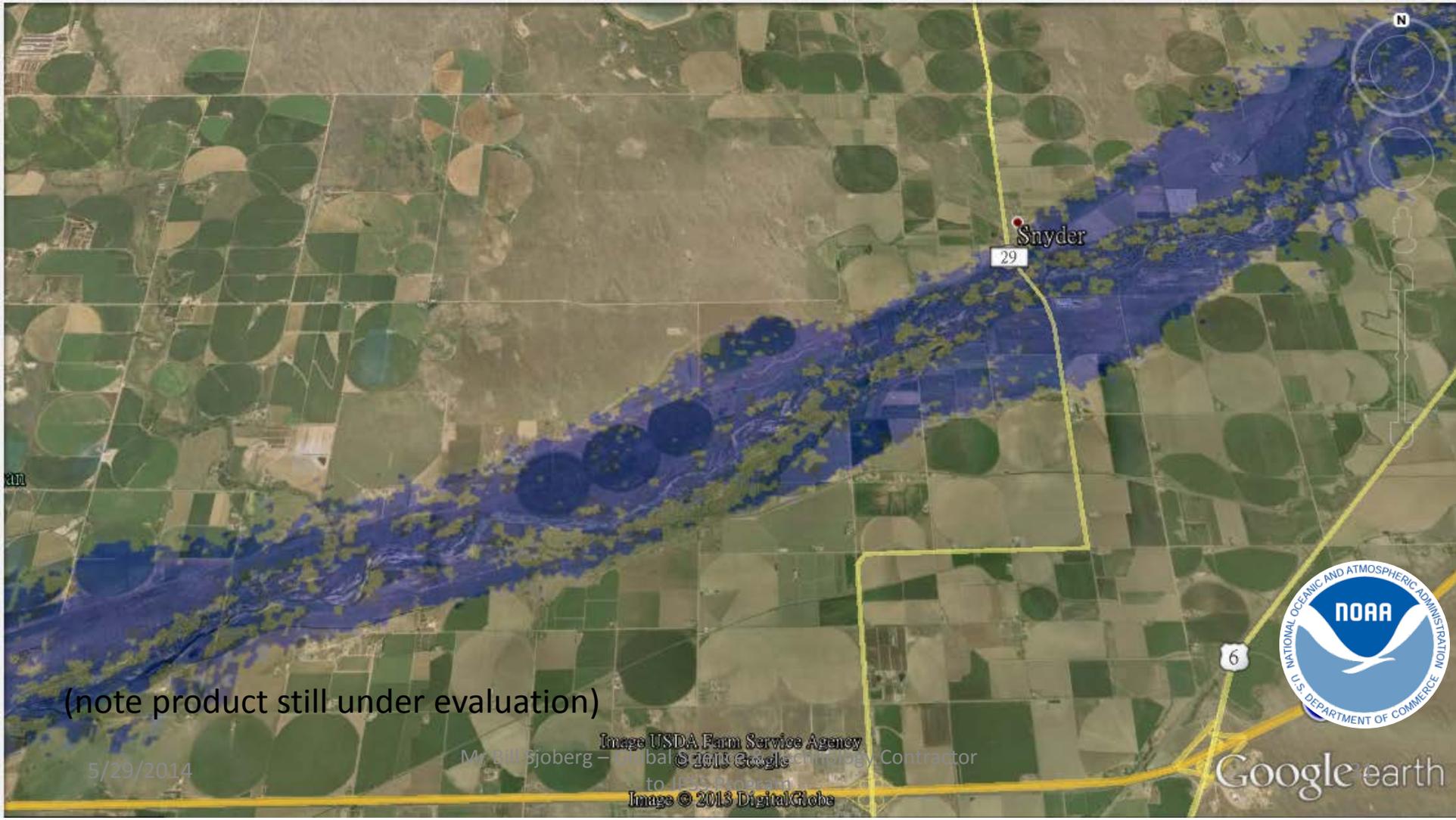
5/29/2014

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Image HISPAc Farm Service Agency
© 2013 Google

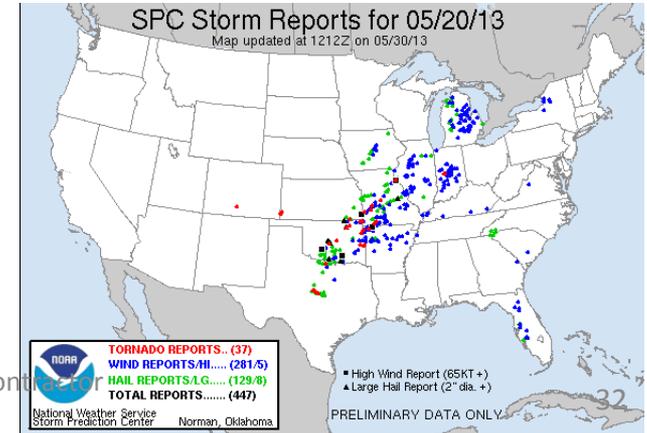
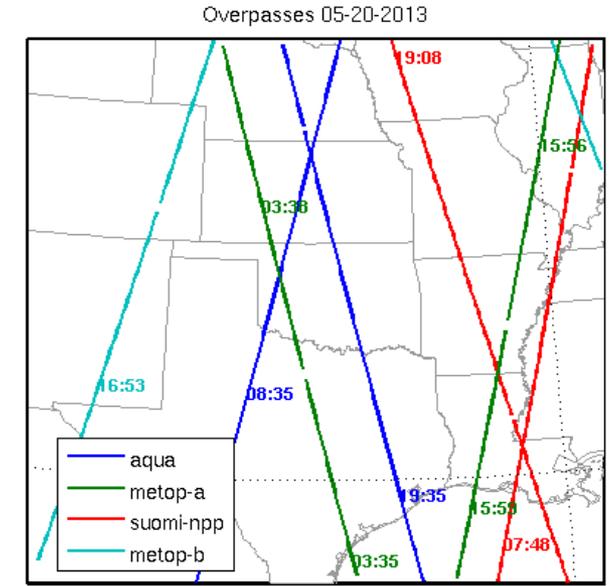
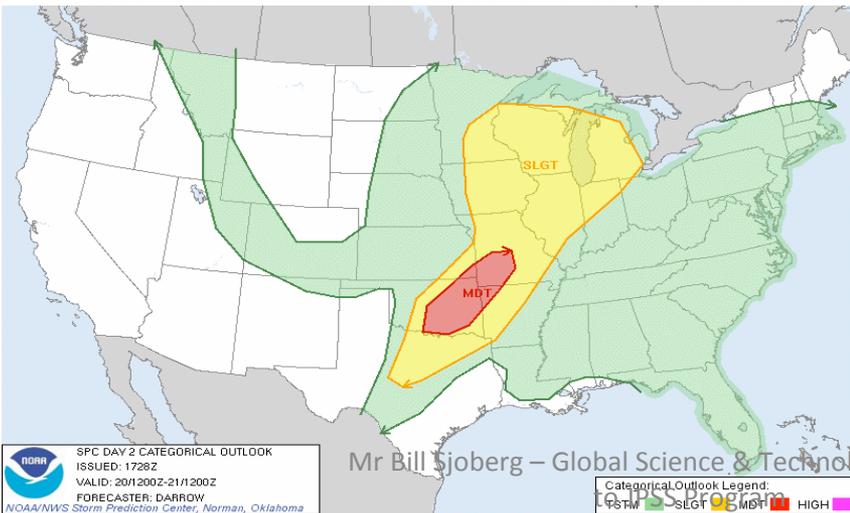
Google earth



Flood near Snyder



Moore, OK Tornado (20 May 2013)

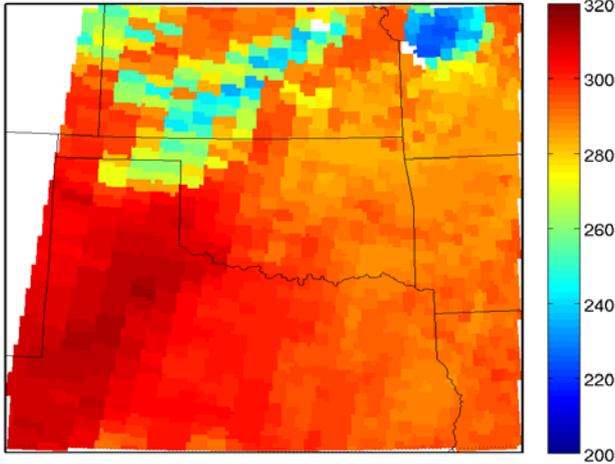


Moore, OK Tornado (20 May 2013)

Window Channel BT

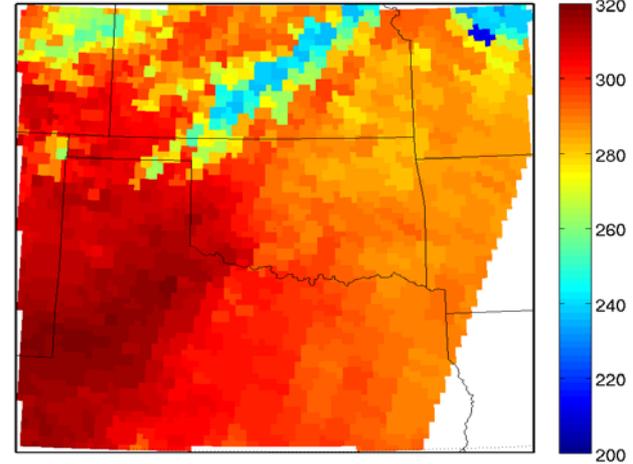
IASI
Metop-A
15:59 UTC

IASI METOP-A Brightness Temperature at 910.0 cm^{-1}
2013-05-20 (15:56)



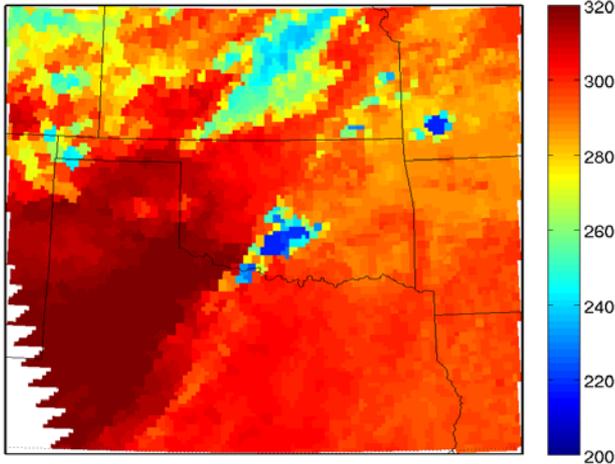
IASI Metop-B
16:53 UTC

IASI METOP-B Brightness Temperature at 910.0 cm^{-1}
2013-05-20 (16:51)



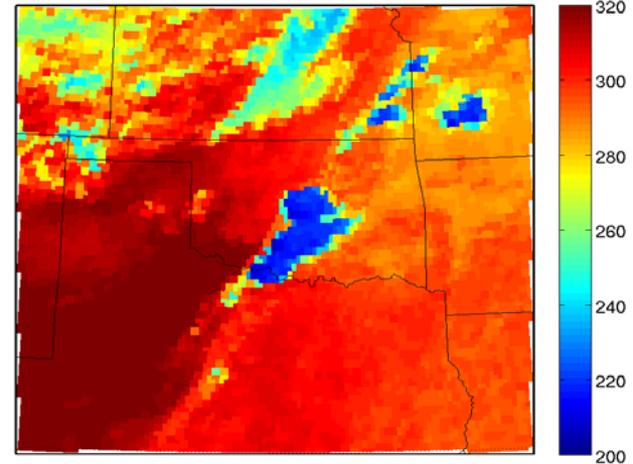
CrIS
19:08 UTC

CrIS Brightness Temperature at 910.0 cm^{-1}
2013-05-20 (19:00)



AIRS
19:35 UTC

AIRS Brightness Temperature at 911.2 cm^{-1}
2013-05-20 (19:35)





Satellite Data Assimilation for Tropical storm (SDAT)

SDAT website is developed and maintained by CIMSS Sounding Team:

Team leaders: Jun Li, Tim Schmit (NOAA)

Team members: Jinlong Li, Zhenglong Li, Pei Wang, Yong-Keun Lee

- Project focused on use or the regional numerical weather prediction (NWP) models (WRF - Weather Research and Forecasting, and/or HWRF – Hurricane WRF) and the advanced data assimilation methodologies (GSI, and/or EnKF).
- Data assimilated include both conventional and satellite observations.
- Satellite data assimilated
 - ATMS (Suomi-NPP)
 - AMSUA (POES N15, POES N18, MetOp-A, NASA AQUA)
 - AIRS (NASA AQUA),
 - IASI (MetOp-A),
 - MHS (POES N18, MetOp-A)
- Note: SDAT showed promising forecasts for Colorado precipitation - additional work to be done



Satellite Data Assimilation for Tropical storm (SDAT)

SDAT

Satellite
Data
Assimilation for
Tropical storm



[Home](#) [Forecasts](#)

Forecast

Model: wrf

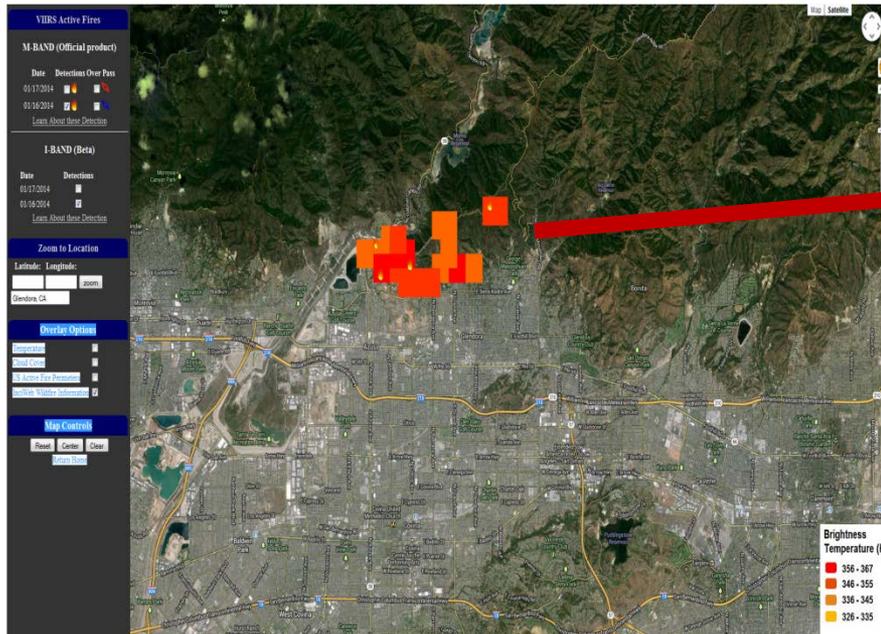
VARS	2013-10-04			2013-10-05			2013-10-06			2013-10-07		ANI		
	06Z	12Z	18Z	00Z	06Z	12Z	18Z	00Z	06Z	12Z	18Z			
Hurricane ▲	●	○	○	○	○	○	○	○	○	○	○	○	○	
Intensity-KAREN	0													<input type="button" value="Play"/>
Track	0													<input type="button" value="Play"/>
RH ▼	●	●	●	●	●	●	●	●	●	●	●	●	●	
SLP ▼	●	●	●	●	●	●	●	●	●	●	●	●	●	
T ▼	●	●	●	●	●	●	●	●	●	●	●	●	●	
TPW ▼	●	●	●	●	●	●	●	●	●	●	●	●	●	



SDAT for Tropical Storm Karen (4 Oct 2013)



Active Fires Webpage



- The Colby Incident started Thursday January 16th, 2014 at approximately 06:00 AM PST in the vicinity of Glendora Mountain Road and the Colby Trail.
- On 17 Jan burned area was 1,863 acres.

The National Weather Service and US Forest Service both depend on VIIRS data to predict, identify and monitor wildfires.

JPSS has funded development and implementation of the Active Fires program through its Proving Ground.

JPSS Supporting Wildfire Detection through VIIRS

Colby Fire – Jan 2014

Glenora CA





Summary

- The JPSS PGRR Program has proven its value over a 2-yr period
- Project teams have shown they can respond to high-visibility, rapidly changing environmental crises
- The forecaster-PGRR teams have been innovative in applying SNPP capabilities
- Innovations will drive decisions being made for JPSS satellites
- Successes have been documented in articles and seminars strengthening user advocacy