

Real-time Generation of River Ice and Flood Products Derived from VIIRS Imagery

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CSP/IMAPP Users' Group Meeting
EUMETSAT
15 April 2015

Overview

- Two products
 - River flood from GMU
 - River ice from CCNY
- Realtime processing
 - SSEC/CIMSS
 - Geographic Information Network of Alaska (GINA)
- Product distribution
 - AWIPS II for use and evaluation by National Weather Service
 - RealEarth (Web Map Service at CIMSS) for general access
- Status and future plans

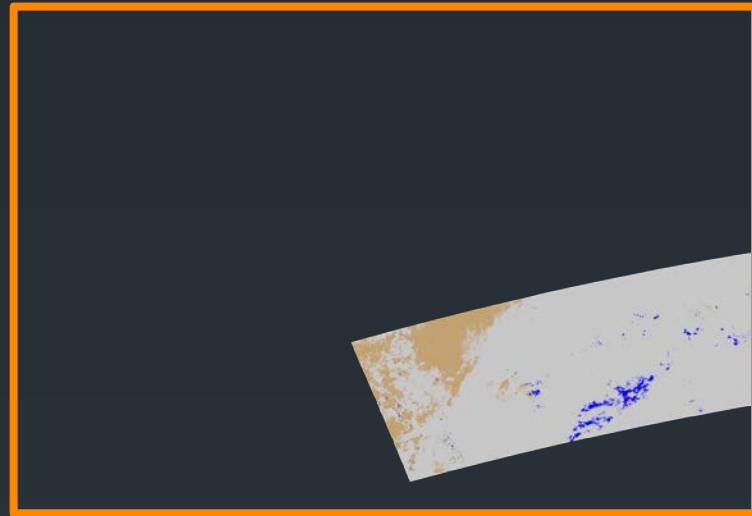
River Flood Product

- Estimate of flooding water fraction
- Regions of ice, cloud, snow cover, and cloud shadow identified
- Algorithm developed at George Mason University (GMU)
 - VIIRS: SVI01, 2, 3, 5, Cloud mask (IICMO)
 - Ancillary: Global land cover, DEM, land/sea mask, MODIS water mask, land/sea surface temperature
 - C/C++ and IDL

River Flood Product

- Output: HDF and PNG files, by granule

- Contact: Sanmei Li



- Reference:

Sanmei Li, Donglian Sun, Yunyue Yu, Ivan Csiszar, Antony Stefanidis, Mitch Goldberg (2012). A New Shortwave Infrared (SWIR) Method for Quantitative Water Fraction Derivation and Evaluation with EOS/MODIS and Landsat/TM data. *IEEE Transactions on Geoscience and Remote Sensing*, 51.

River Ice Product

- Information on river ice location, extent, and concentration
- Algorithm developed at City College of New York (CCNY)
 - VIIRS: SVI01, 2, 3, 5, Cloud mask (IICMO)
 - Ancillary: CCNY provides Matlab files of specific rivers
 - Matlab

River Ice Product

- Output: HDF and PNG files, by granule
- Contact: Naira Chaouch



- Reference:
Naira Chaouch, Marouane Temimi, Peter Romanov, Regina Cabrera, George Mckillop, Reza Khanbilvardi.(2014). An Automated Algorithm for the Monitoring of River Ice over the Susquehanna River Basin using MODIS data. *Hydrological Processes*. **28**, Issue: 1, 62-73.

CIMSS Role

- Produce the products in near real-time
 - Use CSPP-generated VIIRS SDRs and EDRs from SSEC and GINA DB data
 - Work with algorithm providers (GMU and CCNY) to run their research code in our environment
- Reformat products
 - Convert and concatenate PNG files to:
 - AWIPS II compatible netCDF files
 - GeoTIFF for use in SSEC's RealEarth Web Map Service (WMS)
 - RealEarth WMS available as part of IMAPP

CIMSS Role

- **Distribute products for evaluation to:**
 - NWS River Forecast Centers (RFC) via the Unidata Local Data Manager (LDM) to their AWIPS II
 - RealEarth for everyone
- **Update algorithms**
 - Based on user feedback
 - Bug fixes
 - General improvements
 - Performance, etc.



NCRFC: North Central
NERFC: North East
MBRFC: Missouri Basin
WGRFC: West Gulf
APRFC: Alaska Pacific

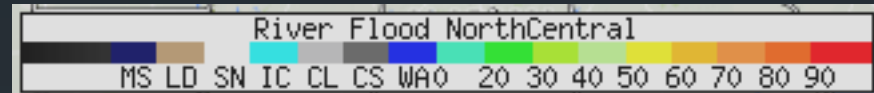
RealEarth

- <http://realearth.ssec.wisc.edu/>
- Web Map Service (WMS) hosted at SSEC
- Provides overlays, transparencies, color enhancements
- Right click to probe and get data value
- Left and right arrow keys to step through different times
- 'Share' button in the Display Controls
 - Options to share display: web link, KML (Google Earth), Facebook, Twitter
 - Save as GeoTIFF
- 200+ real-time satellite, radar, METAR, snow depth, etc.
 - River Ice and Flood products are in the 'Hazards' category

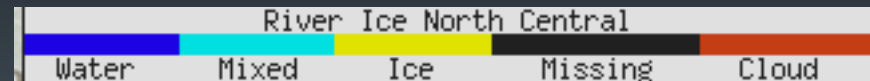
Products Legend (RealEarth)

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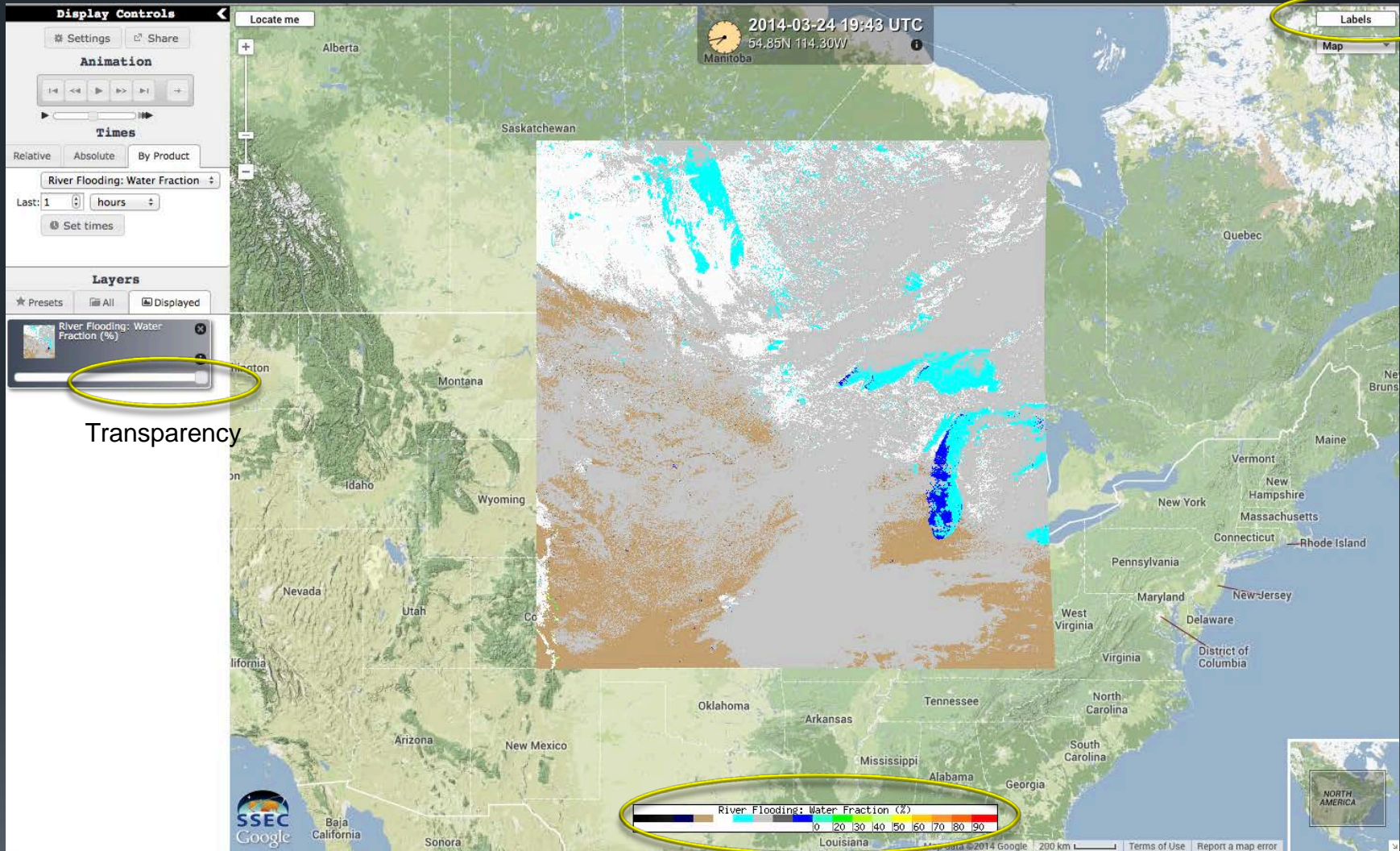
- River Flood
 - MS: Missing
 - LD: Land
 - SN: Snow
 - IC: Ice
 - CL: Cloud
 - CS: Cloud Shadow
 - WA: Water
 - 0 – 90: Water fraction



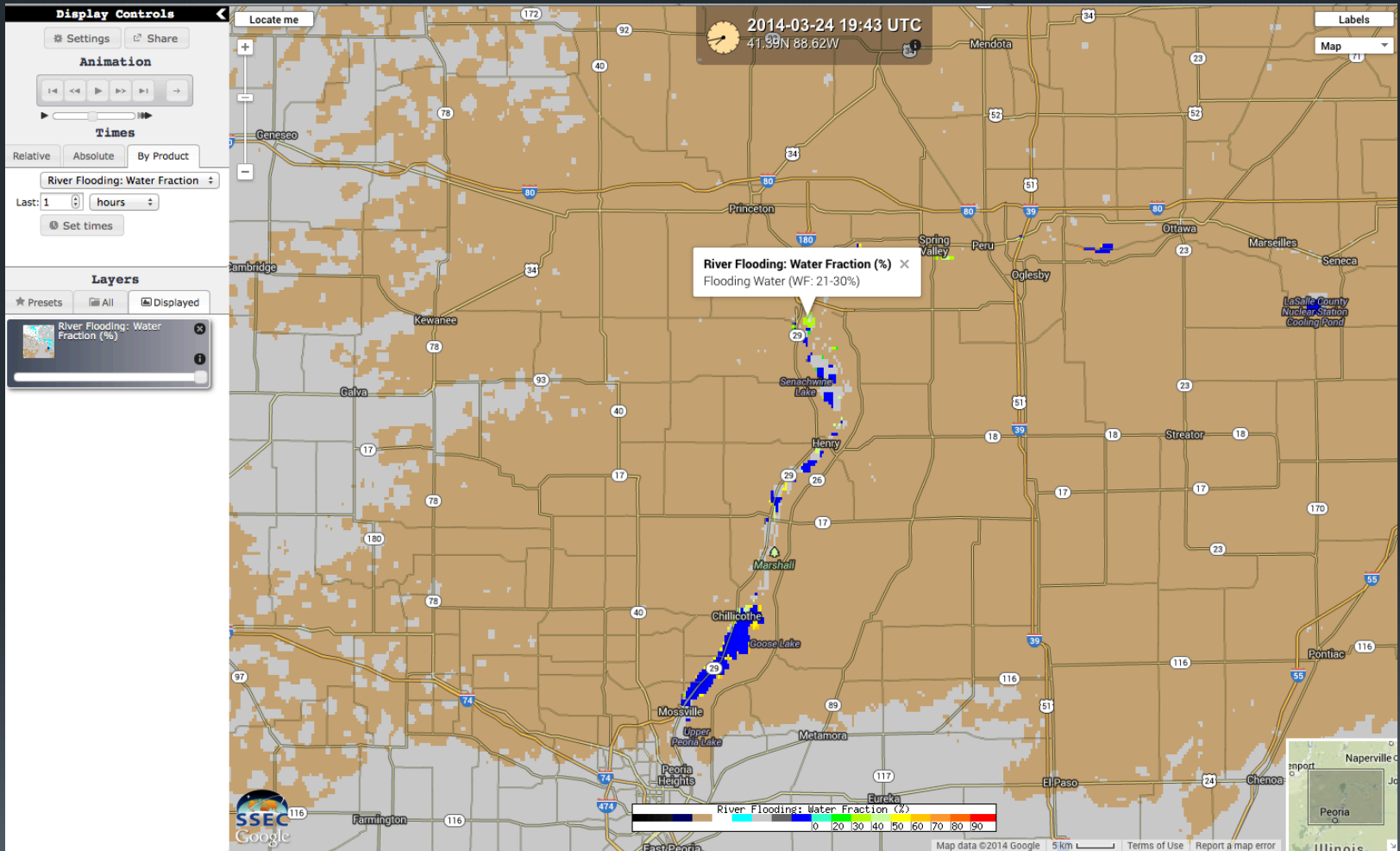
- River Ice:



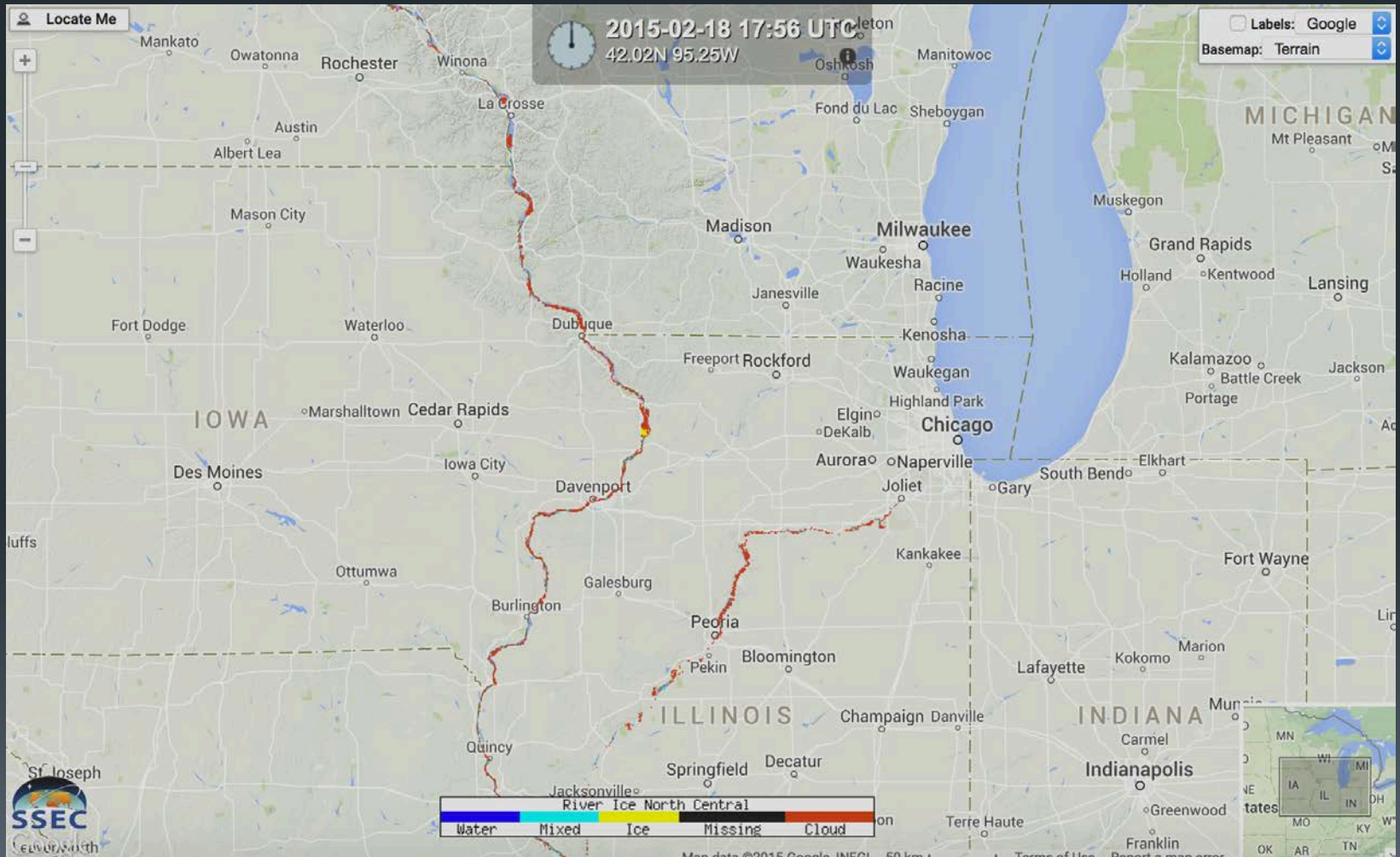
NCRFC: River Flood



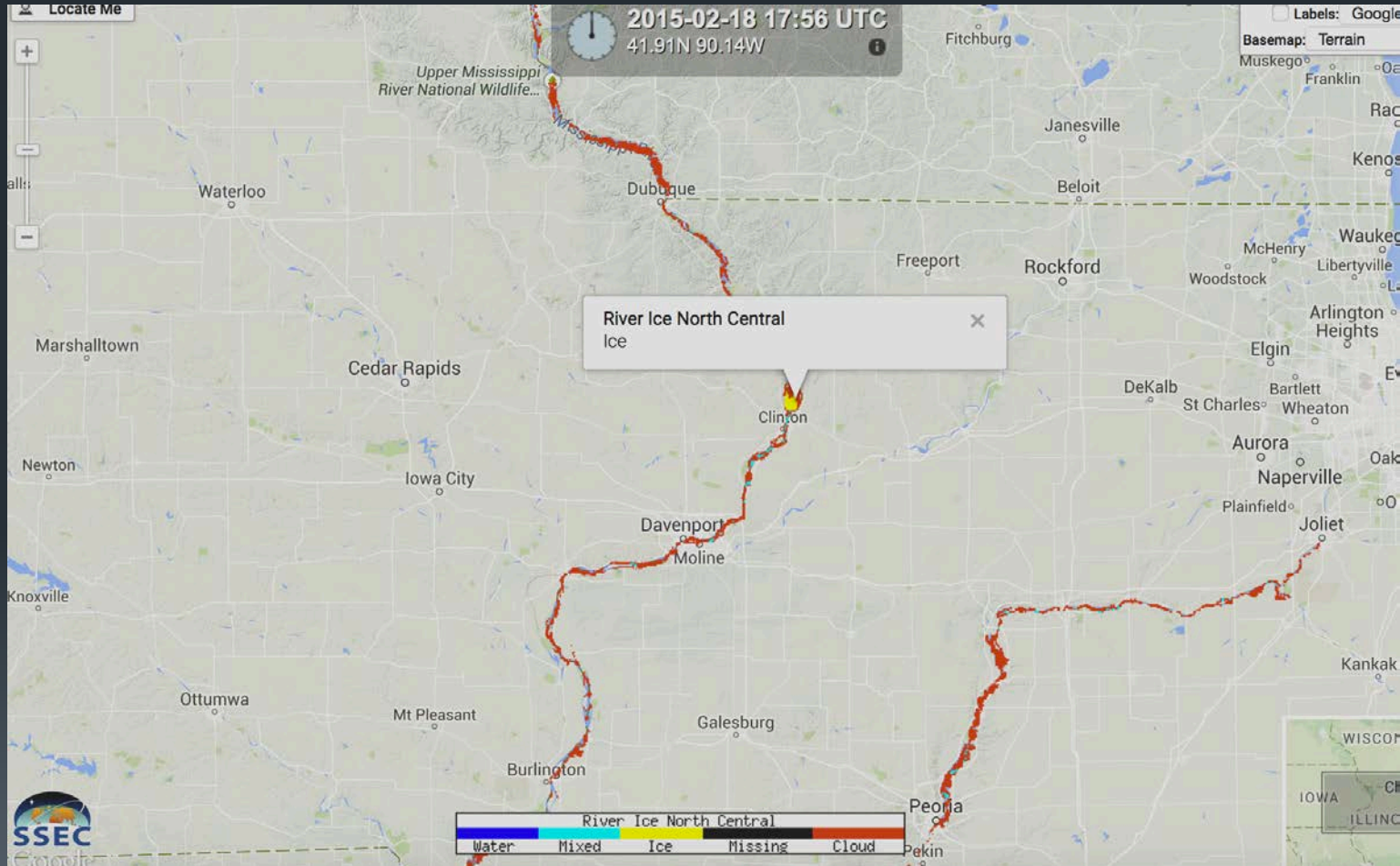
River Flood (Data Probe)



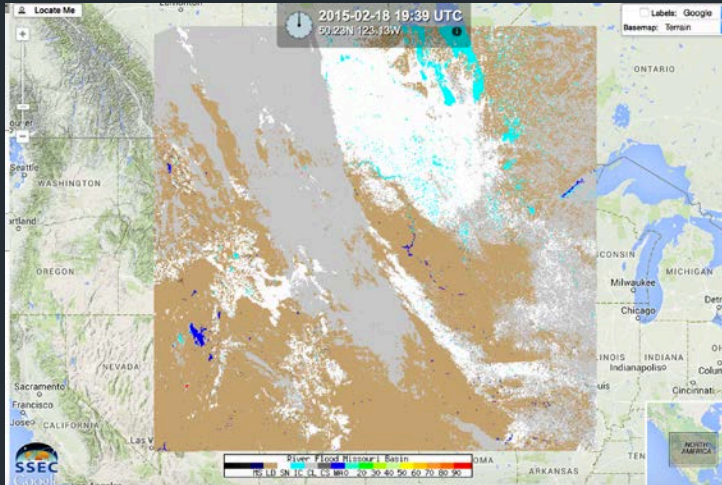
NCRFC: River Ice



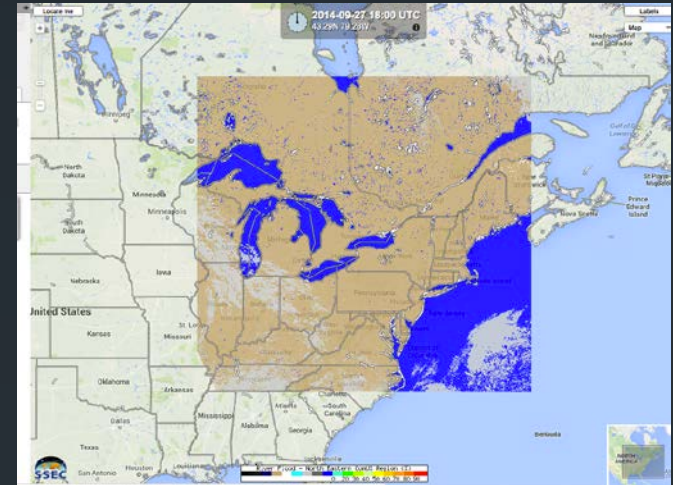
River Ice (Data Probe)



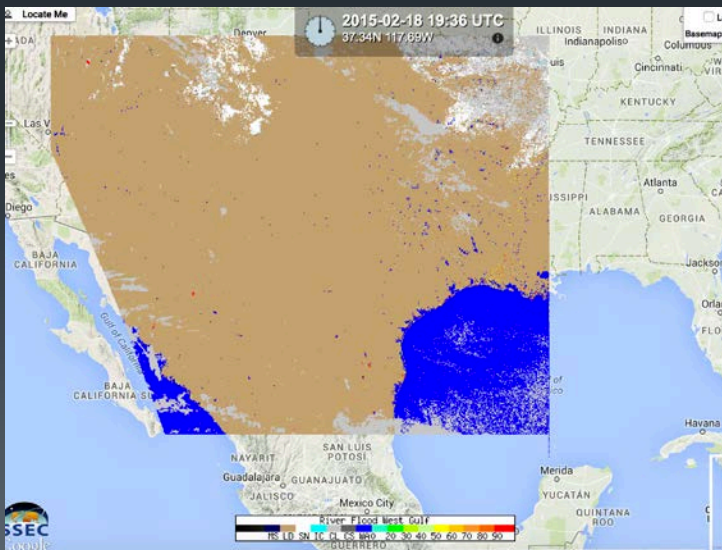
Regional coverage



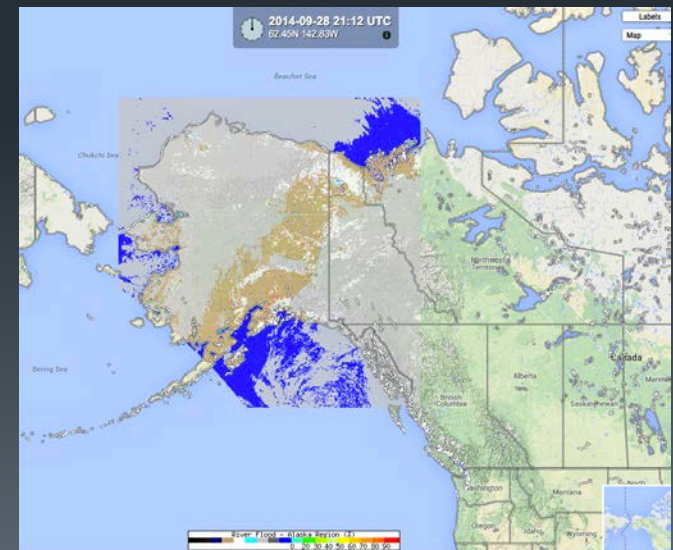
Missouri Basin



North East

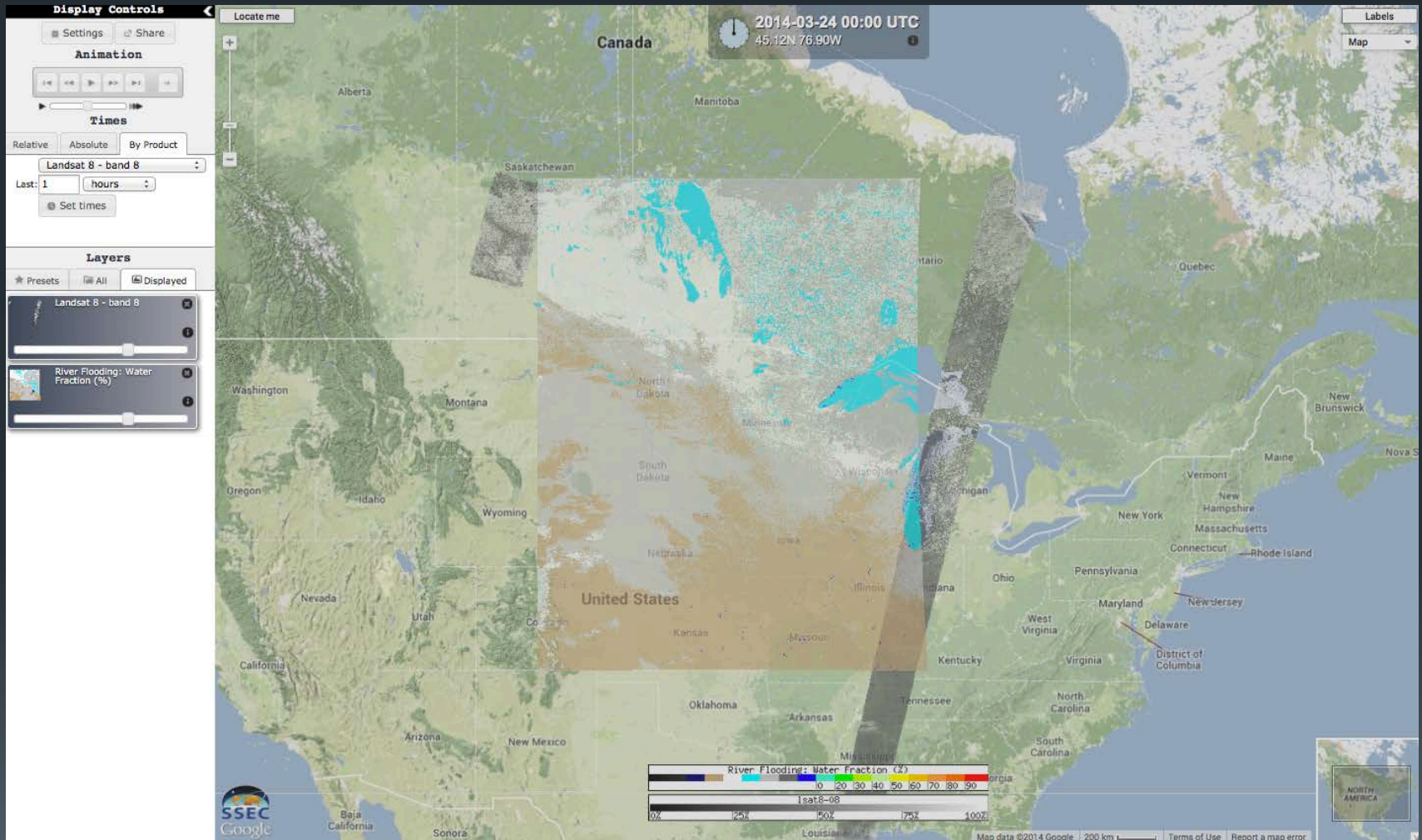


West Gulf

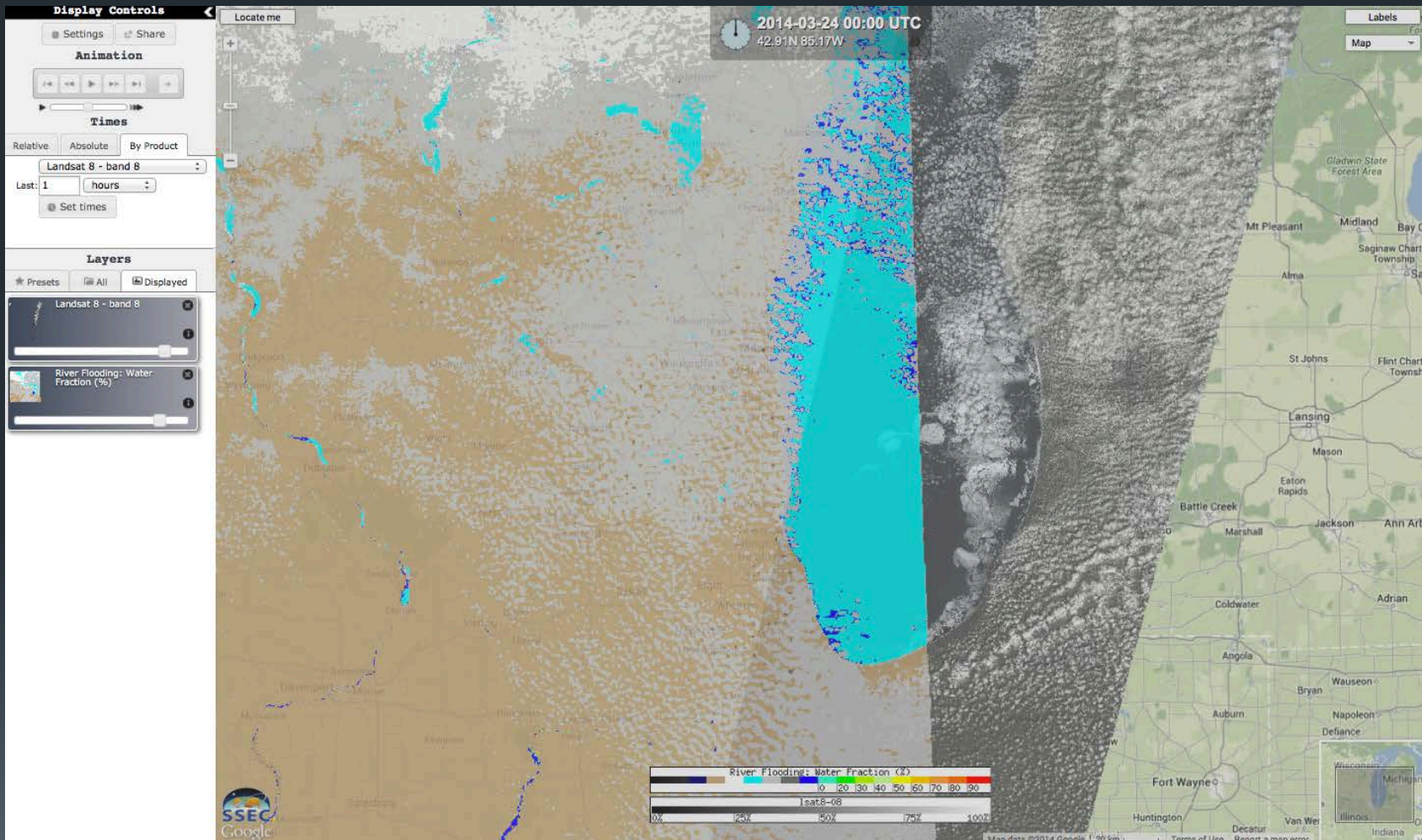


Alaska Pacific

River Flood with Landsat



River Flood with Landsat

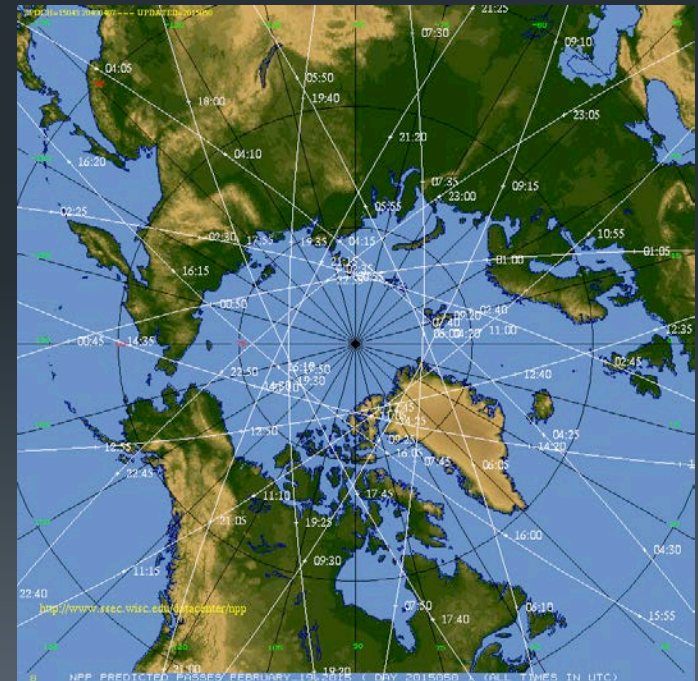


Product Status

- River Flood: All sectors generated routinely
- River Ice: All sectors generated routinely
- Products updated about twice daily for each RFC region
- Polar orbit tracks



<http://www.ssec.wisc.edu/datacenter/npp/NA.html>



<http://www.ssec.wisc.edu/datacenter/npp/ARCTIC.html>

River Flood in RealEarth

- NCRFC, NERFC, MBRFC, WGRFC, APRFC regions
- These links will always display the last 2 days
 - North Central: <http://realearth.ssec.wisc.edu/s/S1ZuU>
 - North East: <http://realearth.ssec.wisc.edu/s/E1ZxU>
 - Missouri Basin: <http://realearth.ssec.wisc.edu/s/f1Zys>
 - West Gulf: <http://realearth.ssec.wisc.edu/s/y1ZBB>
 - Alaska Pacific: <http://realearth.ssec.wisc.edu/s/01ZCM>

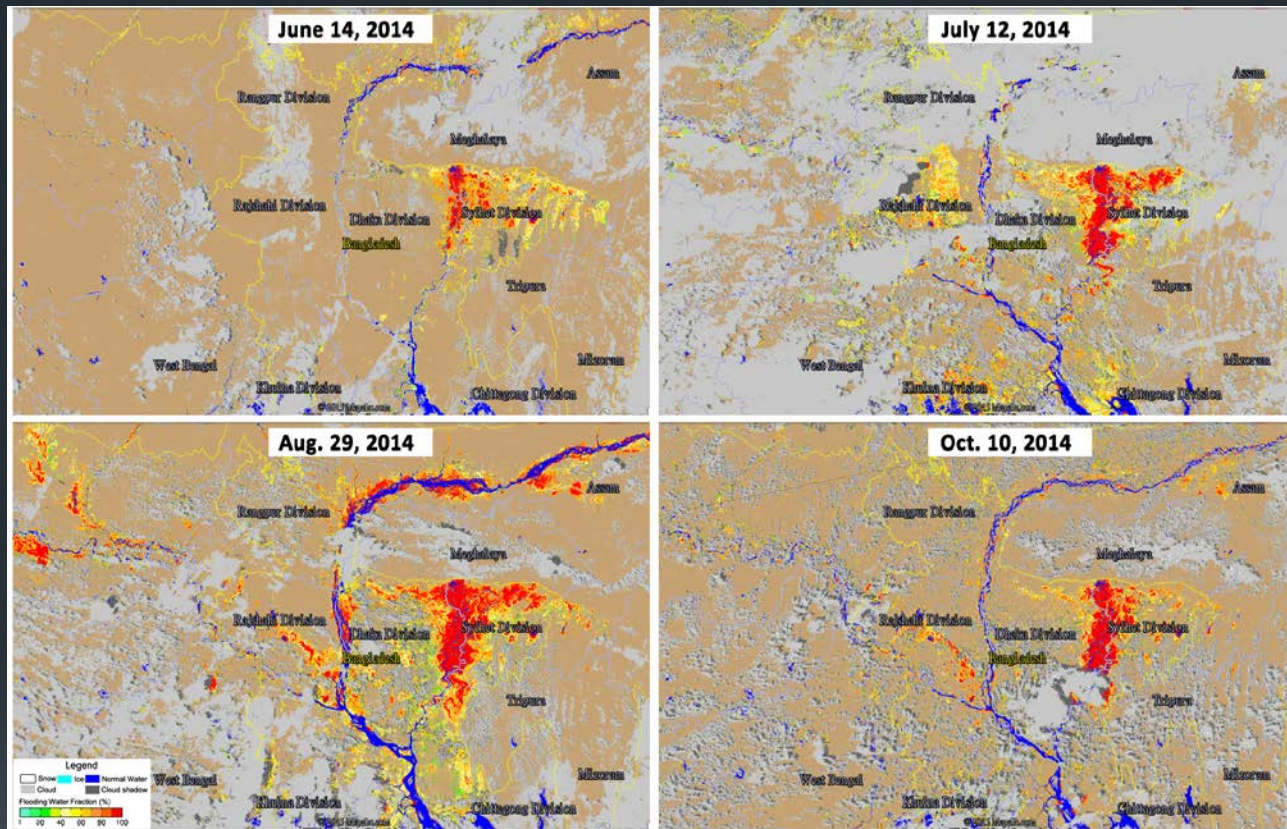


River Ice in RealEarth

- NCRFC, NERFC, MBRFC, APRFC regions (no WGRFC)
- These links will always display the last 2 days
 - North Central: <http://realearth.ssec.wisc.edu/s/e2eZW>
 - North East: <http://realearth.ssec.wisc.edu/s/v2f1P>
 - Missouri Basin: <http://realearth.ssec.wisc.edu/s/A277j>
 - Alaska Pacific: <http://realearth.ssec.wisc.edu/s/j274a>



River Flood Product: Bangladesh

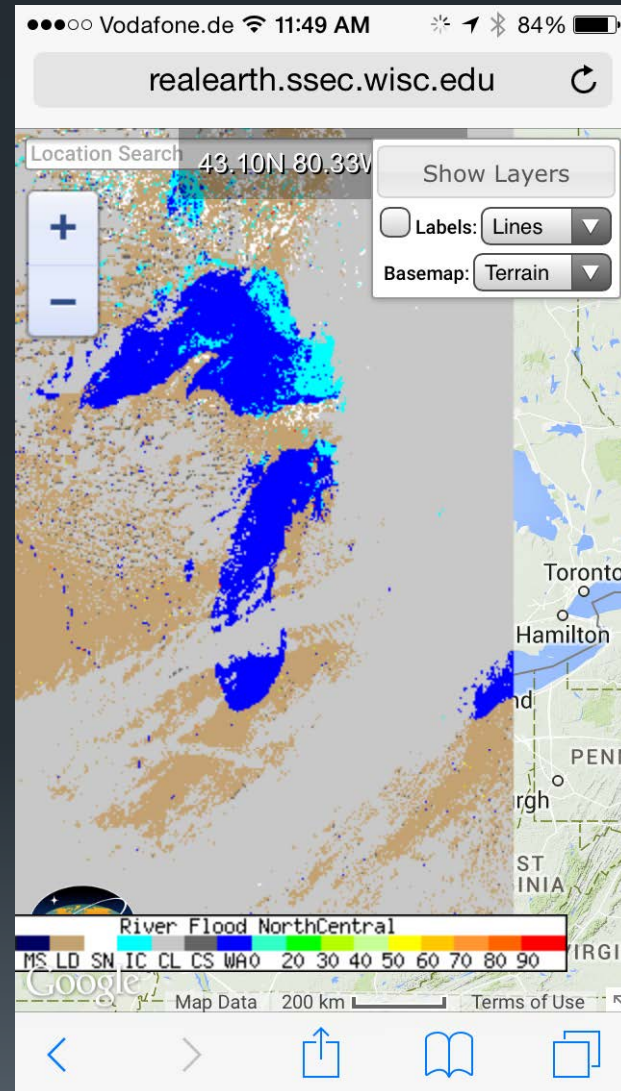


Changes in flooding over the summer of 2014 in Bangladesh

“An official at the disaster management...said the floods have affected more than 74,000 people...and have also affected crops, with more than 100,000 acres of farmland submerged in 20 districts, most in the north of the country.” (Reuters, 26 Aug 2014)

Mobile access to RealEarth: Browser

- Start with shortcut link
- No data probes

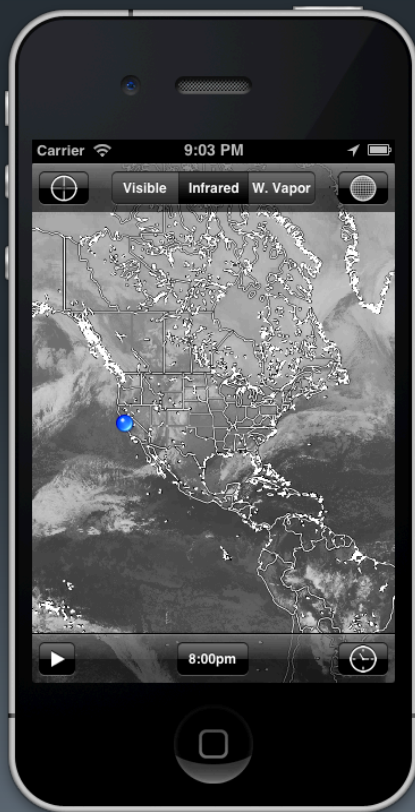


<http://realearth.ssec.wisc.edu/s/S1ZuU>

Mobile access to RealEarth: Native app

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- WxSat on iOS and Android
 - <https://itunes.apple.com/us/app/wxsat/id627994249?mt=8>
 - <https://play.google.com/store/apps/details?id=edu.wisc.ssec.wxsat>

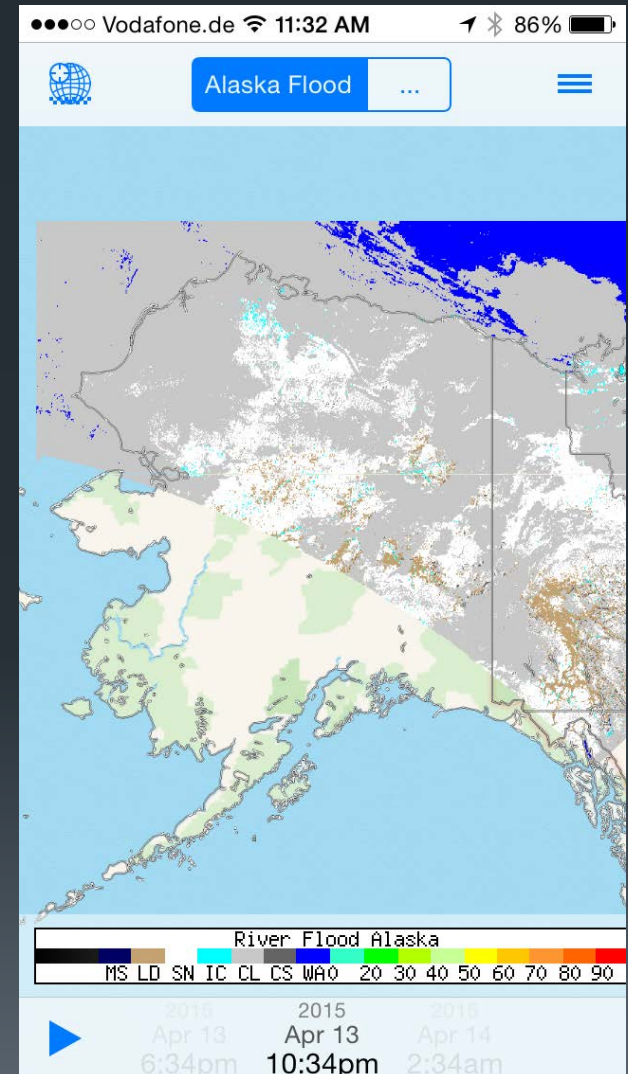


Currently only global
composites of visible, IR
window, and water vapor
channels



Update to WxSat App

- Access to all 200+ RealEarth products
- Create favorites
- Likely to be called 'RealEarth'
- Available later this year



Status and Future Plans

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- Product generation continues at CIMSS and GINA
- Proposal to NOAA to incorporate the river ice and flood algorithms into the CSPP
- Update to WxSat app to access all RealEarth products