The Himawari training program for NWS Pacific Region meteorologists

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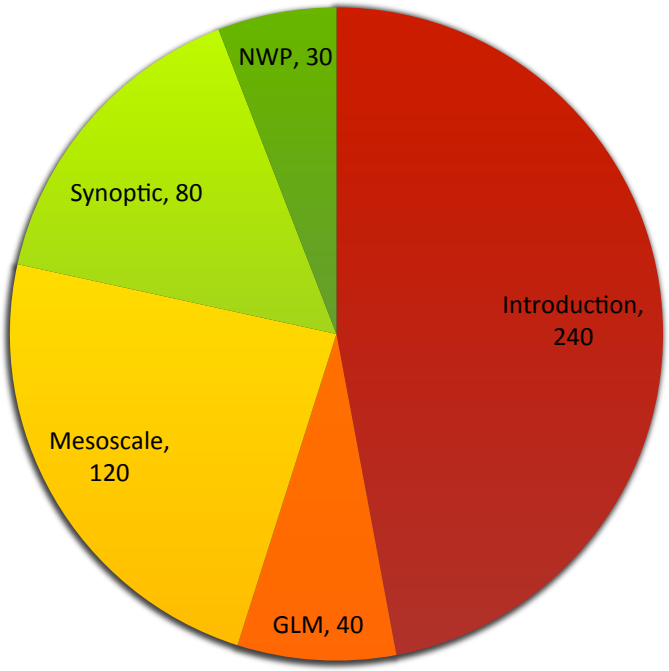
Training Paradigm

Foundation

General

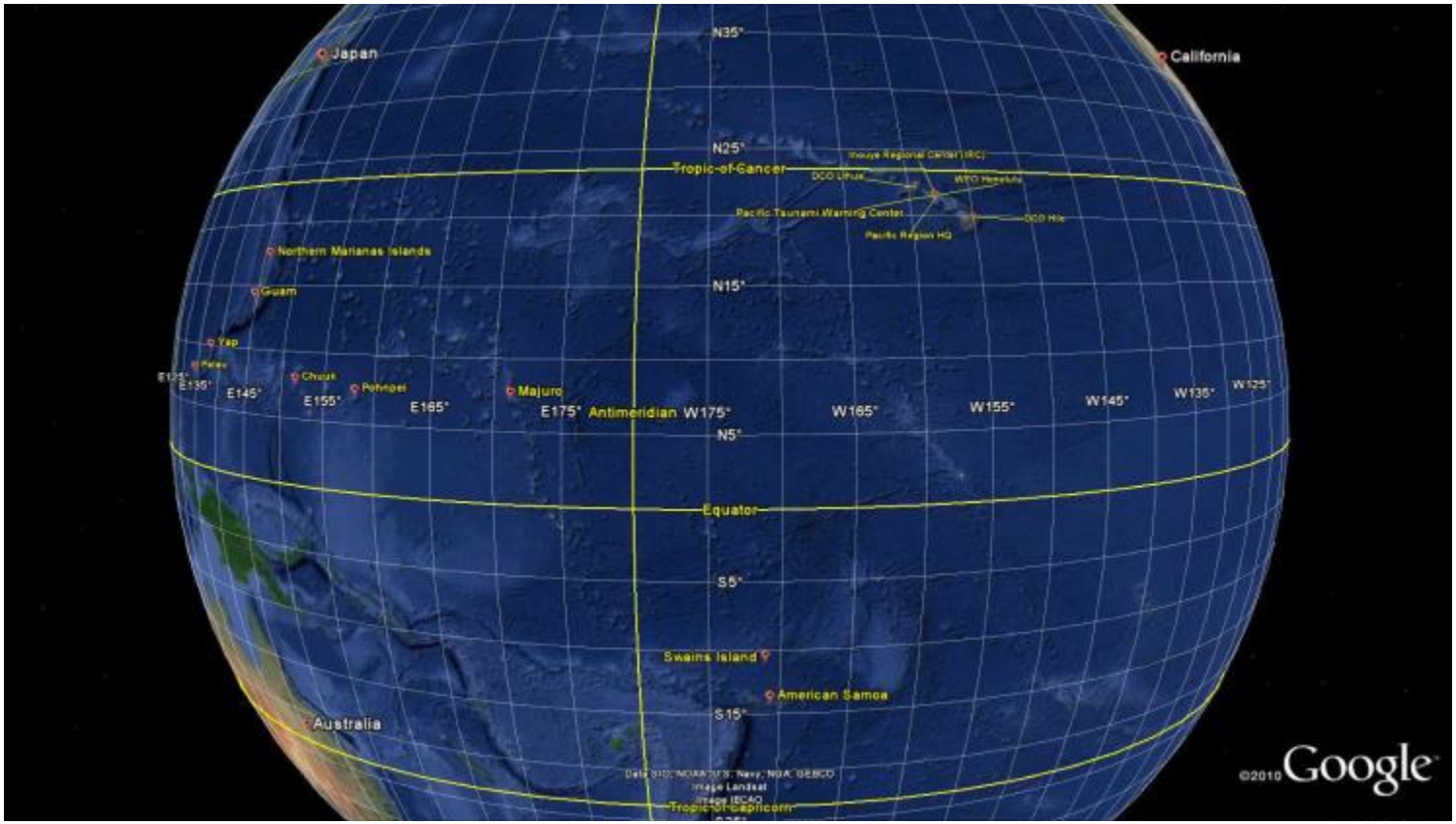
Specialized

Proposed Foundational Training
for all NWS (US NMHS) meteorologists



- GOES-R Introduction and SatMet Background Track (240 minutes)
- Geostationary Lightning Mapper Track (40 minutes)
- Mesoscale/Convection Track (120 minutes)
- Synoptic Features Track (80 minutes)
- Numerical Weather Prediction and Data Assimilation Track (30 minutes)

NWS Pacific Region



Credit: Eric Lau

Special Training for Guam

- Himawari-8 is now operational
  - National GOES-R training program not yet ready
- Opportunity to train forecasters at NWS Guam on how to use ABI-like imagery before the rest of the NWS forecasters
- NWS sponsored the development of special training for Guam to assure “day one” readiness
  - Special training may be necessary for other OCONUS sites
- Elements of this training will filter into national training program for GOES-R

Heritage of Training Workshops

- CIMSS previously developed software for visualizing multi-spectral imagery from polar-orbiting satellites
  - HYDRA
- Scientists from CIMSS travel to locations around the world to offer in-person training on meteorological satellite imagery to a variety of interested audiences
- The NWS has favored remote workshops in recent years due to easier logistics and decreased costs

Training Challenge

- Develop a training course/workshop that
  - Lasts only a few days
  - Focuses on the “need to know” information
  - Ensures participants are ready to apply knowledge to operations, and continue learning
  - Incorporates lab sessions that encourage participants to interact with each other and interrogate the imagery
- Establish “day one” readiness

Training Concept

- Bring instructors to train forecasters in their workplace
- Segment two-day workshop into 3 to 4 hour sections
- Regionally-relevant examples and lab activities
- Healthy ratio of hands-on interactivity to lectures
- Teach the meteorologists what the bands are *capable* of sensing; let the meteorologists learn what the bands *are* sensing
  - Develop expertise

Leverage Community Resources

- Training materials and presentations that the JMA, Australian BOM, EUMETSAT, COMET, and others have already developed are suitable and relevant
  - Instructors reviewed existing body of training prior to developing content for the new course
- Apply existing resources, update with local examples, then fill any gaps
- Plan to share with the international community
- Contribute to broader US NWS training program

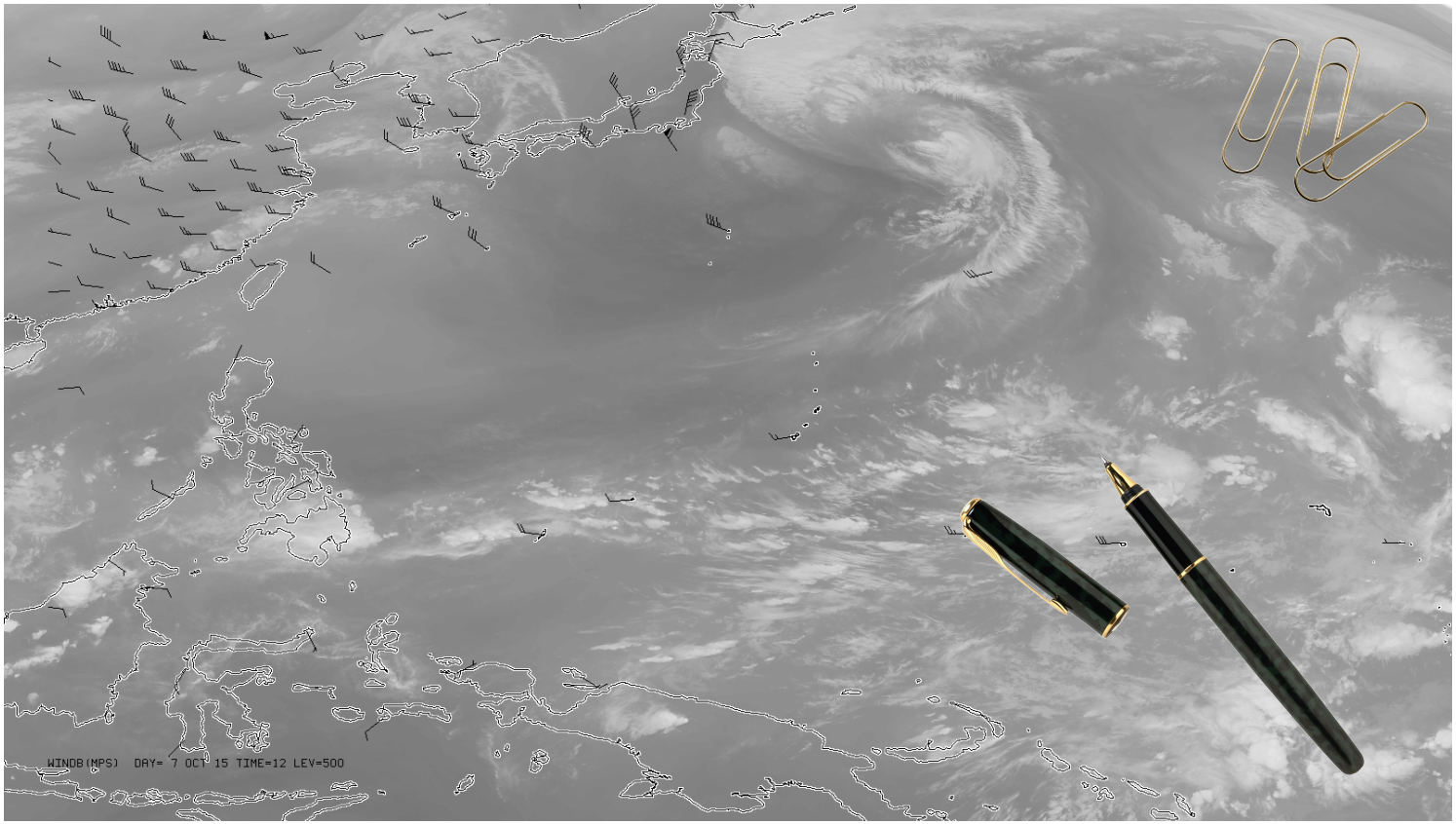
Satellite-Related Training Topics

- Introduction to the new spectral bands
- Weighting functions and their relationship to vertical position of tropospheric features, particularly for the water vapor channels
- Visualization approaches for multi-spectral imagery (RGBs, band differences)
- Evolutionary considerations for the operational forecaster (spatial and temporal resolution)

Meteorological Considerations

- Identifying air masses and features
  - Mesoscale and synoptic
- Aviation meteorology
  - Cloud phase (convection, icing, etc.)
  - Sulfur dioxide and volcanic ash
- Tropical meteorology
  - Typhoons
  - Extratropical transitions
  - Sea surface temperature

Capstone Contouring Exercise



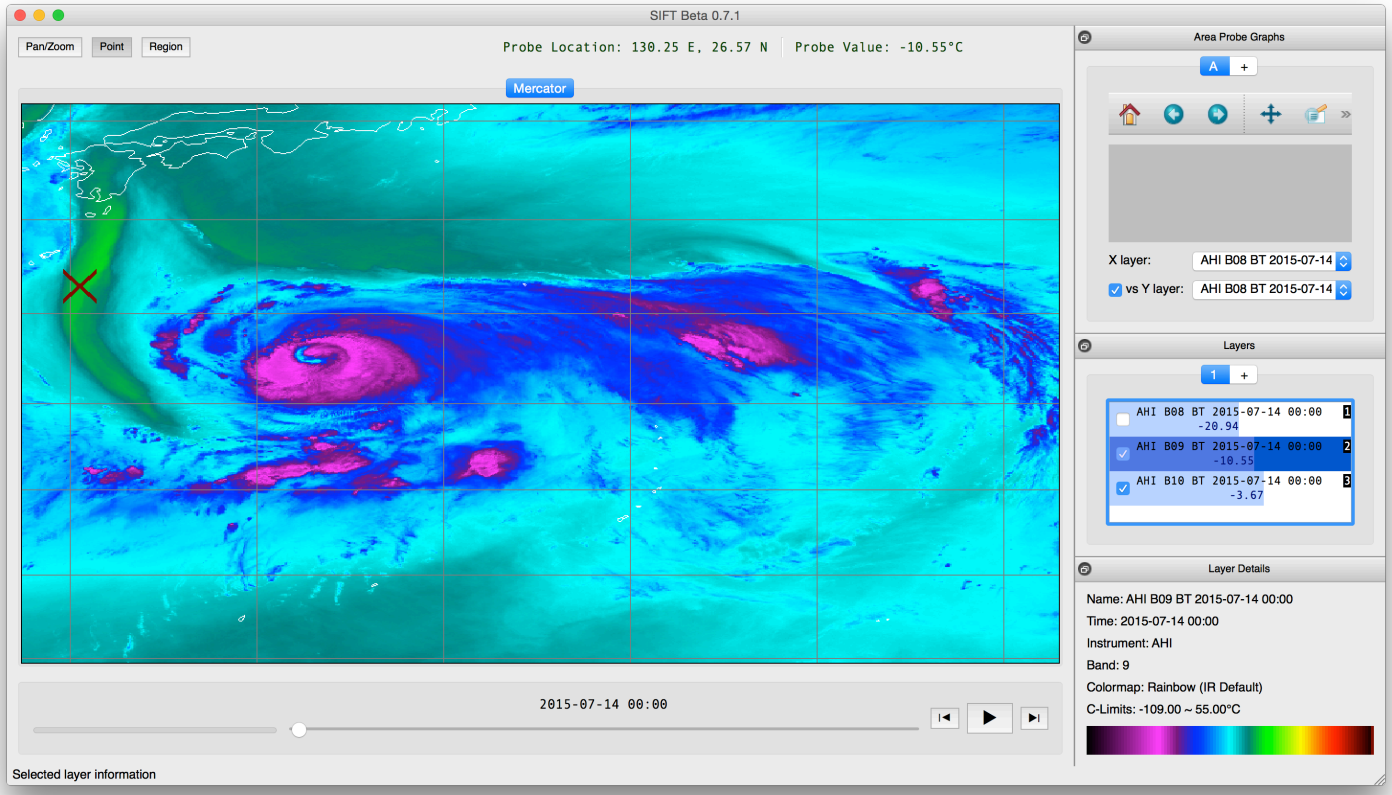
Training Software: SIFT

- Satellite Information Familiarization Tool
- Designed to run on mid-range consumer grade computers and notebooks
  - Windows and Mac
- Built with Python and PyCharm
  - Numerous open source packages: Numpy, MatPlotLib, SciPy, Numba, PyProj, VisPy, PyOpenGL, NetCDF4, H5Py, Pillow, PyShp, Shapely, Rasterio, GDAL
- Supports Mercator projection only (current pre-release)
- Reads GeoTIFFs (current pre-release)

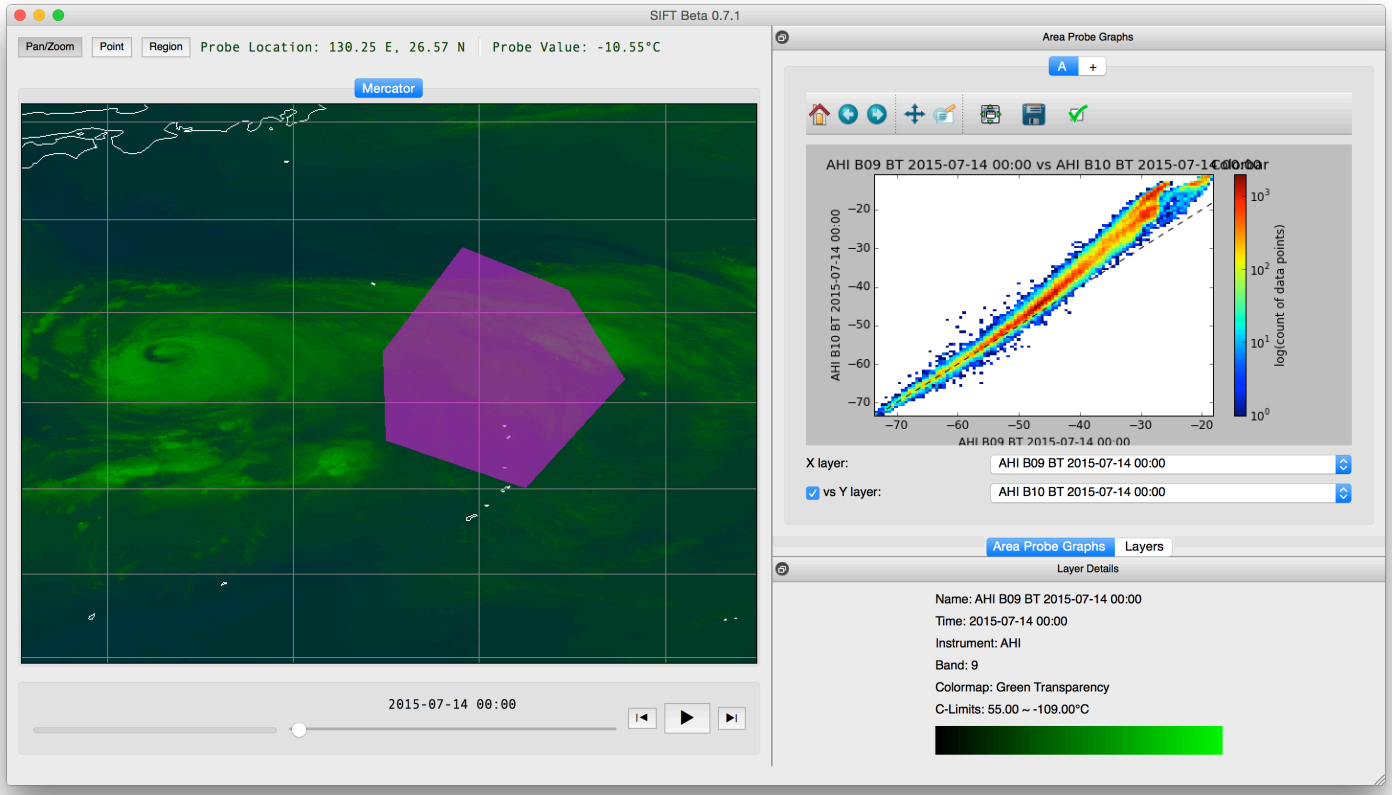
Main SIFT Features

- Loop through multiple bands for a single time, or multiple times for a single band
- Change color enhancement by band
  - Transparent gradients are available
- Seamless panning and zooming across entire full disk, even while looping
- Probe a point to determine reflectance or brightness temperature for all loaded bands
- Create histograms (single band) and density maps (two bands) based on user-defined polygon

SIFT Example



SIFT Example



Future of SIFT

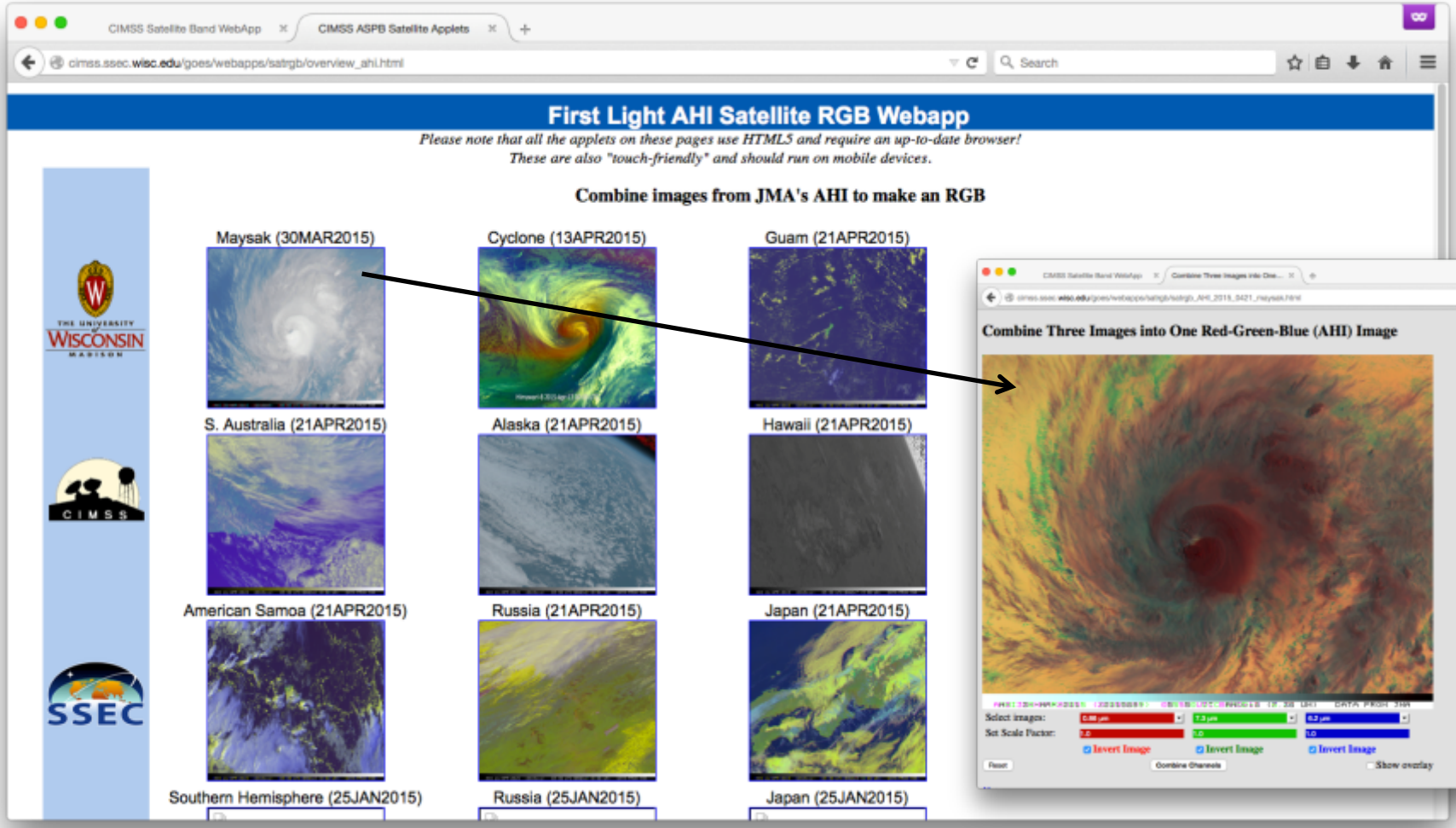
- Many prospective features
  - Possibility to make source code available for community development
- Unique opportunity to reach international community with visualization and data interrogation software for meteorological satellite imagery
  - Plan to support other advanced imagers
- Software could scale to work on tablets and potentially other mobile devices if data is available from a central repository

Web Applications as Learning Tools

- CIMSS hosts web applications ("webapps") to assist learning about the spatial, spectral, and temporal improvements of the Advanced Baseline Imager (ABI), as well as image composites (e.g., RGBs)
  - The use of "webapps" is incorporated into new training course content
  - A number of cases from the Advanced Himawari Imager (AHI) are included
  - Work with modern browsers and usable on newer mobile devices (smartphones, tablets, etc.)

http://cimss.ssec.wisc.edu/education/goesr/

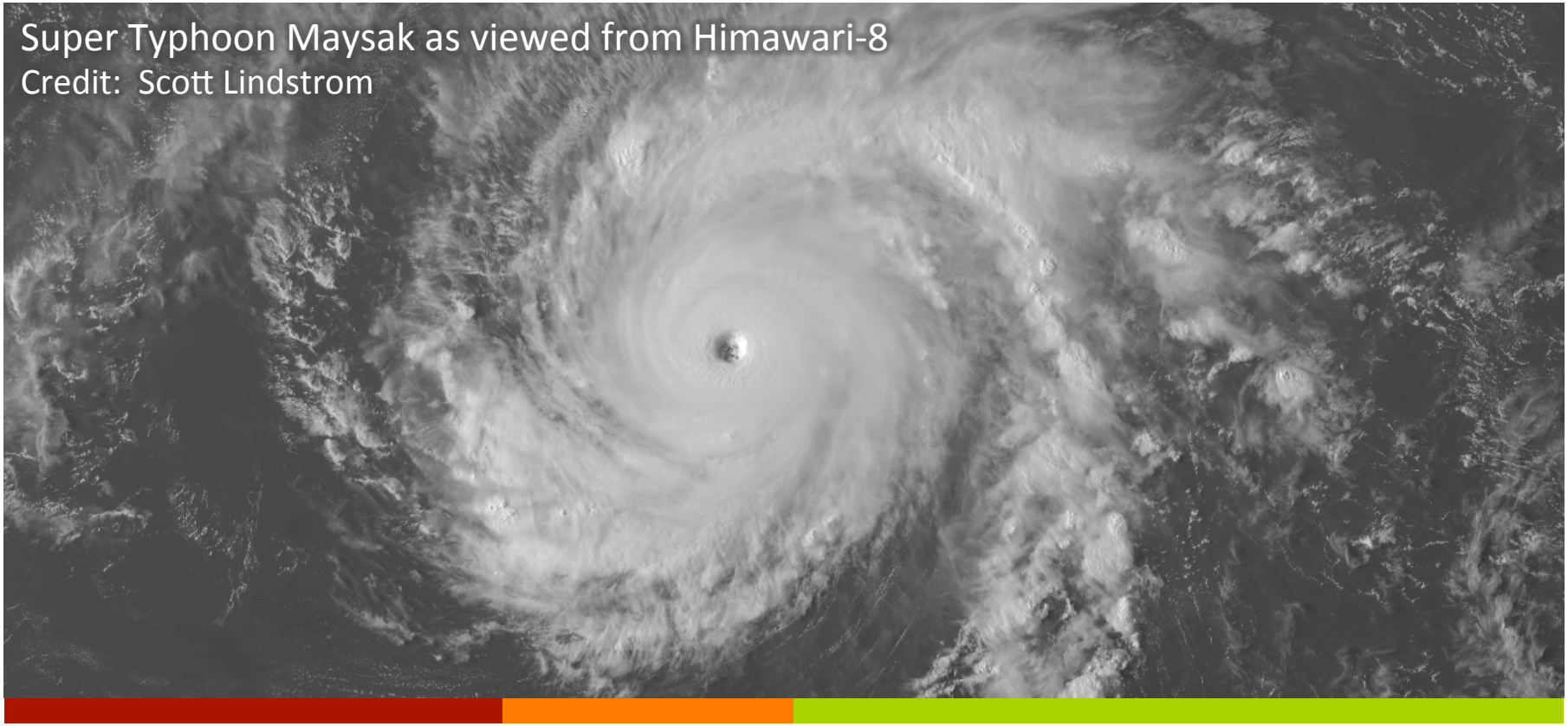
SatRGB Web Application



http://cimss.ssec.wisc.edu/goes/webapps/satrgb/overview_ahi.html

ABI and AHI Band Fact Sheets

http://www.goes-r.gov/



Questions? Comments?

Send me an e-mail:

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Foundational Training Plan

- GOES-R Introduction and SatMet Background Track (240 minutes)
  - Basic principles of radiation (15 minutes)
  - Basic operation of the GOES-R satellites (15 minutes)
  - Spectral bands (90 minutes)
  - Multi-channel interpretation approaches (30 minutes)
  - Baseline products (80 minutes)
- Geostationary Lightning Mapper Track (40 minutes)

Foundational Training Plan

- Mesoscale/Convection Track (120 minutes)
  - Pre-convective environment
  - Features
  - Convective evolution
- Synoptic Features Track (80 minutes)
  - Cyclogenesis
  - Jet features and general circulation patterns
  - Atmospheric Rivers
  - Tropical to Extratropical Transition
- Numerical Weather Prediction and Data Assimilation Track (30 minutes)