Jet Propulsion Laboratory
California Institute of Technology

CPEX Portals Status and Updates

Svetla Hristova-Veleva, **Brian Knosp, P. Peggy Li, Quoc Vu,** F. Joe Turk
Bjorn Lambrigtsen, Hui Su, Shuyi Chen, Ed Zipser

CPEX Science Team Meeting
July 16th , 2019

Jet Propulsion Laboratory
California Institute of Technology

CPEX Portals Status and Updates

Acknowledgements:

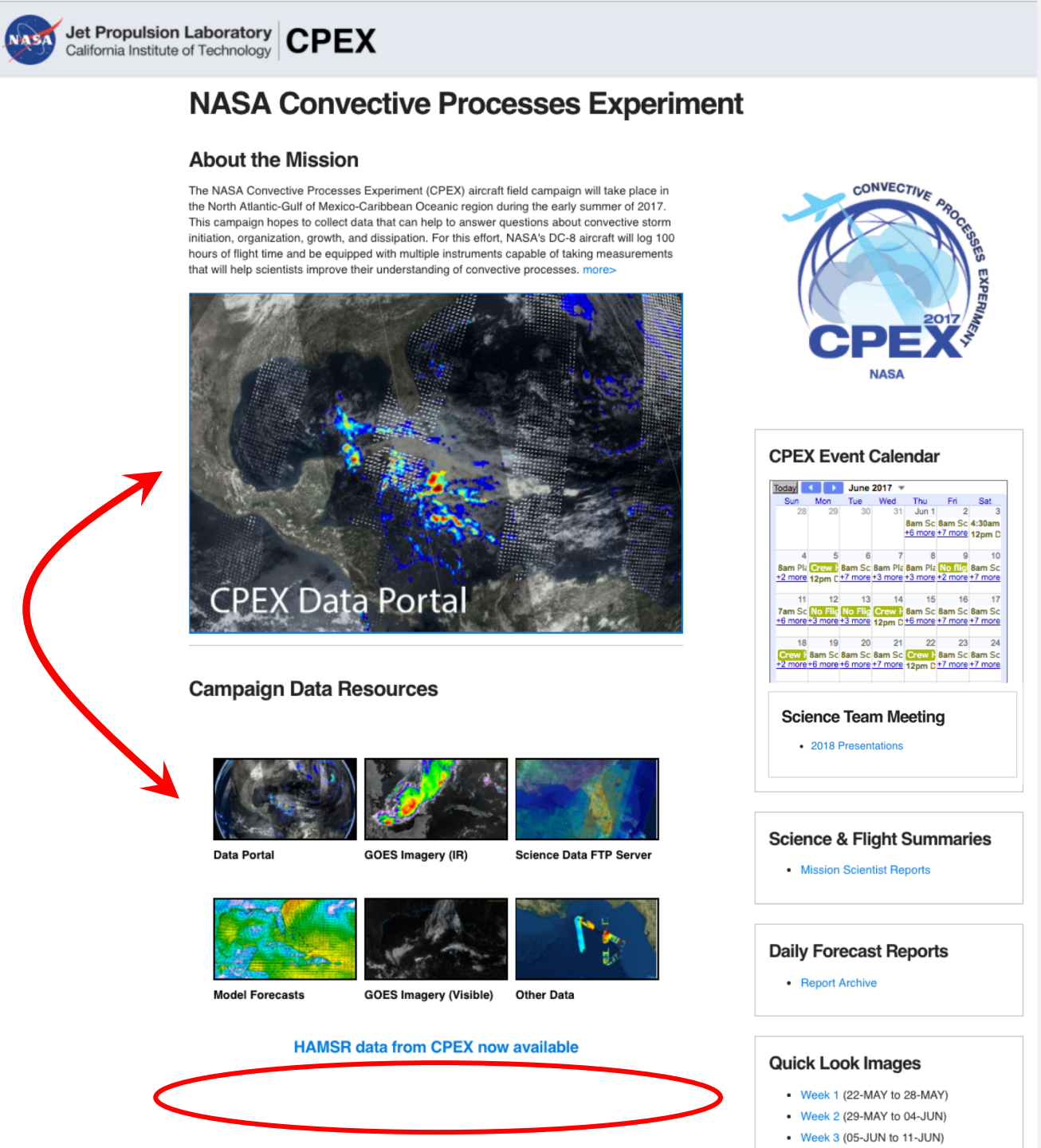
- previous NASA funding (HSRP and ESTO/AIST) resulted in JPL developing the capability to quickly stand-up NRT visualization portals that combine data from a variety of instruments and models
- Because of that, CPEX portals were developed in a very short time.

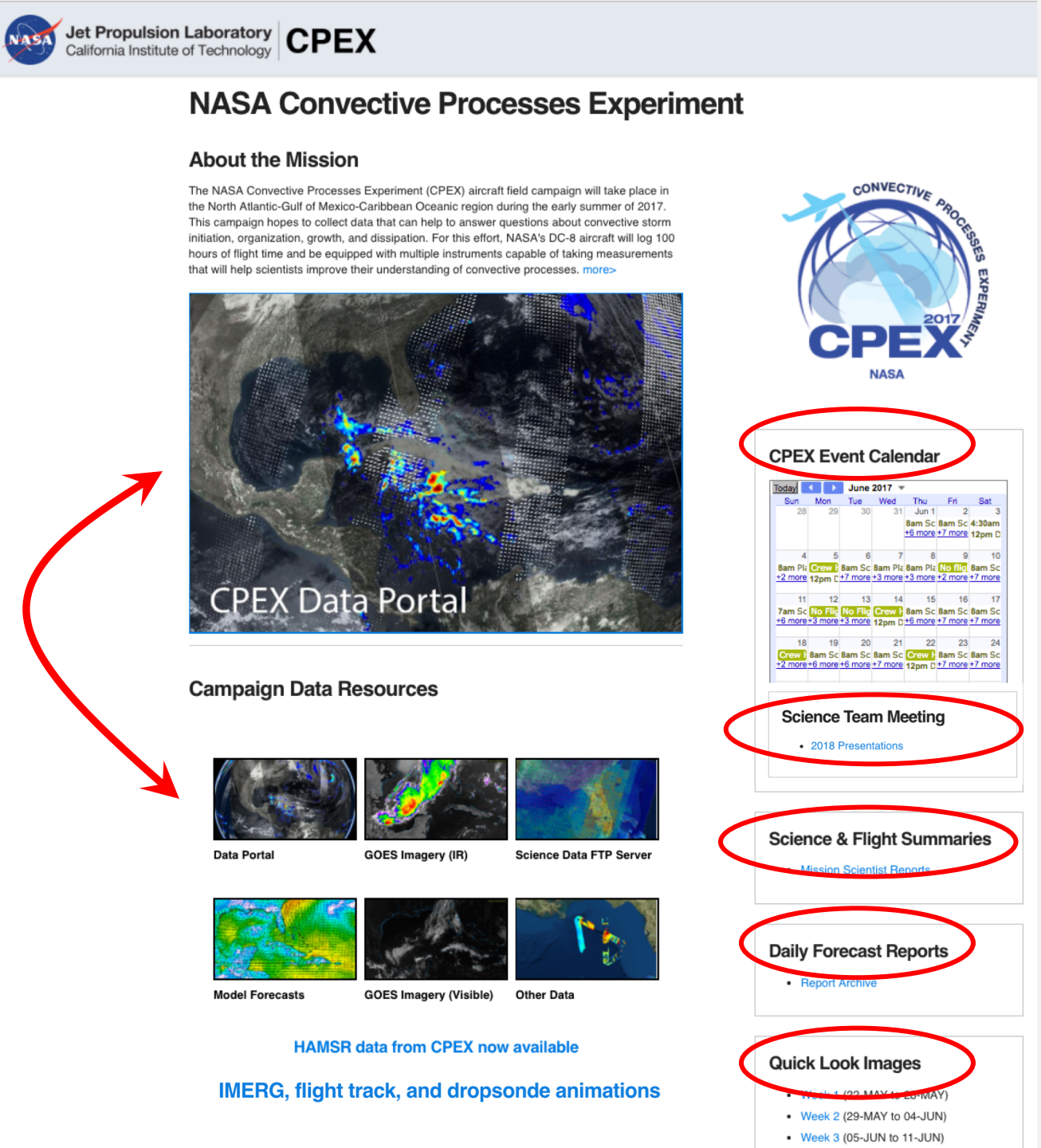
- Note: with support from the science grants of several PI's

CPEX Home Page

https://cpex.jpl.nasa.gov

- **Served as the official project website,**





CPEX Home Page

https://cpex.jpl.nasa.gov

- **Served as the official project website, offering the following resources:**
  - Event Calendar
  - Science Team Meetings
  - Flight and Science Summaries
  - Daily Forecast Reports
  - Quiklook Images
  - Information about aircraft and instruments
  - Team contact information & campaign image gallery

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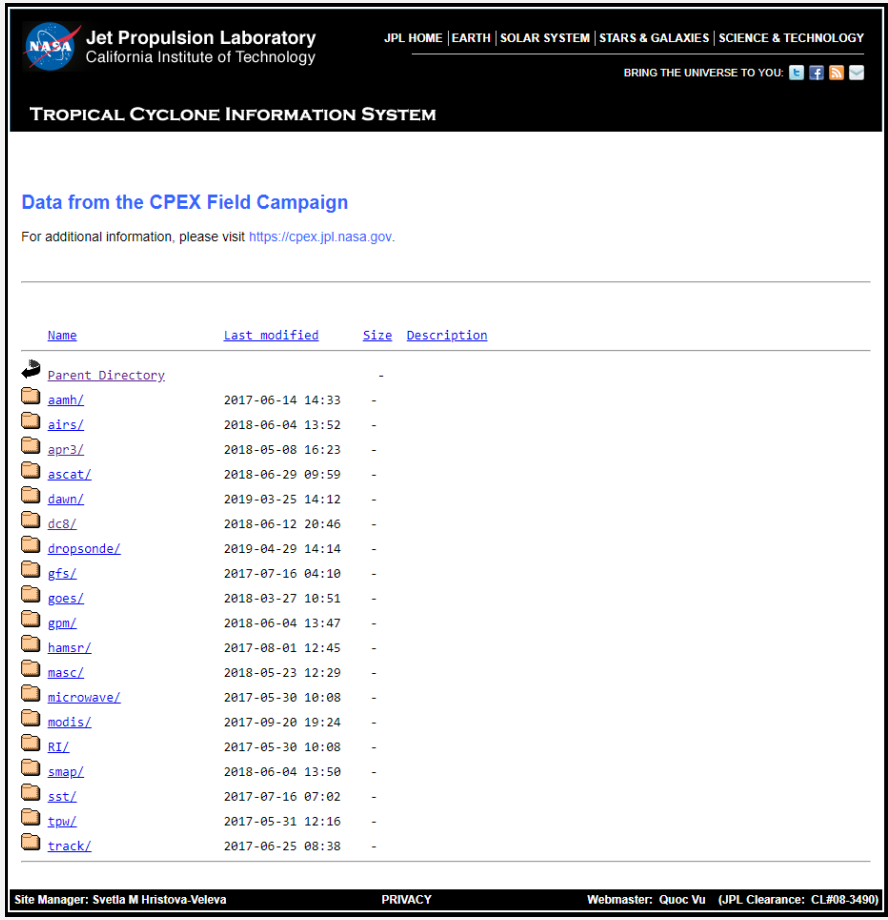
  - **Gateway to related data resources –**
    - **JPL Data Portal (https://cpexportal.jpl.nasa.gov)**
    - **Science Data Repository for all observed data and GFS**
    - **Model Forecast pages, etc. (Shuyi and team)**
    - **Flight animations courtesy Ed Zipser and Mani**

CPEX Science Data Repository

https://tcis.jpl.nasa.gov/data/cpex/

(replaces the previously available CPEX FTP website, but the same data is available)

- For easy download, data is organized by instruments and dates/flights, including:
  - satellite data CPEX airborne data GFS model forecasts
- **Satellite data** is subsetted into the CPEX domain for the campaign time period
  - **Cloud and Precipitation**
    - GOES (IR, VIS, water vapor)
    - Microwave (GPM constellation) - microwave brightness temperature (AMSR2, GMI, SSMIS) and JPL Rain Indicator product
    - Level 3 precipitation product IMERG GPM,
  - **Thermodynamics** - AIRS L2, TPW from Metop-B, NOAA-18 and NOAA-19, AAMH Microwave sounder data product from AMSU-A and MHS,
  - **Surface**
    - Wind ASCAT Wind, SMAP wind speed, (CYGNSS only for visualization)
    - SST - MUR 1km SST
  - **Aerosol Loading** - MODIS AOT from Terra
- **The latest airborne CPEX science quality data** is made available by the instrument PIs
  - HAMSR, APR3, dropsonde, DAWN and DC8 flight tracks.
- **Daily GFS forecast** at 00Z for 120 hours at every 12 hours interval
  - Relative humidity, temperature, wind vectors, vertical velocity at different pressure levels; sfc and integral



CPEX Data Portal

https://cpexportal.jpl.nasa.gov

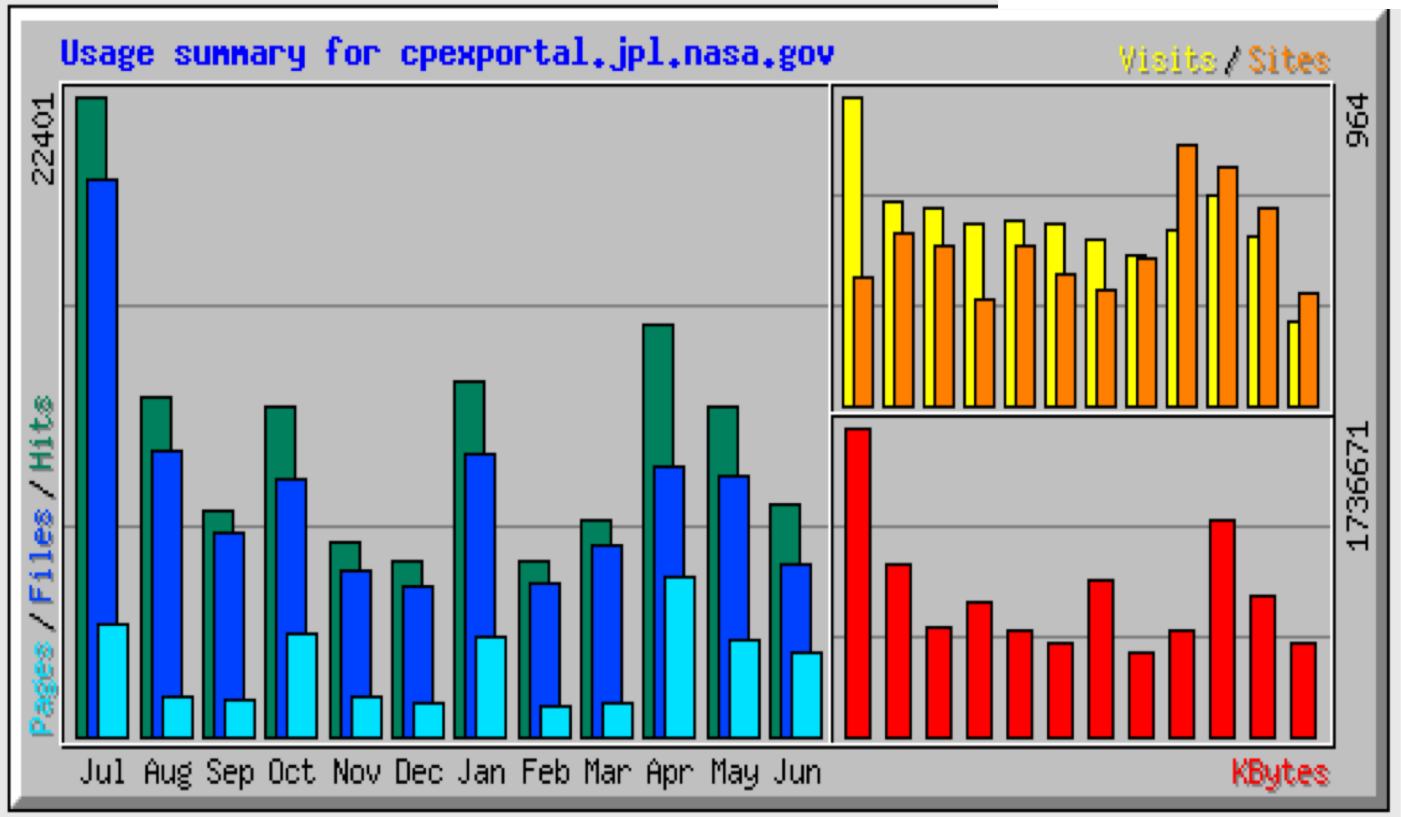
- **Integrates model forecasts with satellite and airborne observations from a variety of instruments and platforms, allowing for easy model/observations comparisons**
  - **Visualization** of satellite data, model forecast, and airborne data products on a 3D global Earth using Cesium (a Google Earth-like web-based 3D Virtual Globe Platform).
- **Allows interrogation of a large number of atmospheric and ocean variables to better understand the large-scale and storm-scale processes** associated with tropical convection.
  - **Overlays multiple types** of products with opacity adjustment and separate calendars for model and data for easy comparison.
  - **On-line analyses Tolls** - Allows access to raw data associated with the images for interactive analysis.
    - Subsetting tools are built in so users can select circular or rectangular areas, lines, or points on the globe.
    - MySQL and Solr databases are used to provide temporal and geospatial search to find the satellite swaths that intersect with the selected area.
- **Provides very rich information source during the analysis stages of the field campaign.**
  - Supports data exploration and visual investigation of all the relevant data products that describe the physical processes in the CPEX domain before, during, and after the campaign.

CPEX Data Portal

https://cpexportal.jpl.nasa.gov

- The CPEX Data Portal received a total of 6,527,569 visits from 10,639 users from October 2017 - June 2019 (logs during the CPEX campaign period were lost during an server OS upgrade)

- During that time period, users viewed/downloaded ~17GB of plots



Information in the above chart shows the last 12 months of site traffic.

UPDATES

- DAWN – V5 winds
- Presentations from the 2018 Science Team meeting
- Ed's and Mani's movies

What is next

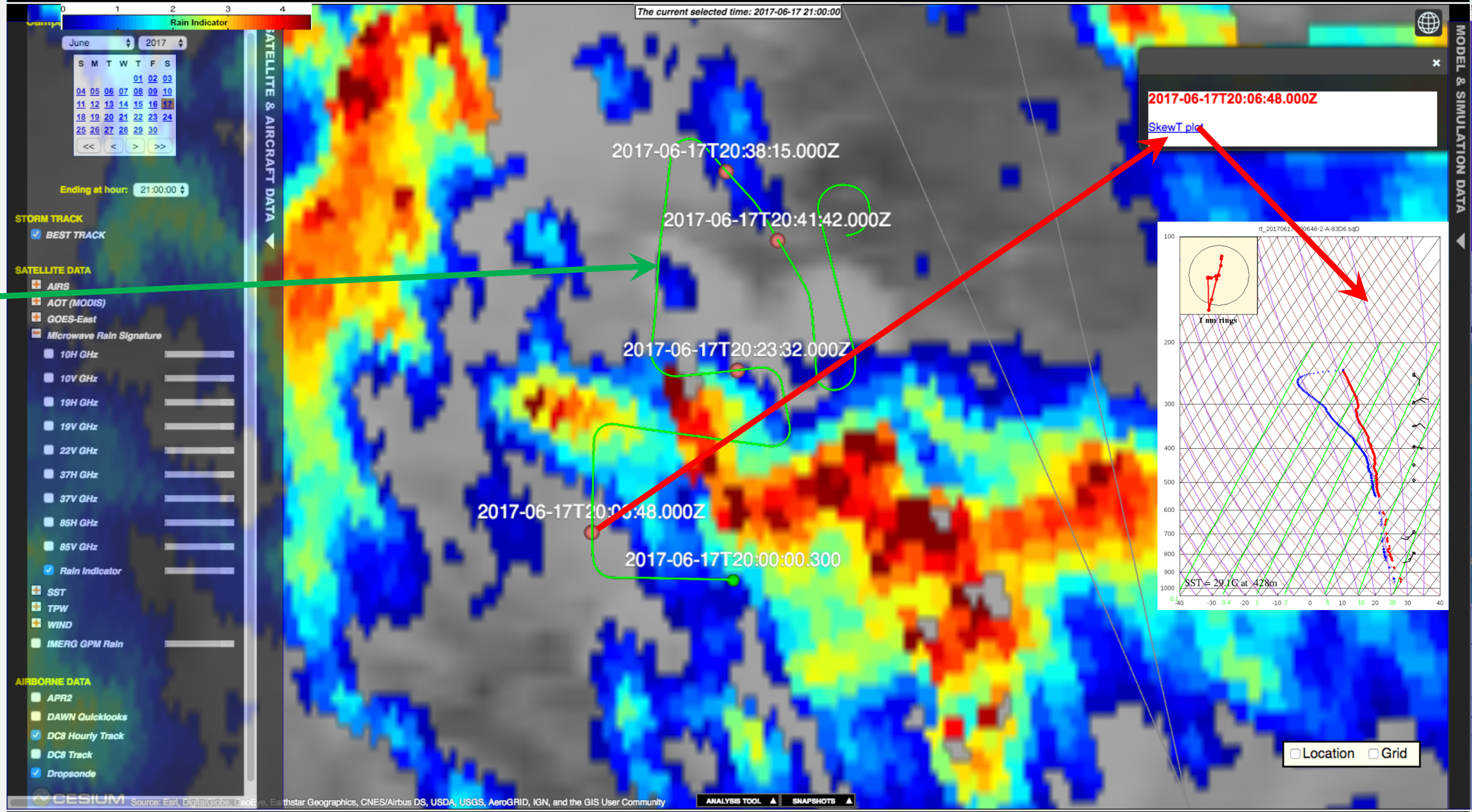
- Do we have new versions of the data (digital and quick looks)
  - Get DAWM new Quick looks …?
- Do we have some analyses we want to put out for the benefit of the community
- Presentations from this meeting
- Ajda's movies

Background

Airborne data in the CPEX data portal with Satellite data providing the large-scale context for the airborne observations

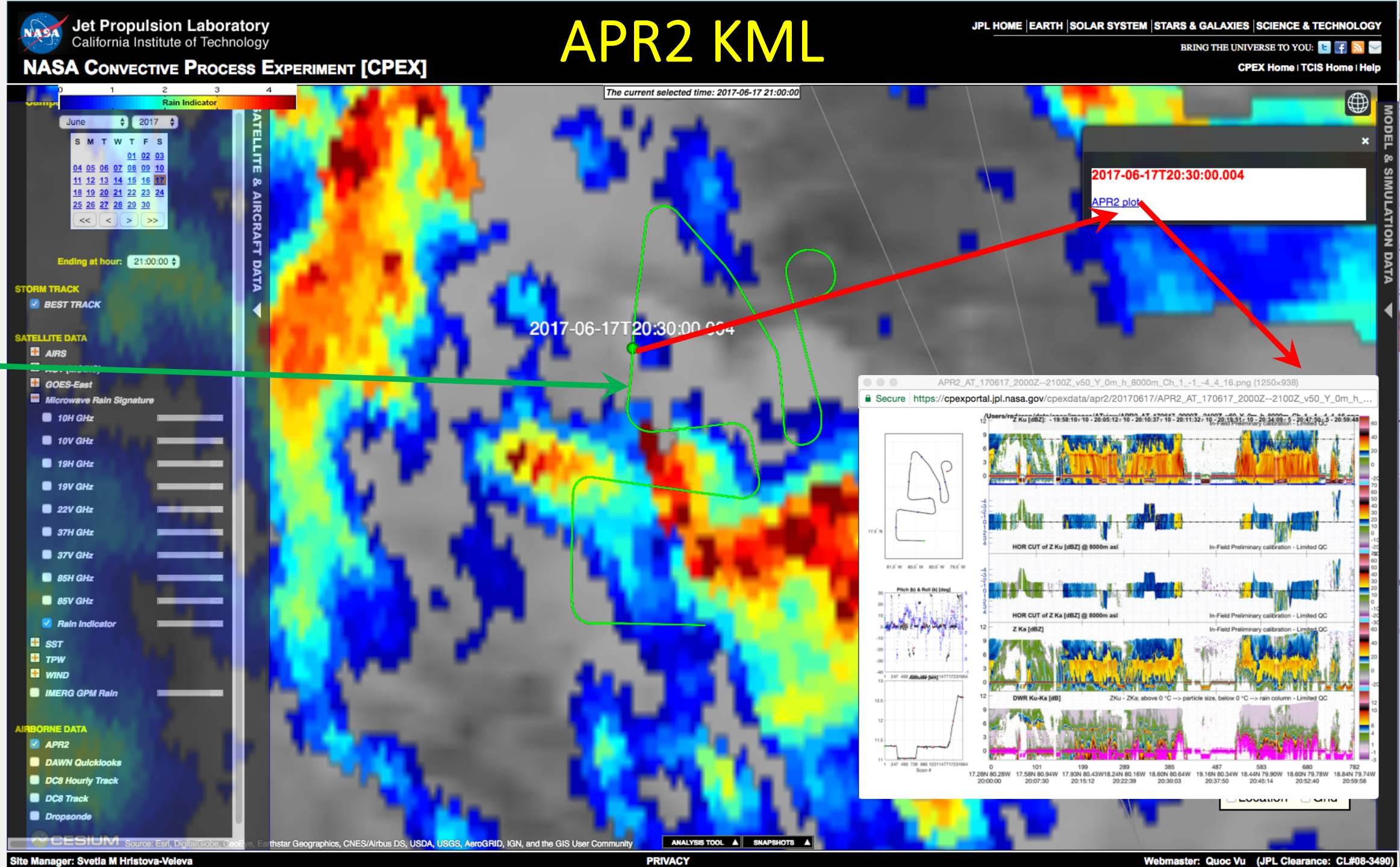
Dropsondes (KML)

Hourly Tracks



APR2 KML

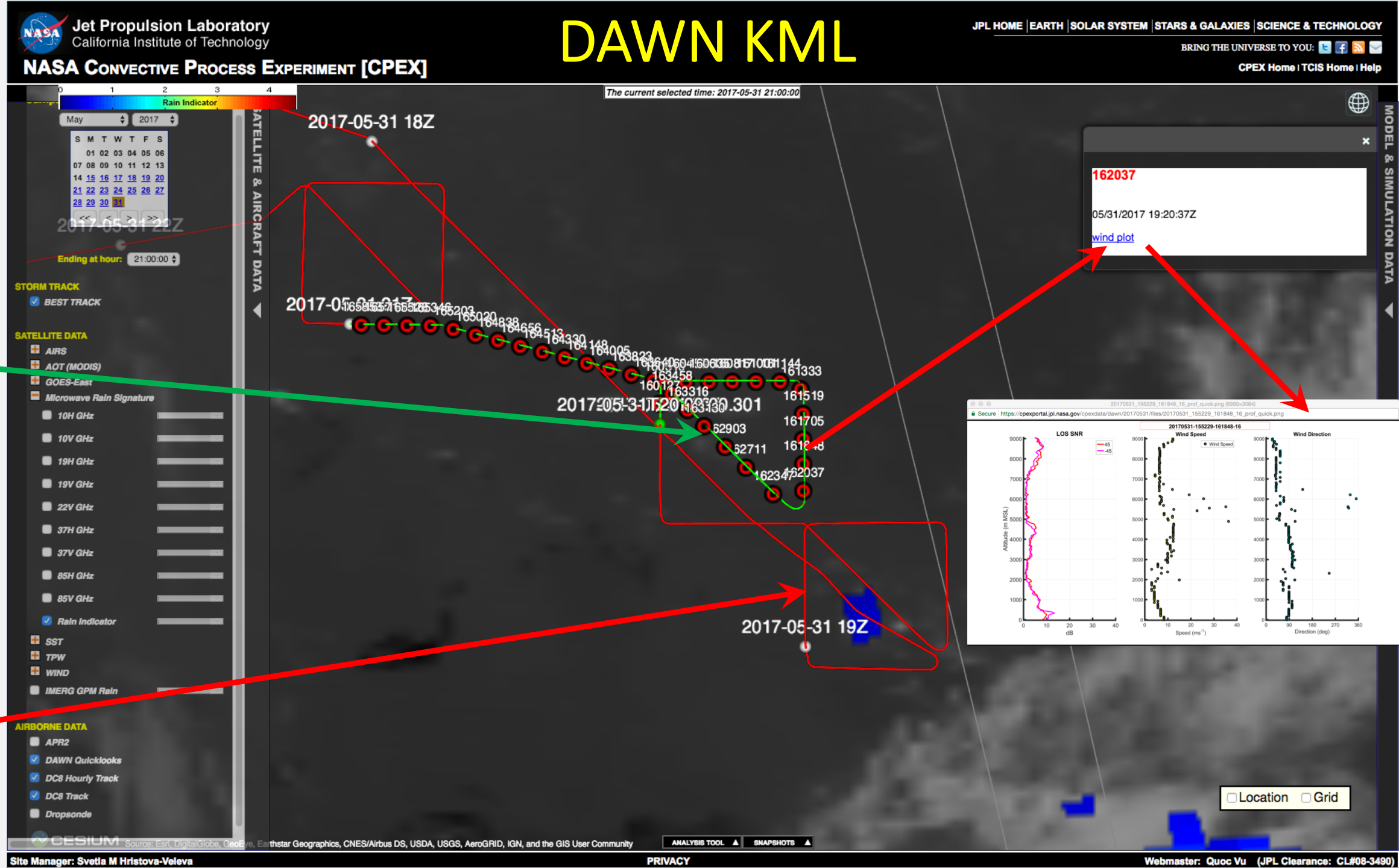
Hourly Tracks



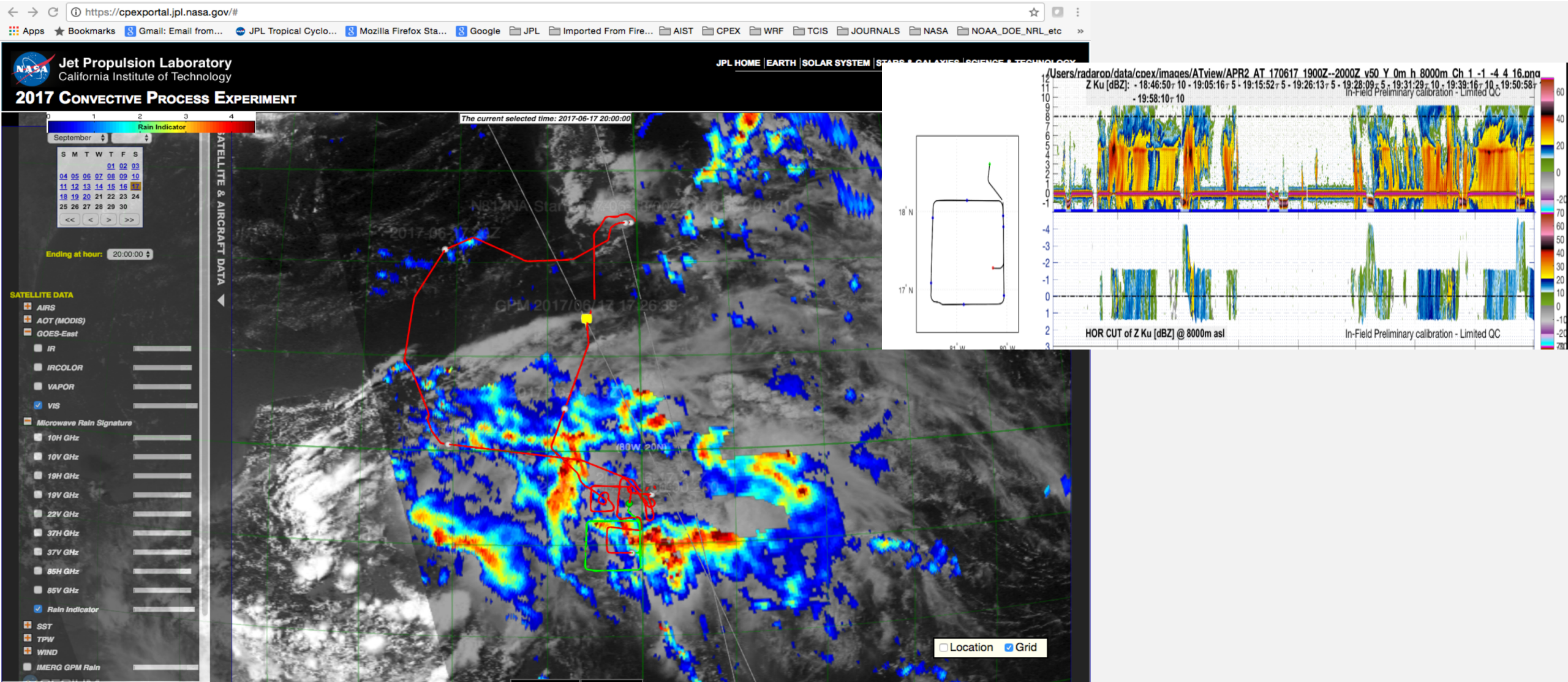
DAWN KML

Hourly Tracks

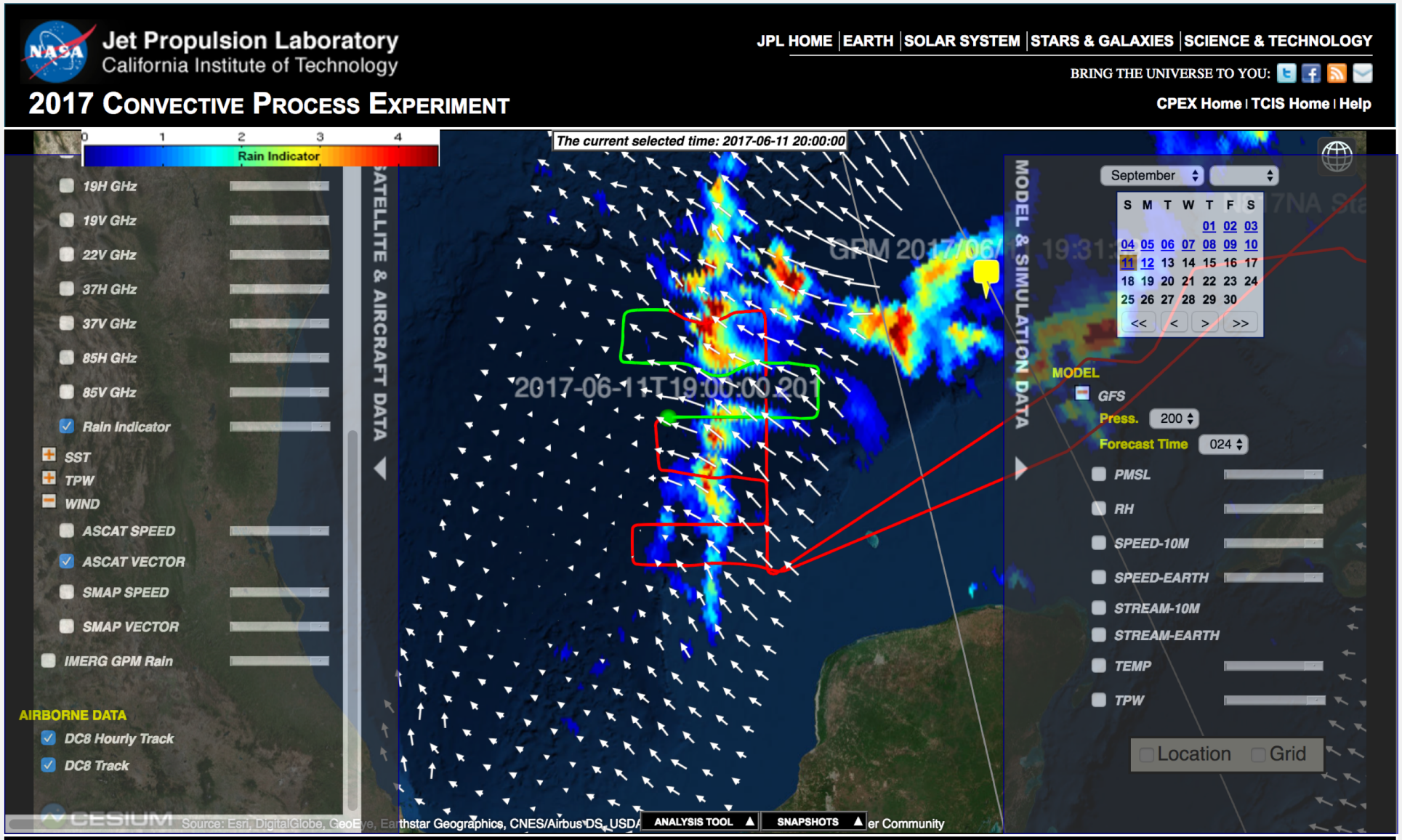
Mission Tracks



Satellite and Airborne observations of TS Cindy, collected during NASA's CPEX.
Illustrated is the storm structure during the hurricane formation stages on June 17th 2017. The DC-8 flight track (in red) is plotted over the the visible and passive microwave satellite observations, with the latest hour of the flight plotted in green. The inset shows the APR-2 observations of the storm structure.
Such data, and more are available from the CPEX web site (https://cpex.jpl.nasa.gov) that was developed at JPL.



Satellite Data - The June 11 case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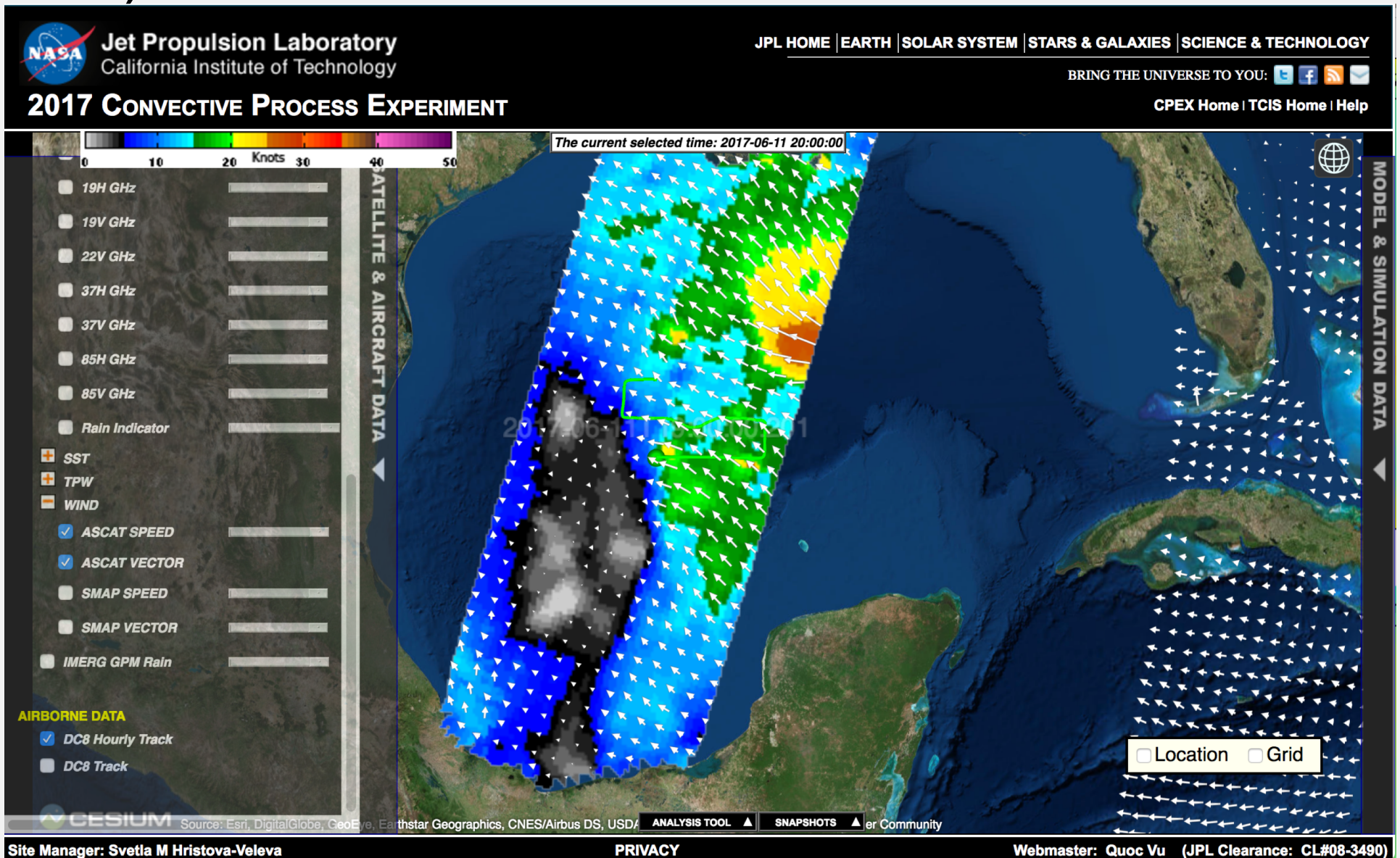
JPL HOME | EARTH | SOLAR SYSTEM | STARS & GALAXIES | SCIENCE & TECHNOLOGY
BRING THE UNIVERSE TO YOU:
2017 CONVECTIVE PROCESS EXPERIMENT
CPEX Home | TCIS Home | Help
0 1 2 3 4
Rain Indicator
The current selected time: 2017-06-11 20:00:00
SATELLITE & AIRCRAFT DATA
19H GHz
19V GHz
22V GHz
37H GHz
37V GHz
85H GHz
85V GHz
Rain Indicator
SST
TPW
WIND
ASCAT SPEED
ASCAT VECTOR
SMAP SPEED
SMAP VECTOR
IMERG GPM Rain
AIRBORNE DATA
DC8 Hourly Track
DC8 Track
2017-06-11T19:00:00.201
MODEL & SIMULATION DATA
September
S M T W T F S
01 02 03
04 05 06 07 08 09 10
11 12 13 14 15 16 17
18 19 20 21 22 23 24
25 26 27 28 29 30
<< < > >>
MODEL
GFS
Press. 200
Forecast Time 024
PMSL
RH
SPEED-10M
SPEED-EARTH
STREAM-10M
STREAM-EARTH
TEMP
TPW
Location
Grid
CESIUM
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA
ANALYSIS TOOL
SNAPSHOTS
er Community

ASCAT; 16Z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2017 Convective Process Experiment
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The current selected time: 2017-06-11 20:00:00
0 10 20 Knots 30 40 50
SATELLITE & AIRCRAFT DATA
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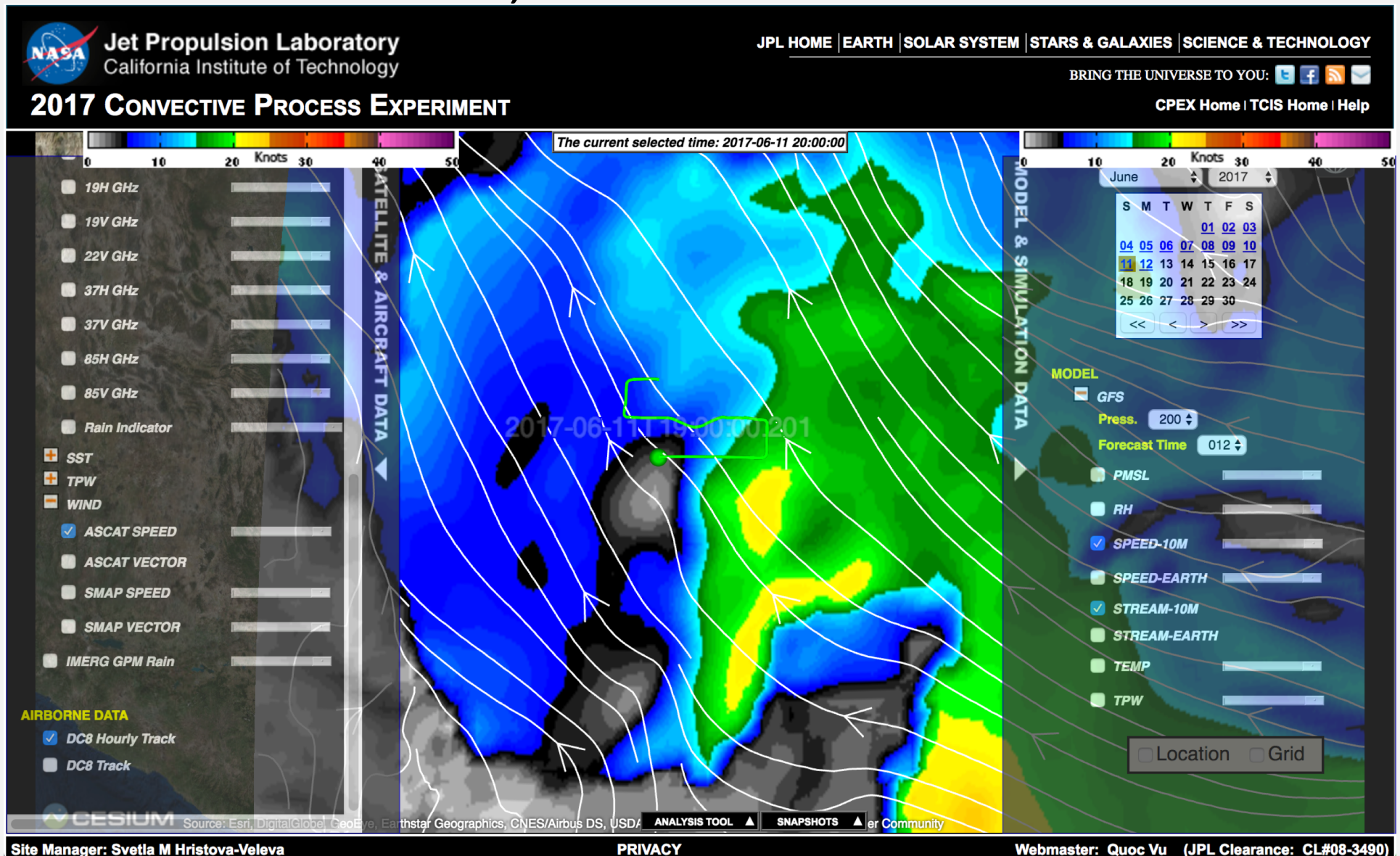
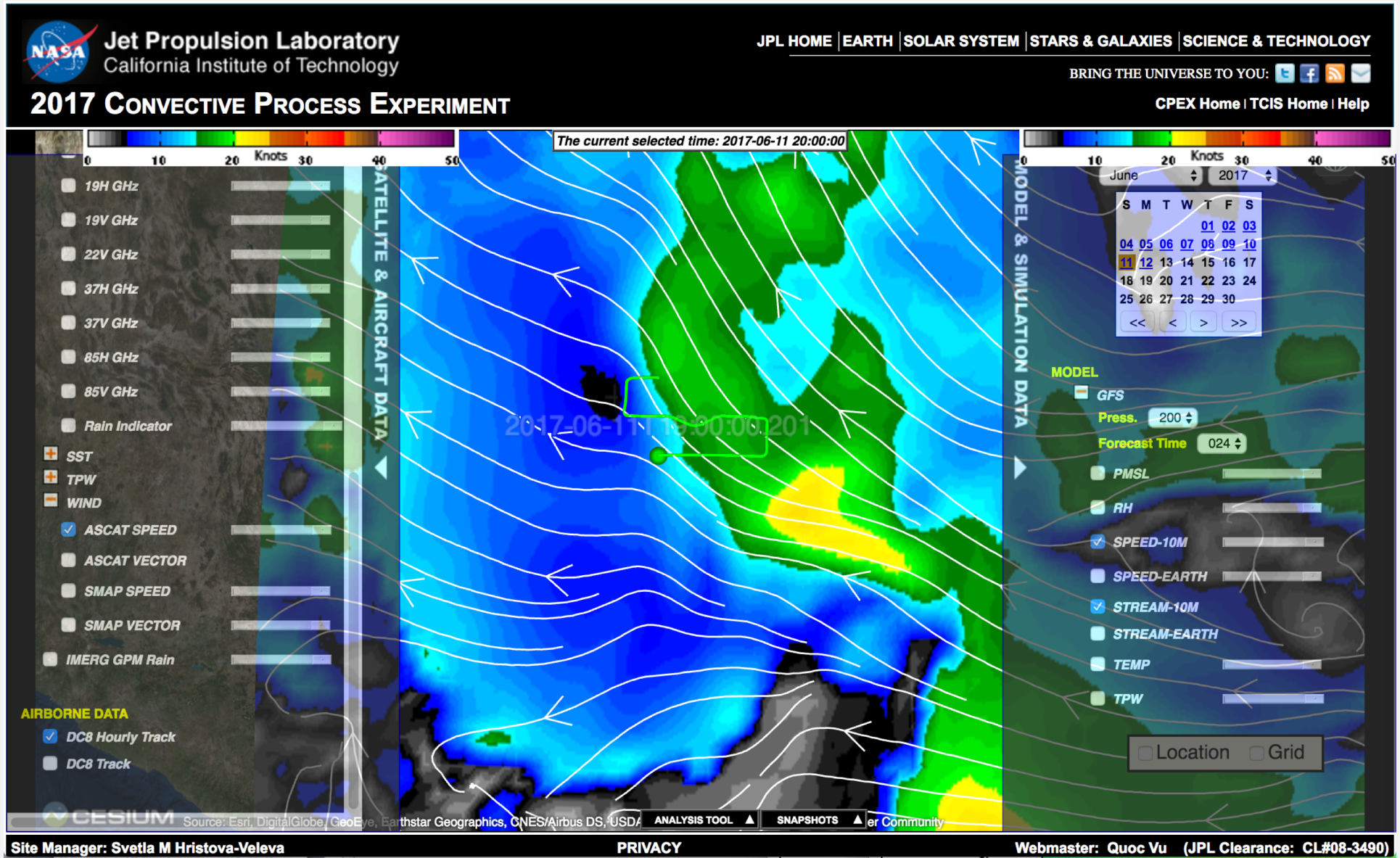
SNAPSHOTS
er Community
Site Manager: Svetla M Hristova-Veleva
PRIVACY
Webmaster: Quoc Vu (JPL Clearance: CL#08-3490)

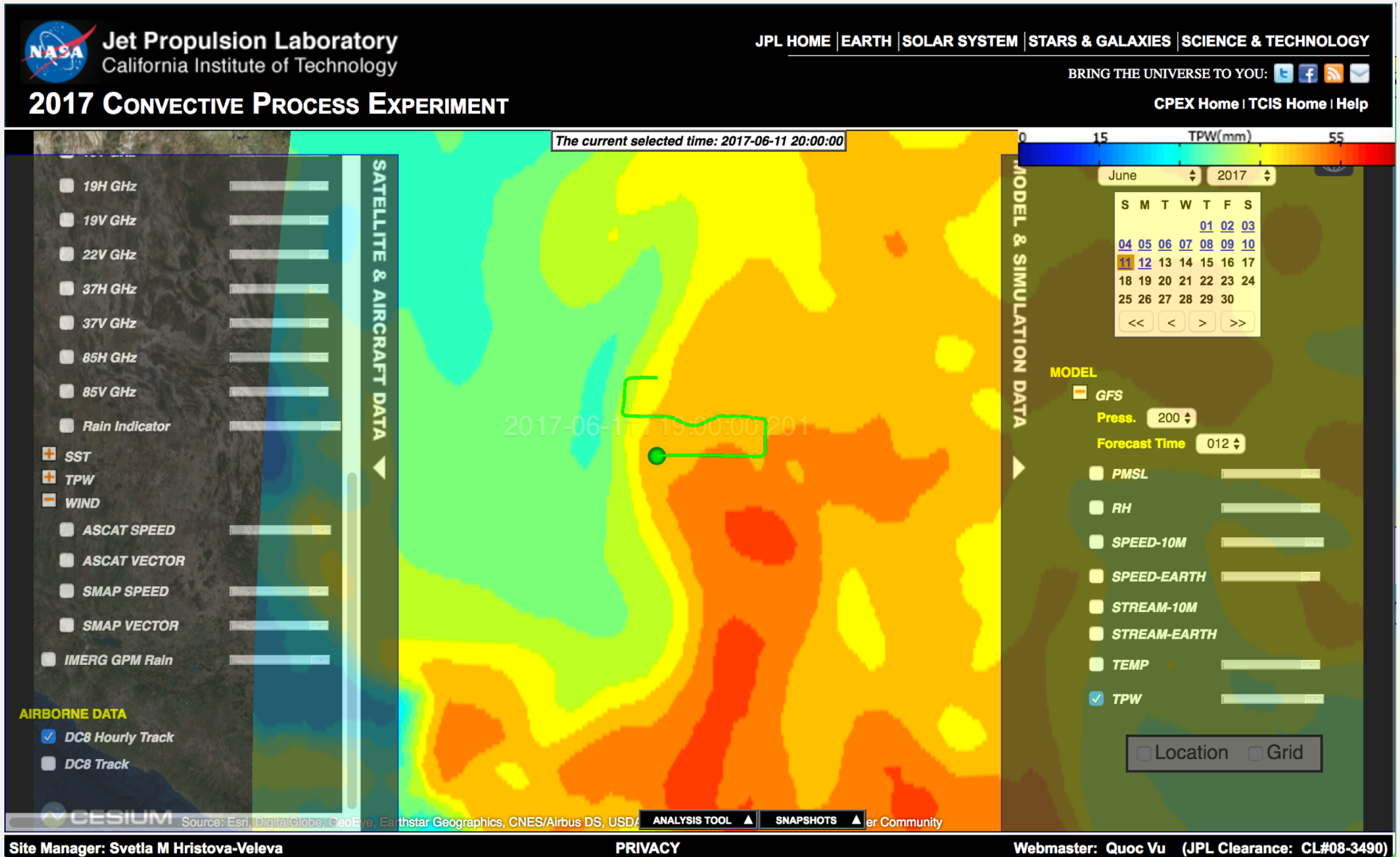
GFS: 12h forecast; valid at 12Z



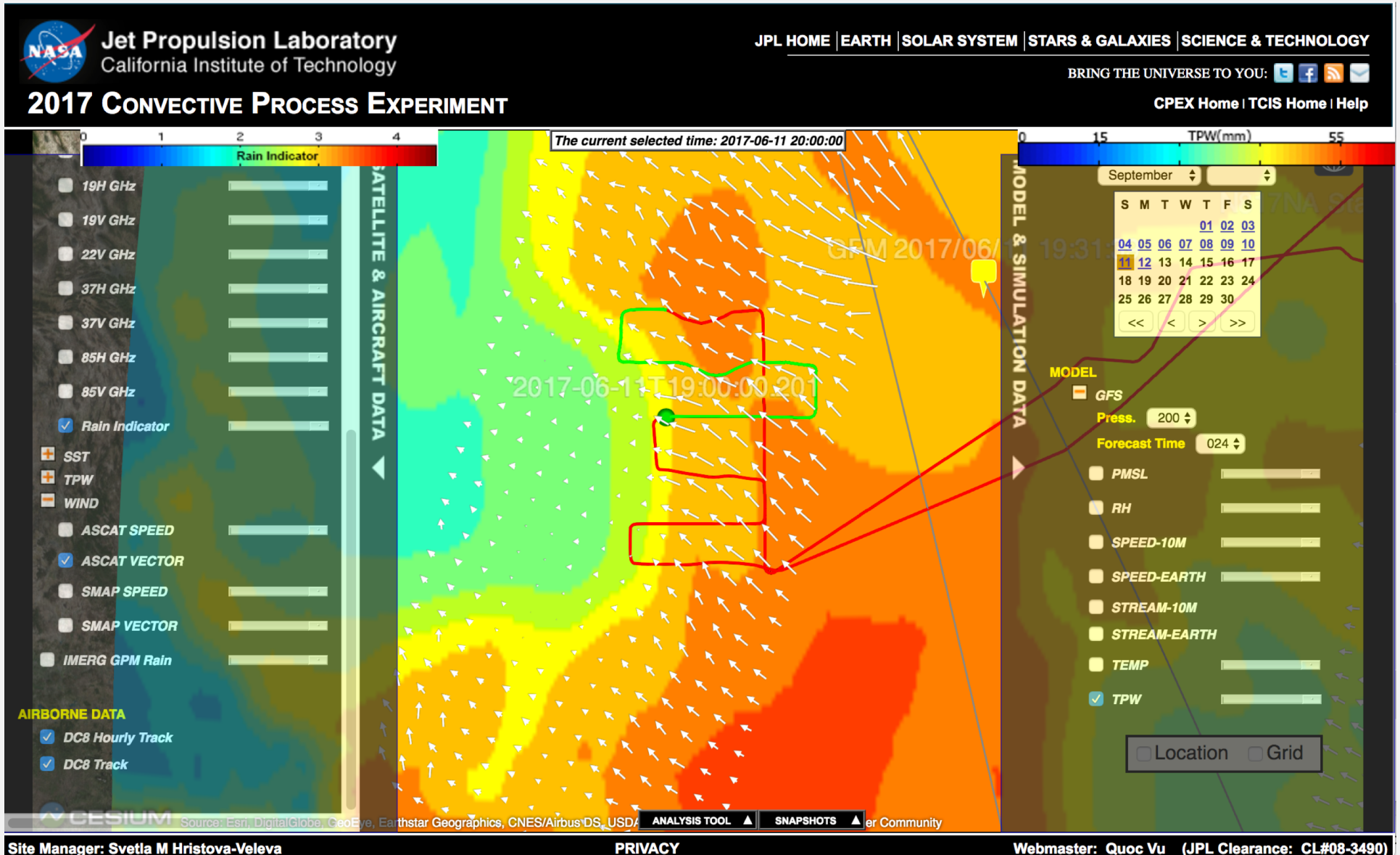
GFS: 24h forecast; valid at 00Z on the 12th



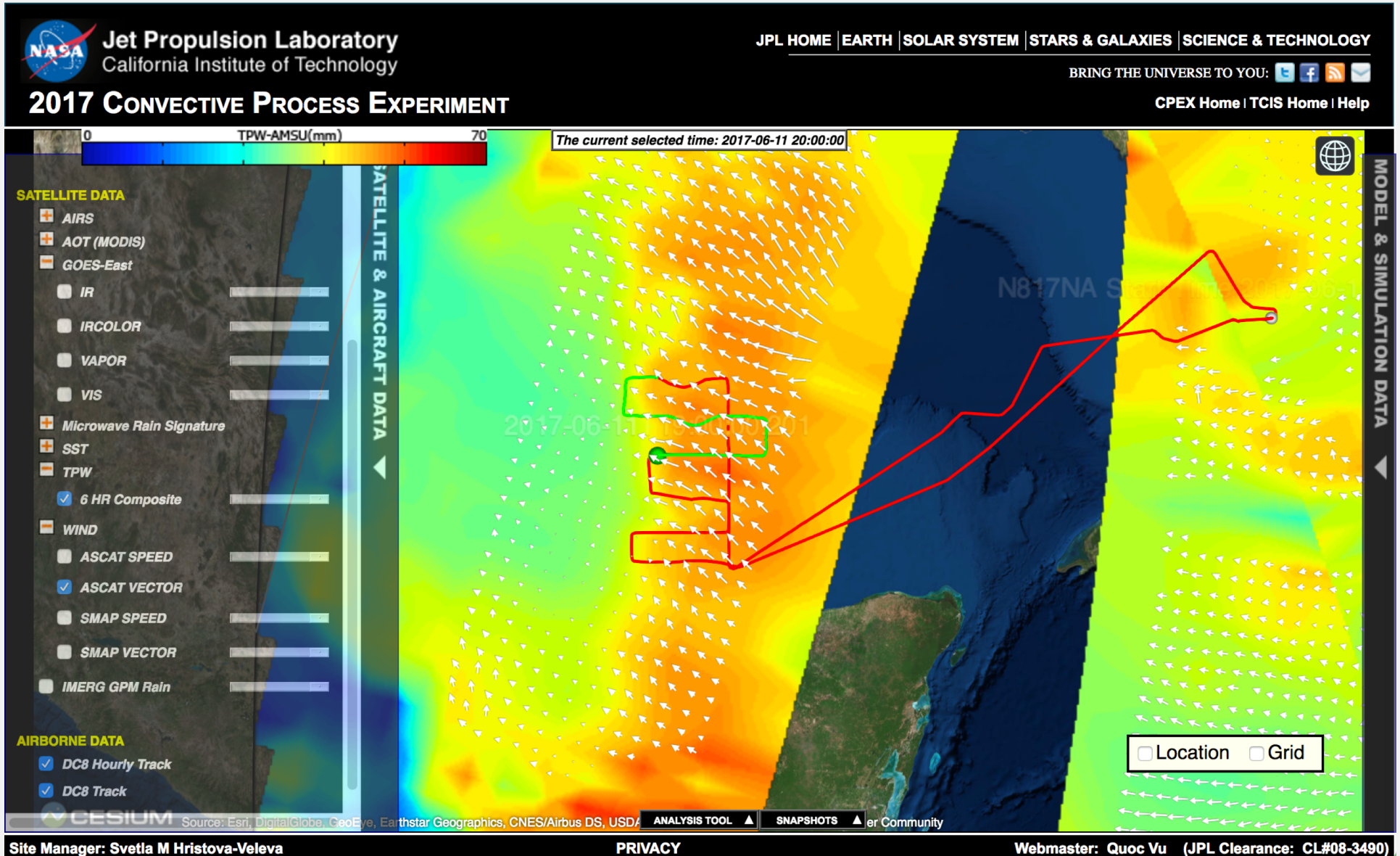
GFS: TPW; 12h forecast, valid at 12Z on the 11th



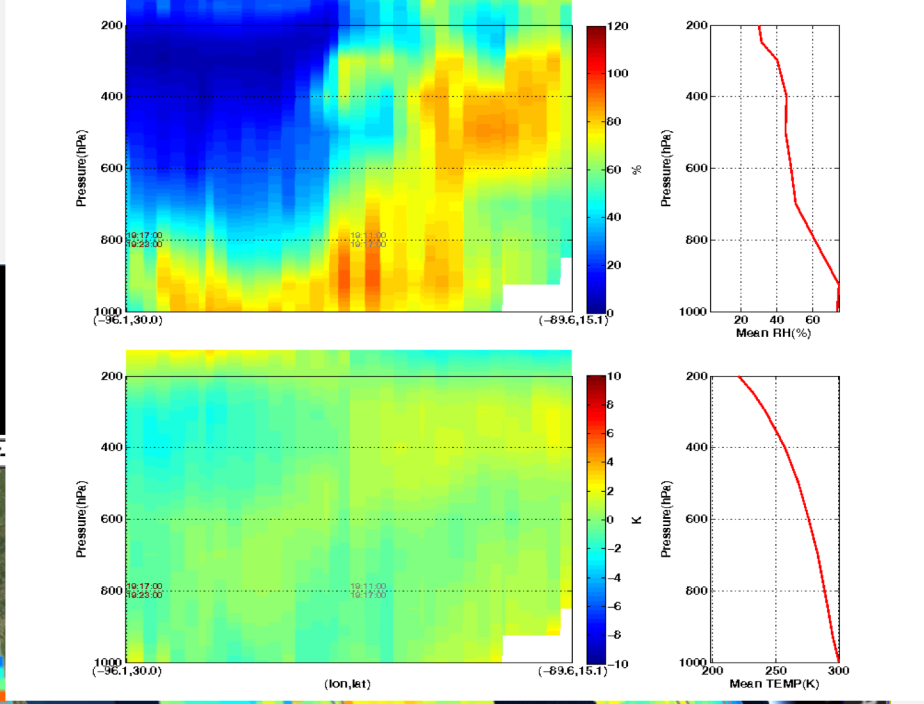
GFS: TPW; 24h forecast, valid at 00Z on the 12th
ASCAT at 16Z On the 11th



TPW from AMSU; 6h composite at 20Z
ASCAT at 16Z On the 11th



AIRS; Relative humidity at 200 mb
The “Slicer” Analysis Tool



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NORTH ATLANTIC HURRICANE WATCH [NAHW]

The current selected time: 2017-

Ending at hour: 21:00:00

SATELLITE DATA
AIRS
CAPE
LI
RH Press. 200
TEMP Press. 200
AOT (MODIS)
GOES-East
IR
IR 2 Day Animation
IRCOLOR
VAPOR

SATELLITE & AIRCRAFT DATA

ANALYSIS TOOL
Line
Left: -89.(15.0 Go
Right: -96.(30.0 Go
Center: -92.(22.5 Go
1: RH_AIRS
2: N/A
3: N/A
png
Submit Cancel

GOES-West
VIS
VAPOR
Microwave Rain Signature

Status Bar Grid

AGGREGATION QUERY
SNAPSHOTS

Site Manager: Svetla M Hristova-Veleva PRIVACY Webmaster: Quoc Vu (JPL Clearance: CL#08-3490)

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The “Slicer” Analysis Tool