# SNPP Atmosphere SIPS Update

MODIS/VIIRS Science Team Meeting

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# SIPS Team

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# Topics

1. VIIRS Level 1B data
2. MODIS/VIIRS inter-calibration match files
3. Quicklook images on SIPS website
4. Level 2 product formats and metadata
5. Issue tracking via Jira website

# 1. VIIRS Level 1B Data

# VIIRS Level 1B Data Production
# *No major changes*

- Atmosphere SIPS has created VIIRS L1B data for the entire SNPP mission (starting March 1, 2012), starting with archived Level 0 data.

  Software version is v1.1.0 (Mar 2016).

  LUTs are updated monthly (provided by VCST).
- VIIRS L1B data are produced routinely in forward stream from time-based Level 0 data (latency around 6 hours) and session-based Level 0 data (latency around 2 hours)

# VIIRS Level 1B Data Access
## *No major changes*

SIPS FTP site: ftp://sips.ssec.wisc.edu/viirs/snpp

sipssci1.ssec.wisc.edu: /mnt/dawg/viirs/snpp

```
VL1BM/v1.1.0/yyyy/ddd  (M-band observations)
VL1BI/v1.1.0/yyyy/ddd  (I-band observations)
VL1BD/v1.1.0/yyyy/ddd  (DNB observations)
VGEOM/v1.1.0/yyyy/ddd  (M-band geolocation)
VGEOI/v1.1.0/yyyy/ddd  (I-band geolocation)
VGEOD/v1.1.0/yyyy/ddd  (DNB geolocation)
```

# VIIRS Level 1B Version Updates
## *New information*

- Next update of VIIRS Level 1B software and format (version 2.0) is expected by the end of August 2016.
- No major changes to existing L1B format.
- More quality and uncertainty information will be added, based on input from the Science Team.
- Atmosphere SIPS can host two versions of the L1B data for a limited time (say 6 months). At the end of this period, the v1.1 data would be deleted.

# IDPS Data
## *New information*

- The Atmosphere SIPS no longer ingests or archives VIIRS SDR or EDR data from IDPS.
- VIIRS SDRs and EDRs have been deleted.
- SIPS continues to ingest and archive VIIRS/CrIS/ATMS RDRs via CLASS subscription as a backup for ESDIS Level 0.
- Atmosphere SIPS converted the entire mission record of CrIS and ATMS RDRs to Level 0 for Sounder SIPS and GES DISC.

# 2. MODIS/VIIRS inter-calibration match files

# MODIS/VIIRS intercal match files *No major changes*

- The Atmosphere SIPS has extracted matchups between Aqua MODIS C6 Level 1B 1KM and SNPP VIIRS v1.1 Level 1B M-band data over the SNPP mission record.
- Matchups are where Aqua and SNPP viewed the same scene within 20 min for view zenith angles < 5 deg.
- Matchup files contain unmodified data from the source Level 1B files.
- MODIS 1KM FOVs are the “master”; the closest VIIRS M-band FOV is included in the matchup file, along with statistics for all the overlapping VIIRS FOVs.
- First byte of MODIS C6 Cloud Mask is included for each MODIS FOV for land/sea and cloud/clear discrimination.

# Usage of the intercal match files
## *New information*

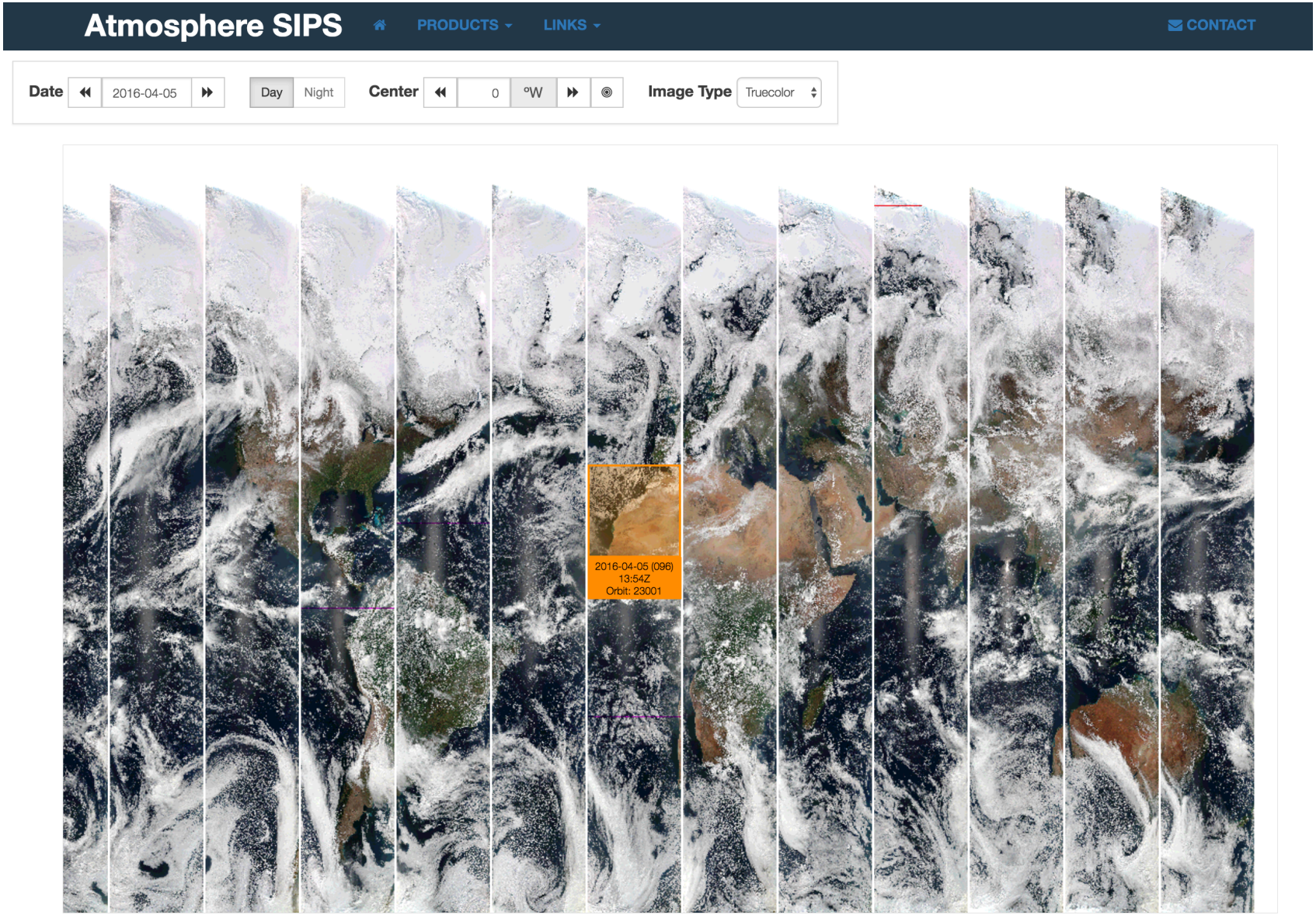
- SIPS is very pleased to see the intercal files being used!
- The files were shared with VCST in April. No feedback received yet.
- If anyone needs intercal from MODIS HKM and/or QKM matched with VIIRS I-bands, please let us know.
- This would take a significant effort to generate since we do not have the MODIS HKM or QKM data at this time (need to weigh cost vs. benefit).
- We will regenerate the current matchup set when the VIIRS L1B v2.0 data is available.

# 3. Quicklook images on SIPS website

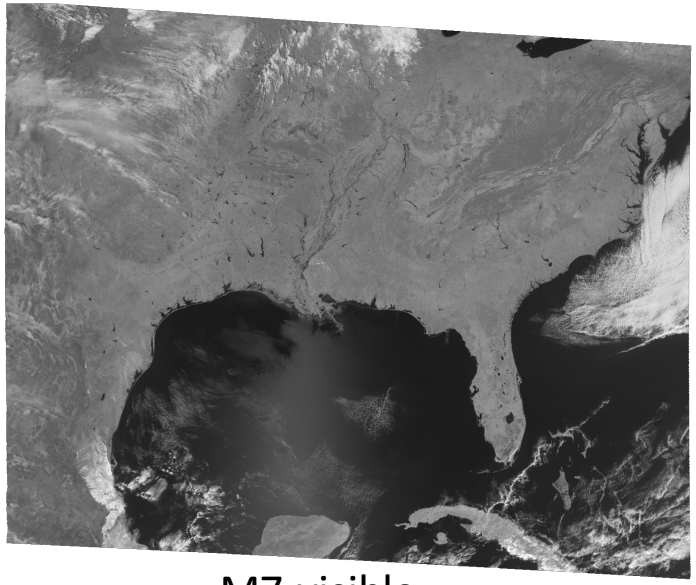
# VIIRS Quicklook Images
# *New information*

- We are working on creating new VIIRS quicklook images (global, granule, day/night) for ST members to use in locating datasets of interest, and then providing a direct link to download the relevant data.
- ST use case would be
  1. Scan the global images to find a day when a region is cloudy, clear, covered by smoke, etc.
  2. Zoom in to examine the 6-min granule of interest (true color, false color, VIS, IR, DNB)
  3. Locate/download the VIIRS Level 1B data

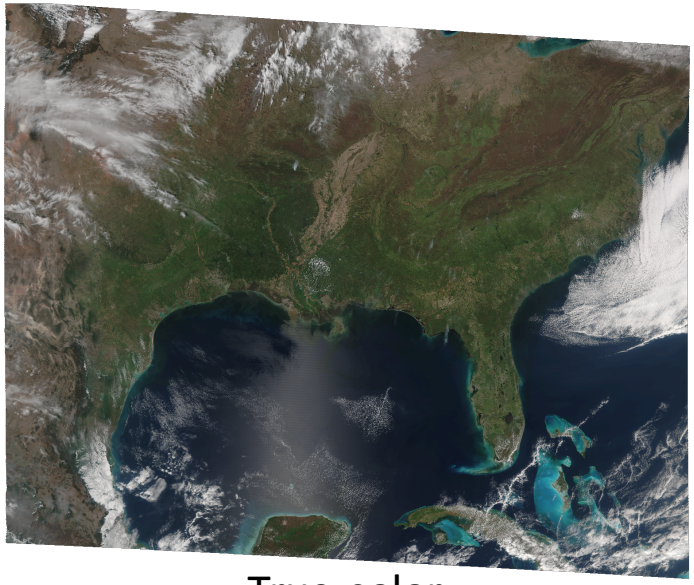
# VIIRS Global View (true color)



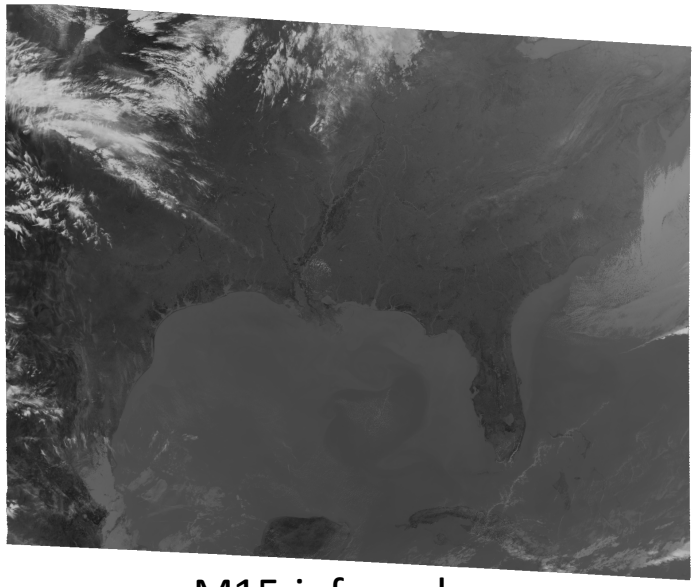
# VIIRS Granule Quicklook Images



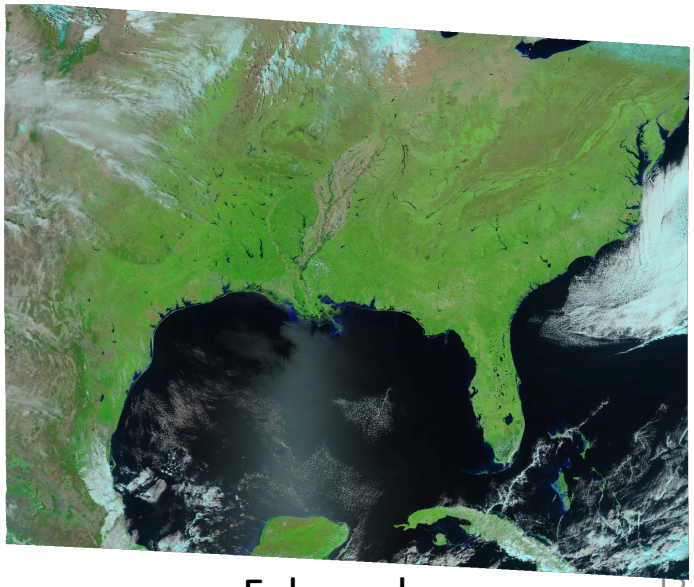
M7 visible



True color



M15 infrared



False color

# Deployment on SIPS website
## *New information*

- We plan to have the quicklook images available on the SIPS website by the end of June.
- You will be able to select and download granules directly from the global view (by clicking on granules of interest.
- You will be able to select and download individual granules from the granule view, and move backwards and forwards along the orbit.

# 4. Level 2 product formats and metadata

# Level 2 formats and metadata
# *New information*

- ESDIS requires that netCDF4 be used as the Level 2 product format.
- Sufficient metadata must be included in the files to provide
  - Information about the source observations (e.g., date, time, sensor, platform, …)
  - Information about the processing (e.g., algorithm/software versions, LUT names, ANC names, …)
  - Information about the product (e.g., quality flags, uncertainty indices, …)
- Additional metadata must be provided to allow delivery, archive, and distribution at LAADS.

# Strawman for a path forward: part 1
## *New information*

1. SIPS provides a CDL file format specifcation "skeleton" describing the structure of a generic Level 2 product file (it will be a text file).
2. Algorithm developers add the names of the product arrays and metadata that they wish to write at runtime (including scale factors and other attributes).
3. SIPS and developers iterate on the CDL files until both sides are satisfied. Developers will own and maintain the CDL file specifications.

# Strawman for a path forward: part 2
## *New information*

4. The SIPS will use the CDL files to create an empty netCDF4 product file before the algorithm starts (developers *will not* need to write code for this).
5. The SIPS will copy granule and scanline metadata from the source L1B file into the product file.
6. The algorithm will populate the product arrays and metadata fields (developers *will* need to write code for this; maybe it could be done via a simple API).

# Using Ocean L2 products as a guide *New information*

- The Ocean team has done a lot of work to design L2 product formats that
  - Use netCDF4
  - Are CF-standards compliant
  - Are compatible with DAAC archives
  - Are suitably formatted for end users
- We can learn a lot from looking at their files as guides on how to design Atmosphere L2 product formats. Examples follow.

# L2 ocean CDL: global attributes

gumley — gumley@bolt:~/viirs_level2 — ssh ash.ssec.wisc.edu — 150×41

```
netcdf V2016150002400.L2_SNPP_SST {
dimensions:
        number_of_lines = 3248 ;
        pixels_per_line = 3200 ;
        pixel_control_points = 3200 ;
        number_of_bands = 15 ;
        number_of_reflective_bands = 10 ;

// global attributes:
                :title = "VIIRSN Level-2 Data" ;
                :product_name = "V2016150002400.L2_SNPP_SST.nc" ;
                :processing_version = "2016.0QL" ;
                :orbit_number = 23759 ;
                :history = "l2gen par=/data3/sdpsoper/vdc/vpu6/workbuf/V2016150002400.L1B_SNPP.nc.param metafile=V2016150002400.L2_SNPP_SST.nc.meta" ;
                :instrument = "VIIRS" ;
                :platform = "Suomi-NPP" ;
                :Conventions = "CF-1.6" ;
                :Metadata_Conventions = "Unidata Dataset Discovery v1.0" ;
                :license = "http://science.nasa.gov/earth-science/earth-science-data/data-information-policy/" ;
                :naming_authority = "gov.nasa.gsfc.sci.oceandata" ;
                :id = "2016.0QL/L2/V2016150002400.L2_SNPP_SST.nc" ;
                :date_created = "2016-05-29T09:17:26.000Z" ;
                :keywords_vocabulary = "NASA Global Change Master Directory (GCMD) Science Keywords" ;
                :keywords = "Oceans > Ocean Temperature > Sea Surface Temperature" ;
                :standard_name_vocabulary = "NetCDF Climate and Forecast (CF) Metadata Convention" ;
                :institution = "NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group" ;
                :creator_name = "NASA/GSFC/OBPG" ;
                :creator_email = "data@oceancolor.gsfc.nasa.gov" ;
                :creator_url = "http://oceandata.sci.gsfc.nasa.gov" ;
                :project = "Ocean Biology Processing Group (NASA/GSFC/OBPG)" ;
                :publisher_name = "NASA/GSFC/OBPG" ;
                :publisher_url = "http://oceandata.sci.gsfc.nasa.gov" ;
                :publisher_email = "data@oceancolor.gsfc.nasa.gov" ;
                :processing_level = "L2" ;
                :cdm_data_type = "swath" ;
                :spatialResolution = "750 m" ;
                :time_coverage_start = "2016-05-29T00:24:00.371Z" ;
                :time_coverage_end = "2016-05-29T00:29:59.784Z" ;
                :start_center_longitude = 176.2259f ;
                :start_center_latitude = 65.1956f ;
:
```

# L2 ocean CDL: scanline data

gumley — gumley@bolt:~/viirs_level2 — ssh ash.ssec.wisc.edu — 150×41

```
group: scan_line_attributes {
  variables:
        int year(number_of_lines) ;
                year:long_name = "Scan year" ;
                year:units = "years" ;
                year:_FillValue = -32767 ;
                year:valid_min = 1900 ;
                year:valid_max = 2100 ;
        int day(number_of_lines) ;
                day:long_name = "Scan day of year" ;
                day:units = "days" ;
                day:_FillValue = -32767 ;
                day:valid_min = 0 ;
                day:valid_max = 366 ;
        int msec(number_of_lines) ;
                msec:long_name = "Scan time, milliseconds of day" ;
                msec:units = "milliseconds" ;
                msec:_FillValue = -32767 ;
                msec:valid_min = 0 ;
                msec:valid_max = 86400000 ;
        byte detnum(number_of_lines) ;
                detnum:long_name = "Detector Number (zero-based)" ;
                detnum:_FillValue = -1b ;
                detnum:valid_min = 0b ;
                detnum:valid_max = 25b ;
        byte mside(number_of_lines) ;
                mside:long_name = "Mirror Side (zero-based)" ;
                mside:_FillValue = -1b ;
                mside:valid_min = 0b ;
                mside:valid_max = 1b ;
        float slon(number_of_lines) ;
                slon:long_name = "Starting Longitude" ;
                slon:units = "degree_east" ;
                slon:_FillValue = -999.f ;
                slon:valid_min = -180.f ;
                slon:valid_max = 180.f ;
        float clon(number_of_lines) ;
                clon:long_name = "Center Longitude" ;
                clon:units = "degree_east" ;
                clon:_FillValue = -999.f ;
:
```

# L2 ocean CDL: geophysical data

gumley — gumley@bolt:~/viirs_level2 — ssh ash.ssec.wisc.edu — 150×41

```
group: geophysical_data {
  variables:
        short sst(number_of_lines, pixels_per_line) ;
                sst:long_name = "Sea Surface Temperature" ;
                sst:scale_factor = 0.005f ;
                sst:add_offset = 0.f ;
                sst:units = "degree_C" ;
                sst:standard_name = "sea_surface_temperature" ;
                sst:_FillValue = -32767s ;
                sst:valid_min = -1000s ;
                sst:valid_max = 10000s ;
        byte qual_sst(number_of_lines, pixels_per_line) ;
                qual_sst:long_name = "Quality Levels, Sea Surface Temperature" ;
                qual_sst:_FillValue = -1b ;
                qual_sst:valid_min = 0b ;
                qual_sst:valid_max = 5b ;
                qual_sst:flag_masks = 0s, 1s, 2s, 3s, 4s ;
                qual_sst:flag_meanings = "BEST GOOD QUESTIONABLE BAD NOTPROCESSED" ;
        short flags_sst(number_of_lines, pixels_per_line) ;
                flags_sst:long_name = "Product-specific flags, Sea Surface Temperature" ;
                flags_sst:_FillValue = -32767s ;
                flags_sst:valid_min = -32767s ;
                flags_sst:valid_max = 32767s ;
                flags_sst:flag_masks = 1s, 2s, 4s, 8s, 16s, 32s, 64s, 128s, 256s, 512s, 1024s, 2048s, 4096s, 8192s, 16384s, -32768s ;
                flags_sst:flag_meanings = "ISMASKED BTBAD BTRANGE BTDIFF SSTRANGE SSTREFDIFF SST3DIFF SST3VDIFF BTNONUNIF BTVNONUNIF SPARE REDNONUNIF
HISENZ VHISENZ SSTREFVDIFF CLOUD" ;
        short bias_sst(number_of_lines, pixels_per_line) ;
                bias_sst:long_name = "Sea Surface Temperature Bias" ;
                bias_sst:scale_factor = 0.005f ;
                bias_sst:add_offset = 0.f ;
                bias_sst:units = "degree_C" ;
                bias_sst:_FillValue = -32767s ;
                bias_sst:valid_min = -10000s ;
                bias_sst:valid_max = 10000s ;
        short stdv_sst(number_of_lines, pixels_per_line) ;
                stdv_sst:long_name = "Sea Surface Temperature Standard Deviation" ;
                stdv_sst:scale_factor = 0.005f ;
                stdv_sst:add_offset = 0.f ;
                stdv_sst:units = "degree_C" ;
                stdv_sst:_FillValue = -32767s ;
:
```

# Suggested short term actions

1. SIPS will share a sample L2 CDL file spec with the team via a Dropbox shared folder.
2. Each product team will edit their own L2 CDL file spec and add their product arrays and metadata.
3. The SIPS will work with the Hsu team to conduct an end to end test of creating the VIIRS Deep Blue L2 product file, copying L1B metadata, and populating the file with product content and metadata.
4. The SIPS will make sure archive metadata is provided to LAADS to allow product ingest, archive, and search.
5. The workflow we develop will be applied to the rest of the Atmosphere L2 products.

# 5. Issue tracking via Jira website

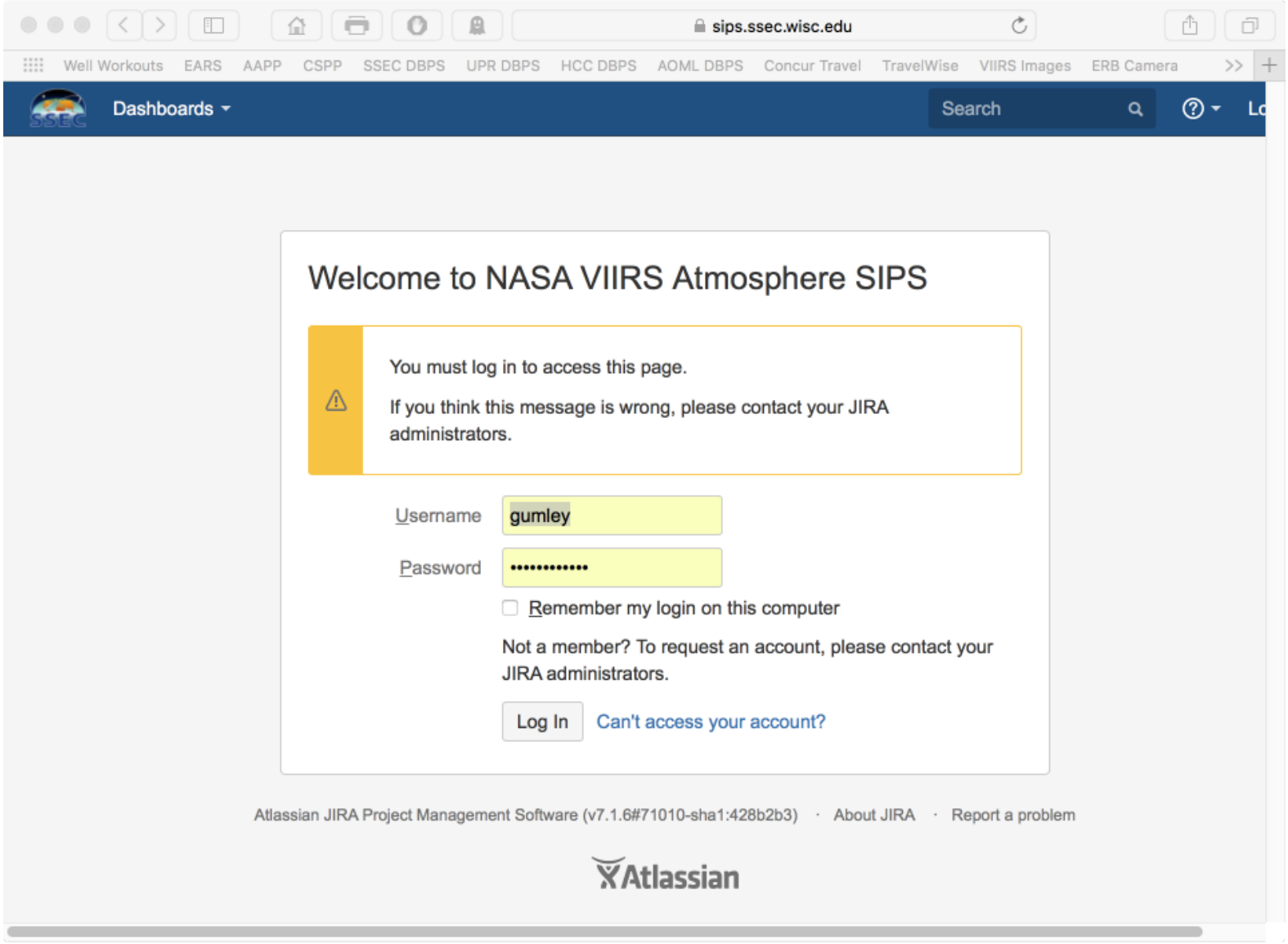
# We need a solution for issue tracking

- Currently the SIPS receives requests from the ST developers via email, e.g.,
  - New version of algorithm is ready for testing
  - Need a test dataset
  - Need some reprocessing done for testing
- Email is not an ideal solution for either the SIPS or the ST developers.
- We need a system for issue tracking that is easy to use, and provides good visibility for both the SIPS and ST developers into what has been requested, and the status of the request.

# Issue tracking via Jira

- Jira is a commercial software system for tracking issues in software teams.
- It is accessed via website at the SIPS.
- You will use your sipssci1 username and password to login.
- Any time you have a new request for the SIPS, you will submit it in Jira.
- The SIPS will provide a simple set of instructions that show you how to do it.

# SIPS Jira login screen



# SIPS Jira example issue (from EvaB)

sips.ssec.wisc.edu

Well Workouts | EARS | AAPP | CSPP | SSEC DBPS | UPR DBPS | HCC DBPS | AOML DBPS | Concur Travel | TravelWise | VIIRS Images | ERB Camera

Dashboards | Projects | Issues | Boards | Create | Search

## All Issues

Switch filter

View all issues and filters

Order by Created

- BOR-3
  New delivery: 6min VIIRS+NUCAPS TPW soft…
- BOR-2
  Ingest C6 MYD07
- BOR-1
  Begin beta forward stream processing

+ Create issue

### Details

Type:
Task

Status:
DONE (View Workflow)

Priority:
Low

Resolution:
Done

Labels:
None

### Description

I've added MYD07 to forward stream ingest.

Now I need to do the historical ingest. I'm going to start with SNPP to present, and go back further if necessary.

### Attachments

### People

Assignee:
Bruce Flynn
Assign to me

Reporter:
Bruce Flynn

Votes:
0 Vote for this issue

Watchers:
3 Start watching this issue

### Dates

Created:
17/May/16 2:35 PM

Updated:
27/May/16 10:46 AM

Resolved:
27/May/16 10:08 AM

# Short term actions on Jira

- The SIPS will migrate all the current requests and issues into Jira for each ST developer.
- By July 15, the SIPS will provide a short set of instructions showing how to login, create a request/issue, and track the status of the request/issue.
- Starting August 1, requests and issues should be submitted via the SIPS Jira website.

# Atmosphere SIPS Points of Contact
## *No major changes*

- SIPS general questions and issues

  Liam.Gumley@ssec.wisc.edu

- Software deliveries and reprocessing

  S. Platnick and C. Hsu: Steve.Dutcher@ssec.wisc.edu

  E. Borbas and B. Gao: Bruce.Flynn@ssec.wisc.edu

  B. Baum and R. Levy: Geoff.Cureton@ssec.wisc.edu

- Schedule updates

  Elaine.Prins@ssec.wisc.edu

# END

# Questions?

Don’t hesitate to call me at 608-265-5358 or email Liam.Gumley@ssec.wisc.edu

with questions any time.