# Mesoscale Mission Manager Tool

Technical Review
May 6, 2019
GOES-R/NWS-OBS TOWR-S Team

# Topics

## Meso Mission Manager

- Introduction & Context
- Dependencies & Languages
- Development environment & process

## NOAA Virtual Lab

- Introduction
- Importance
- Modules

## MMM + Vlab

# Introduction to MMM Tool

- The Mesoscale Mission Manager (MMM) Tool is a task scheduling tool for the GOES-16 & GOES-17 Advanced Baseline Imager Mesoscale Domain Sectors (MDS)
- MMM Tool allows visual representation of satellite mesoscale imagery locations at a specific time
- Single-page VLab web application is created using open-source tools with strong support/ongoing releases
- Comprised of 40 components (javascript files) - 6927 lines of Js code
- Two versions of the tool exist
  - Private version allows users to make requests
  - Public version allows users to see where MDS will be located

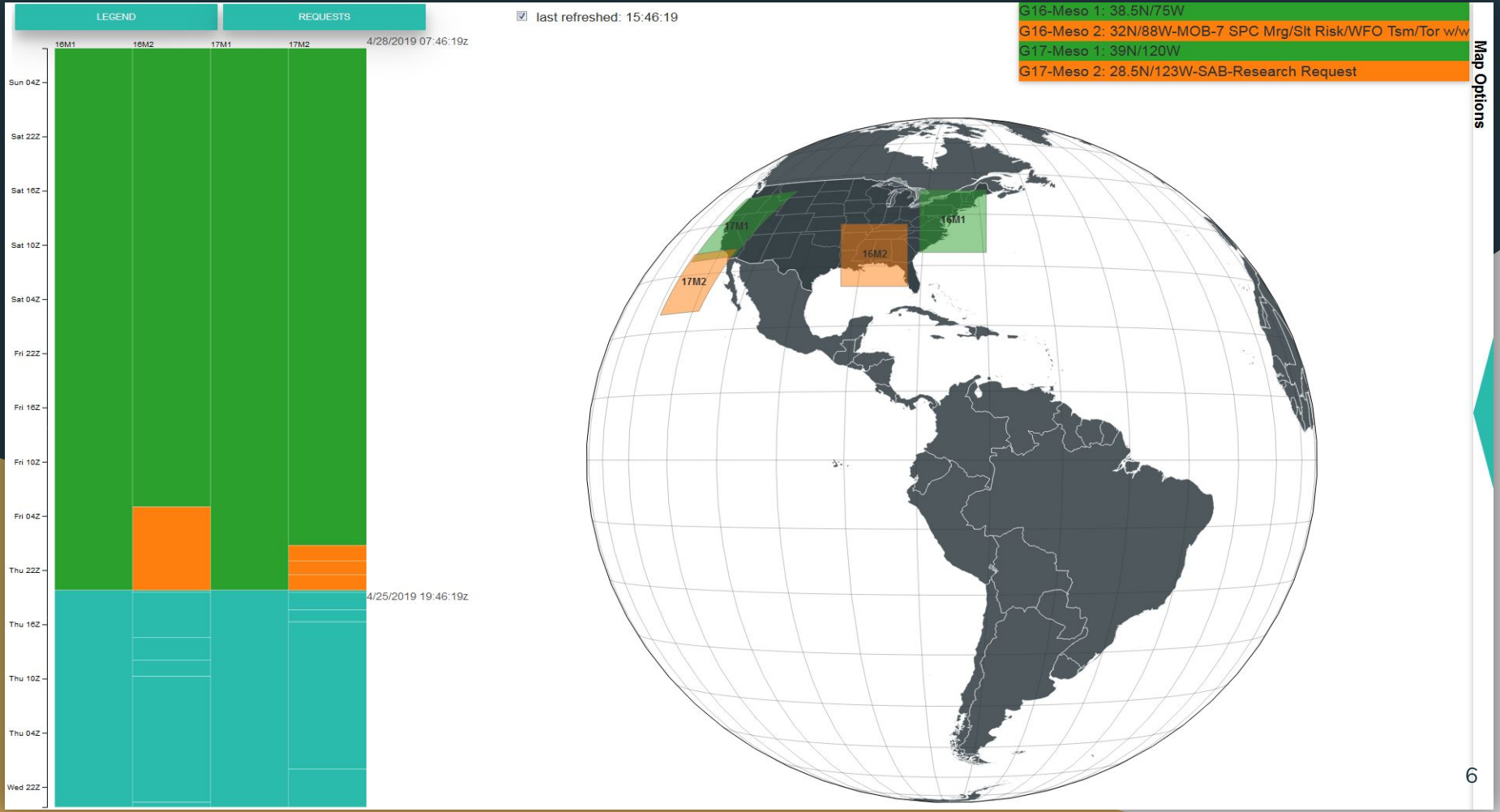
# Introduction Continued…

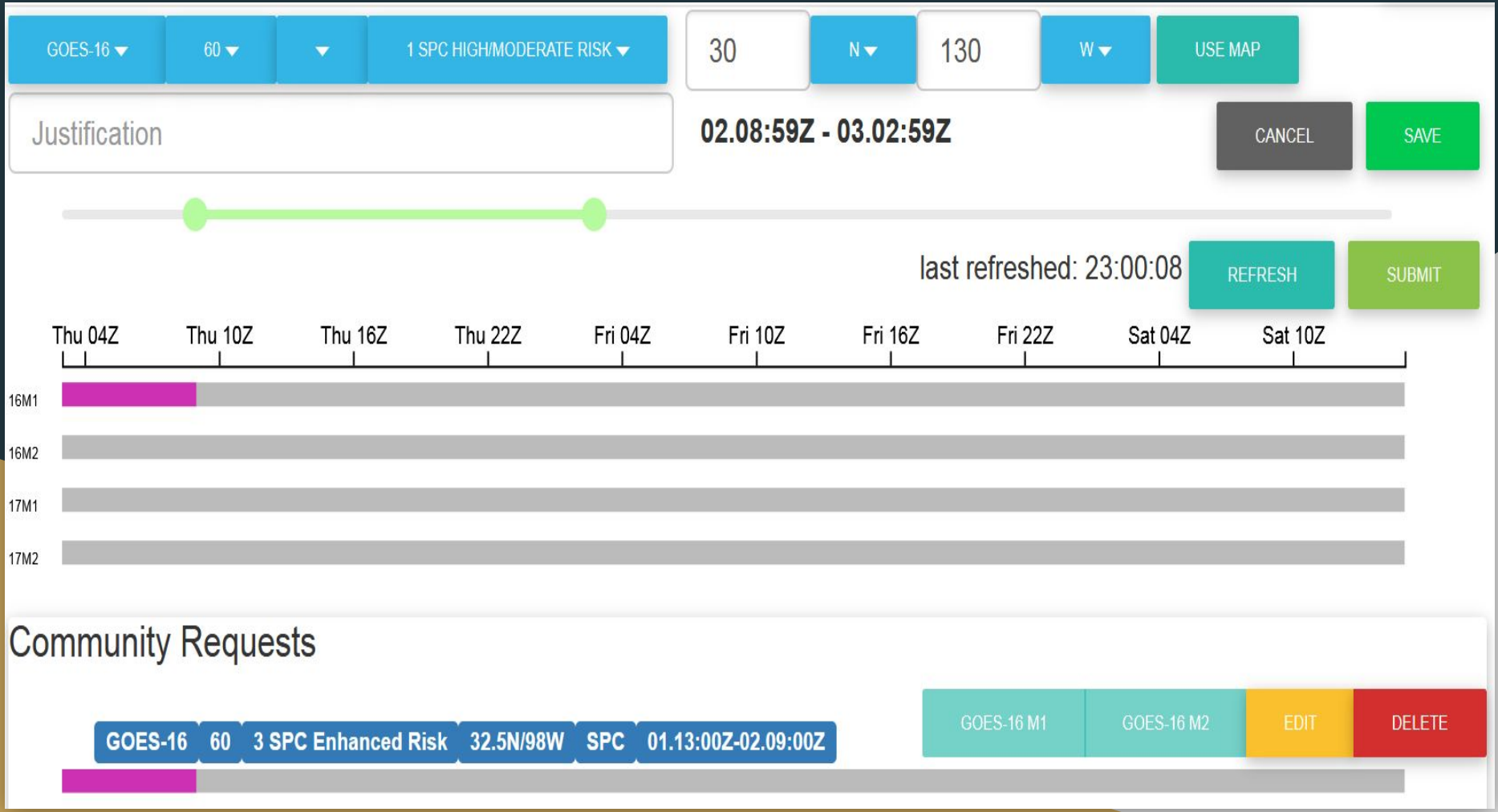
- Gives forecasters ability to visualize and request tasking of GOES East and West ABI meso sectors
- 60 second, 30 second & Full Disk requests
  - Two 60 sec requests can be made at one time per satellite
  - One 30 sec request can be made at one time per satellite
  - Full Disk request provides 5 minute Full Disk imagery (no Mesoscale Imagery)
- Allows NWS Senior Duty Meteorologist (SDM) to create plan based on requests from NWS Weather Forecast Offices and National Centers

# Why Does NWS Need the MMM Tool?

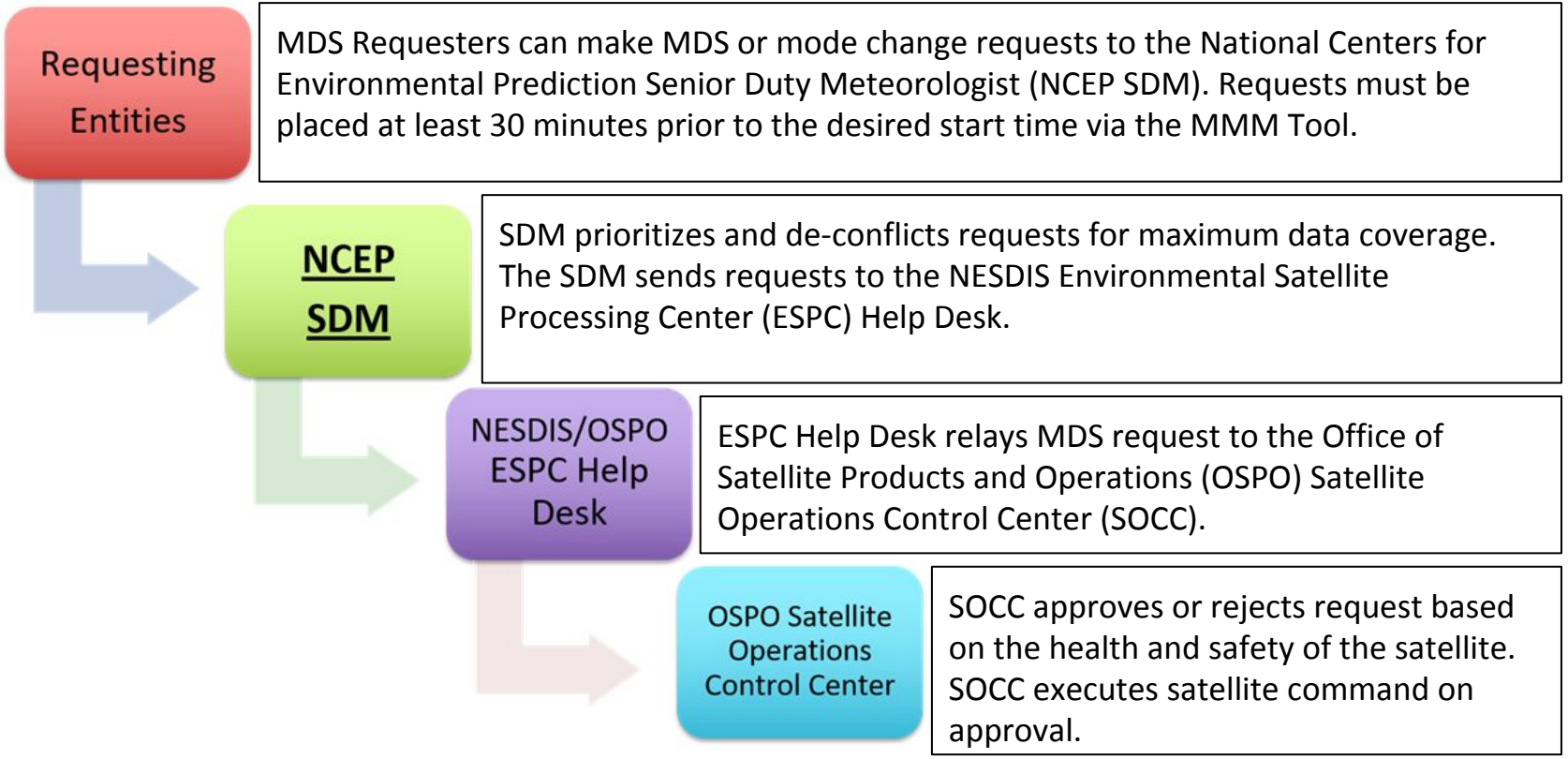
- GOES-13/14/15 imagers have Rapid Scan Operations (RSO)
  - Either on or off, not targeted
  - Same area scanned every ~7 minutes
- GOES-16/17 ABIs have Mesoscale Domain Sectors (MDS)
  - Always on while in Flex Mode (Mode 6)
  - Different non-fixed geographic areas scanned every 1 minute or 30 seconds (1000x1000 km)

**GOES-16/17 MDS is NOT an extension of RSO, it is a completely new capability further complicated by large geographic distribution of NWS operations community**


LEGEND
REQUESTS
last refreshed: 15:46:19
G16-Meso 1: 38.5N/75W
G16-Meso 2: 32N/88W-MOB-7 SPC Mrg/Slt Risk/WFO Tsm/Tor w/w
G17-Meso 1: 39N/120W
G17-Meso 2: 28.5N/123W-SAB-Research Request
Map Options
16M1
16M2
17M1
17M2
4/28/2019 07:46:19z
4/25/2019 19:46:19z
Sun 04Z
Sat 22Z
Sat 16Z
Sat 10Z
Sat 04Z
Fri 22Z
Fri 16Z
Fri 10Z
Fri 04Z
Thu 22Z
Thu 16Z
Thu 10Z
Thu 04Z
Wed 22Z


GOES-16
60
1 SPC HIGH/MODERATE RISK
30
N
130
W
USE MAP
Justification
02.08:59Z - 03.02:59Z
CANCEL
SAVE
last refreshed: 23:00:08
REFRESH
SUBMIT
Thu 04Z
Thu 10Z
Thu 16Z
Thu 22Z
Fri 04Z
Fri 10Z
Fri 16Z
Fri 22Z
Sat 04Z
Sat 10Z
16M1
16M2
17M1
17M2
Community Requests
GOES-16
60
3 SPC Enhanced Risk
32.5N/98W
SPC
01.13:00Z-02.09:00Z
GOES-16 M1
GOES-16 M2
EDIT
DELETE

# What is the MDS Request Process?



# How is the MMM Tool Governed?

- The MMM Tool is developed and maintained by the NWS Office of Observations
- The NWS Office of Observations supports the MDS Core Team, headed by the NWS Operations Division
- MDS Core Team consists of NWS Regional Focal Points, National Centers, NWS Ops Center, and NESDIS
- The MDS Core Team meets on a monthly basis to discuss MDS issues, including bugs or suggested improvements to the MMM Tool
- That information is forwarded to the MMM Tool developers, who implement and test the changes to the MMM Tool
- Changes to the MMM Tool are applied on a monthly development cycle for new features and ASAP for bug fixes

# NOAA Virtual Lab

# What is the VLab?

The NOAA Virtual Lab is a NOAA-wide content management system governed by the NWS Meteorological Development Lab (MDL) and hosted on the College Park instance of IDP.

The VLab is an instance of the Liferay platform that provides tools for:

- Creating custom web content
- developing software (all open source)
- ElasticSearch database (NoSQL)

VLab provides an infrastructure for fast & simple development

# Vlab Reliability

**ElasticSearch**

- Master node and two backup nodes
- If master node fails, a backup node takes over
- When master node recovers, becomes master again and data is synchronized

**Vlab**

- Located in College Park IDP
- Backups handled via snapshots that can restore files when necessary
- File system changes are written to Network FIle System (NFS) mounted directory and controlled by a netapp
- Snapshots created every hour (6 copies)
- Additionally, all snapshots are copied to Boulder IDP every 6hrs

# Vlab User Authentication

- Vlab provides user auth via noaa.gov account
- Vlab login expires after 2 hours of inactivity
- Admin assigns role to user for role-based access

# Access Controls

- Vlab provides role-based access to:
  - ESearch DB via Elastic Interface Manager
  - Documents
  - Web content
- Interface allows for configuration of access rights to particular users or groups
- Ability to create custom roles

# JSON Web Services API

- Esearch DB communication & forum
- create, read, update, delete
- AJAX call is triggered from JS function on load of application (caching disabled)
- Authentication token is required for all data modification calls

# Forums

Forums used for communication throughout community

Ability to create forum that community members can subscribe to for notifications

Ability to post custom content via HTML generated directly from application

# MMM Implementation and the NOAA Virtual Lab

# Languages & Libraries

JavaScript (ES6+) - Web Application Devlopment

- React.Js - UI components
- Babel - Javascript Compiler
- JQuery - UI manipulation
- D3.Js - UI component interaction
- AJAX - DB communication
- Node.Js - server environment
- NPM - Package manager

# Languages & Libraries Continued...

Python - Back-end scripting

- Script makes JSON Web Services API call to push data ElasticSearch
- Listener is triggered on meso change event or every hour

Development tools

- Node.Js - JS runtime environment
- Atom - text editor
- Git - repo management

# Procedures

Development Workflow

- A new branch is created from master for each new feature/bug fix
- A local instance of the application is used for development
- Utilize vlab-dev as staging environment for testing procedure
    - Production build is created from current branch
    - Files uploaded to vlab-dev
    - Regression testing procedure implemented
- Branch merged into master

# Procedures Continued...

- Tag is created
- Release notes are added to updates page of Vlab
- Files are uploaded to production server
- Production test procedure done in collaboration with SDM

# Version Control

Versioning

- Format for version: 2.<year>.<month>.<iteration in month>
- All versions are tagged in Git repo
- All release notes available on Vlab

# Vlab Features Utilized in MMM Tool

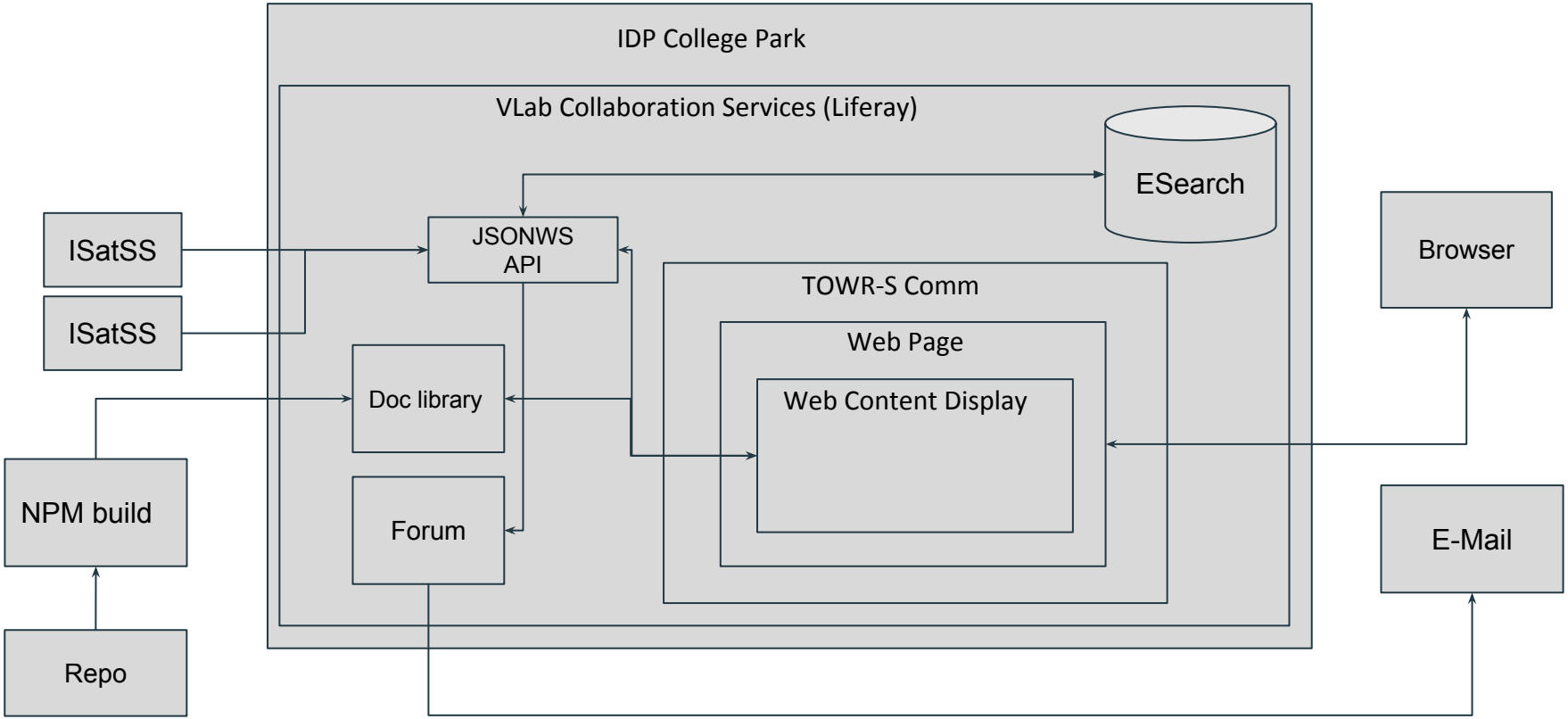
MMM is implemented as user content on the NWS VLab

Features utilized:

- File host/manager - host files for mmm tool
- Authentication and user management (login, user roles interface, community membership)
- Database host/manager - provides interface for creating indices and JSONWS api
- Security - secure web server, role-based access controls, file security controls, DB access controls
- Web content portlet/web page - url schema, application display setup
- Forum post & Email notifications

Provides suite of features that make MMM tool cost effective and easier to develop/maintain

# MMM Integration with VLab



# Conclusion

- GOES-16 & 17 satellites provide new technology that require a new workflow
- MMM Tool provides workflow for proper utilization of new ABI instrument
- Central location for collaboration of a widely dispersed NWS community
- Tool is flexible, extensible, and low impact
- VLab  has proven to be an effective suite of modules for fast/easy implementation of applications

# Questions?