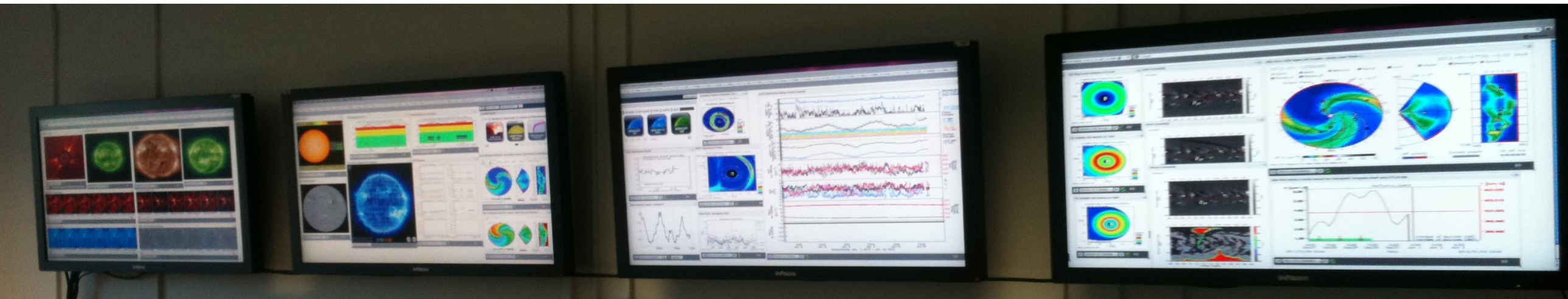
Integrated Space Weather Analysis System

A Software Perspective

Richard Mullinix



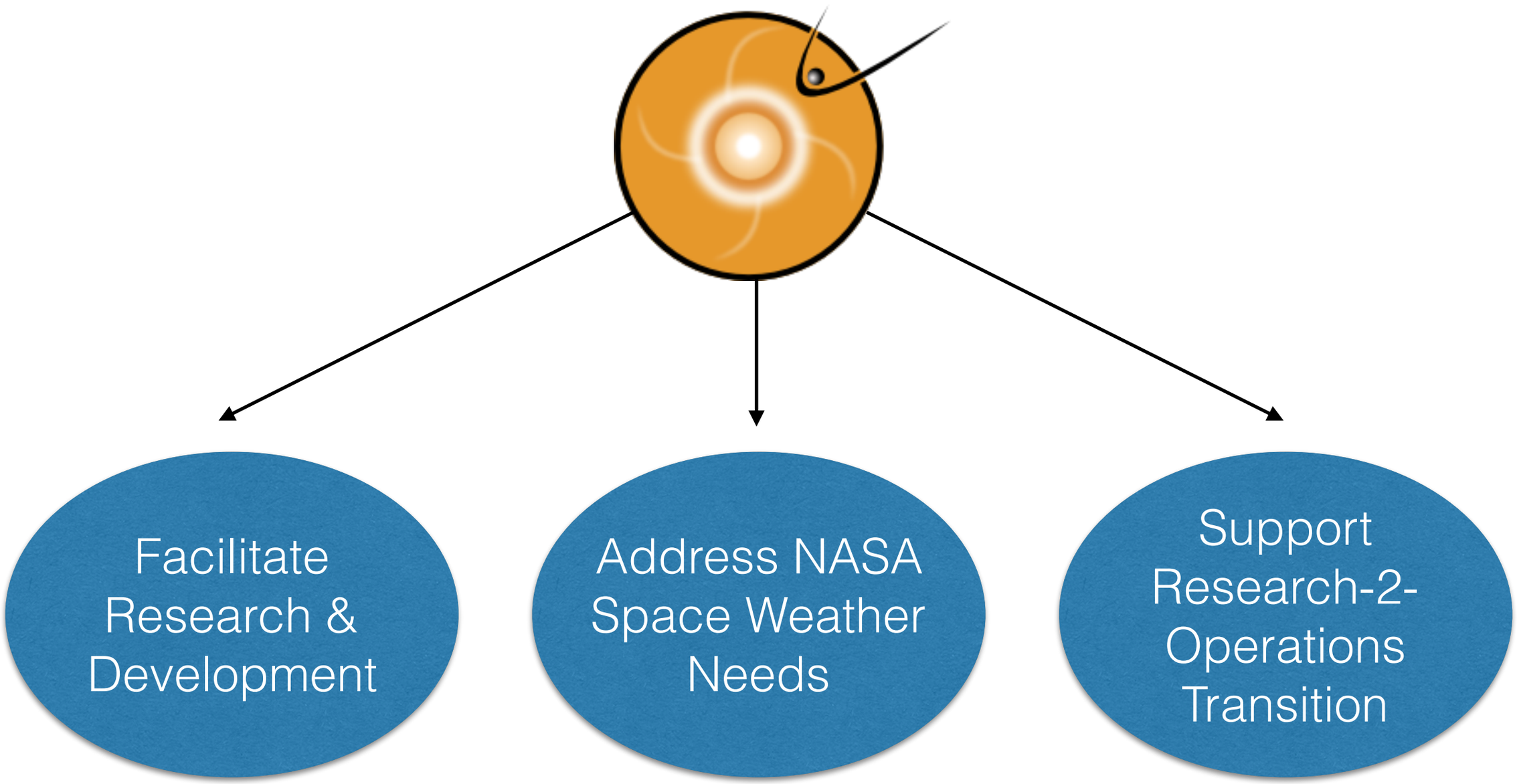
Outline

- Community Coordinated Modeling Center (CCMC)
- Demo
- Architectural design
- Widget Types
- Stats

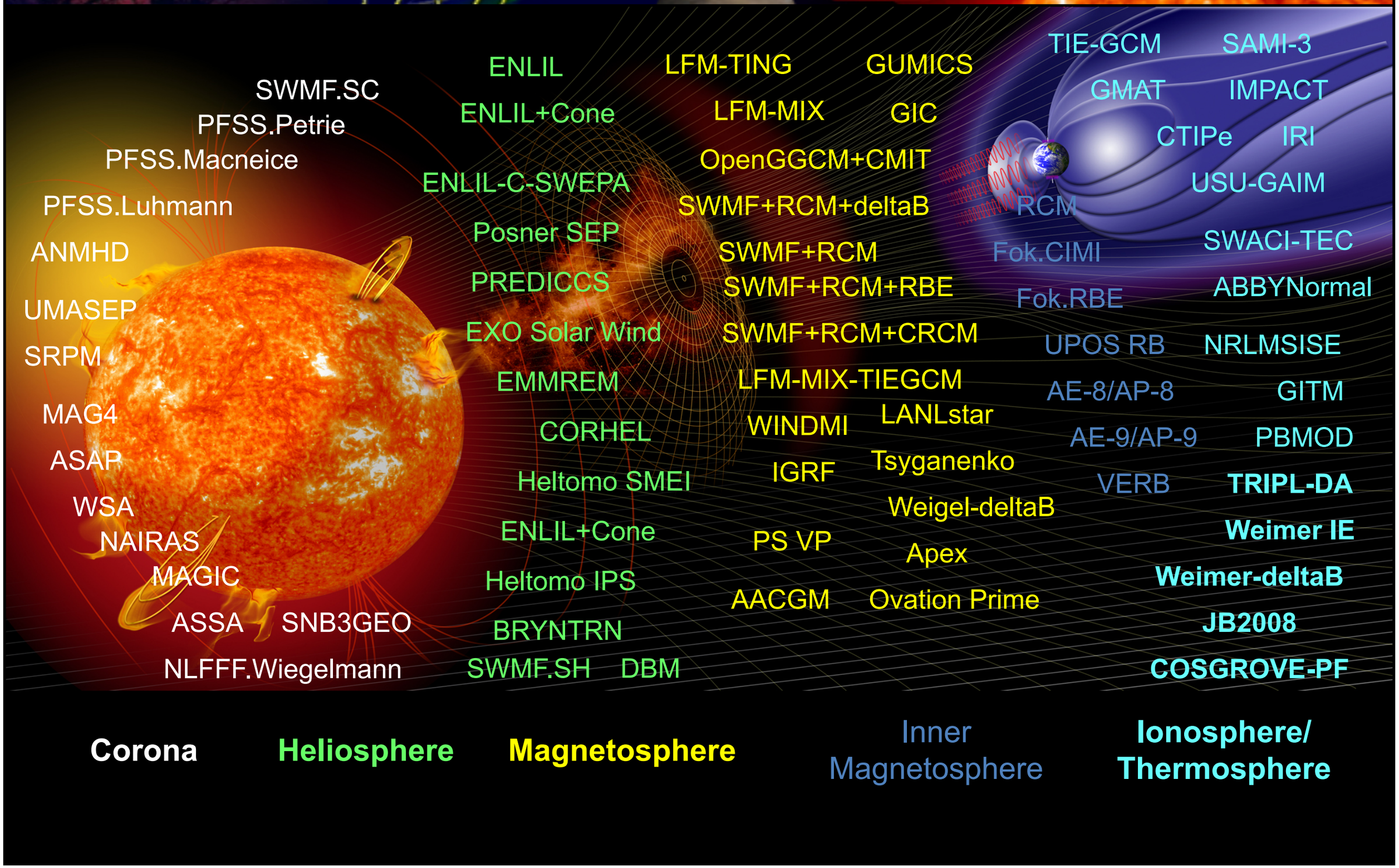
About the CCMC

A multi-agency partnership to
support research and development
for next generation of space science & space
weather models

CCMC Goals


Facilitate Research & Development
Address NASA Space Weather Needs
Support Research-2-Operations Transition

CCMC Assets & Services:
Comprehensive Collection Of Space Weather Models



Corona **Heliosphere** **Magnetosphere** Inner Magnetosphere **Ionosphere/ Thermosphere**

iSWA (2008): Fundamental Challenges

- Existing space weather resources are diverse and scattered

- Centralized location for accurate real time now-casting & forecasting of the space environment

- Historical space weather impact analysis

iSWA Solution & Deliverables

1. Acquire, ingest, and produce NASA relevant space weather information

2. Utilize both observational and simulation/model data

3. Produce and provide real-time data streams

4. Categorize and archive data for historical impact analysis

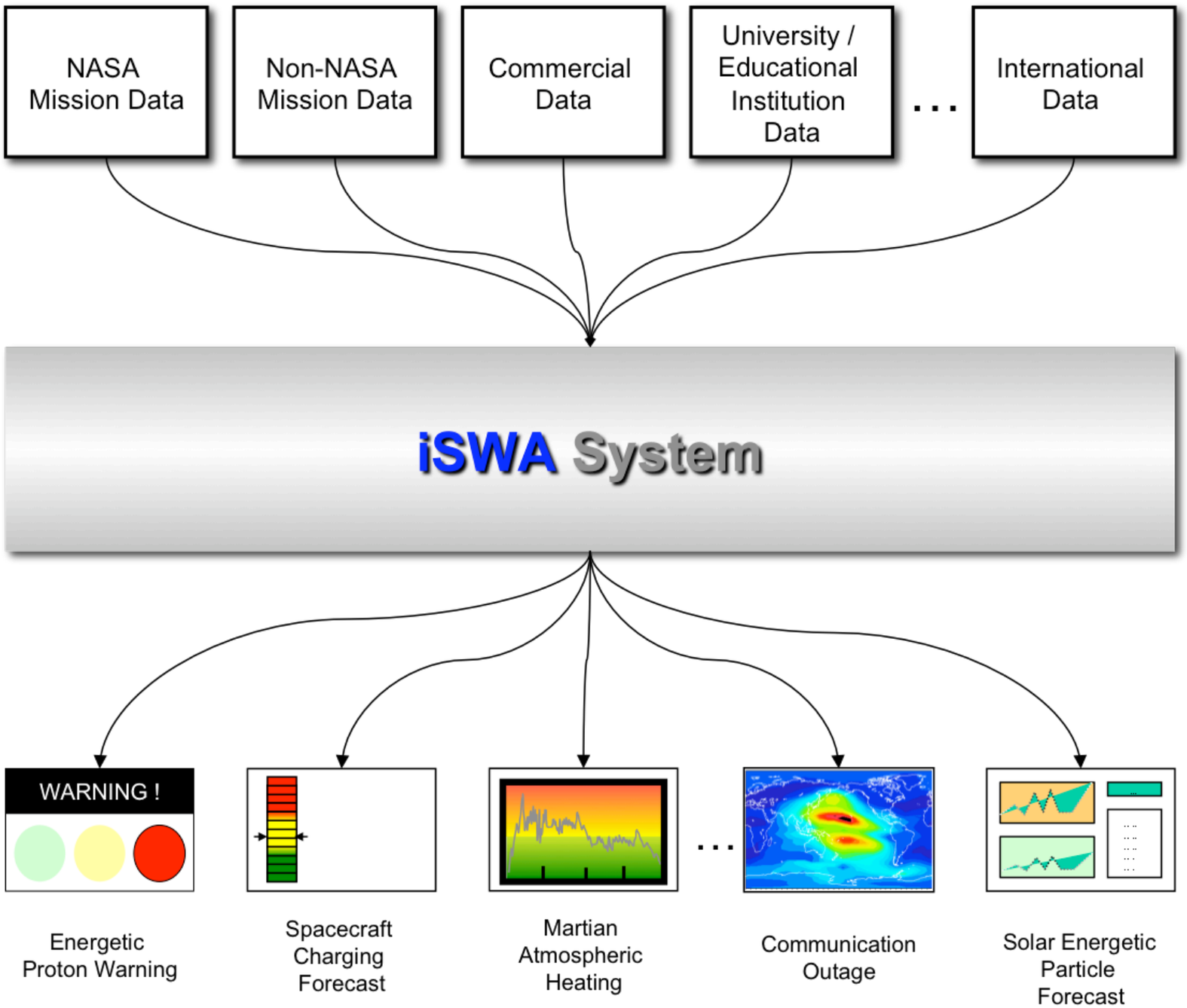
5. Provide customizable and highly configurable displays

6. Disseminate through the most widely deployed and accessible interface – the web

Demo

- General Layout
- Venus Transit (2012-6-6 4:22)
- March 15, 2012 Event

iNTEGRATED SPACE WEATHER ANALYSIS SYSTEM



Highly diverse and distributed space weather data consisting of the latest observational data along with the most advanced space weather model simulation output.

iSWA system collects data from a large and evolving list of sources. Data is sorted, characterized, and processed into 'mission decision supporting' products in response to individual user queries.

iSWA generates and provides a user-configurable display panel that can be accessed from a standard web browser. The end user can then customize their display to focus on specific products of interest.

iNTEGRATED SPACE WEATHER ANALYSIS SYSTEM

Distributed Space Weather Resources

CCMC Space Weather Model Resources

Internet

iSWA

Resource Registry

Data Registry

Data/Tool Registry

Product Registry

BACK END

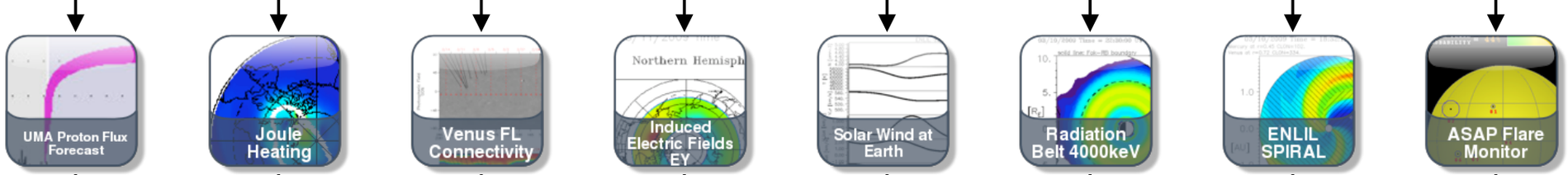
FRONT END

Information Retrieval Robot

Data Sorter

Tool Service

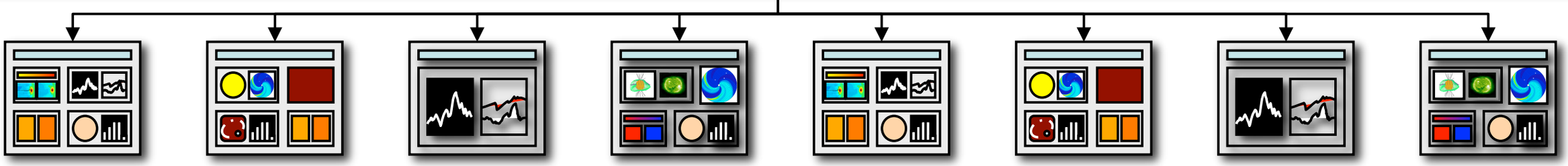
Widget Agent



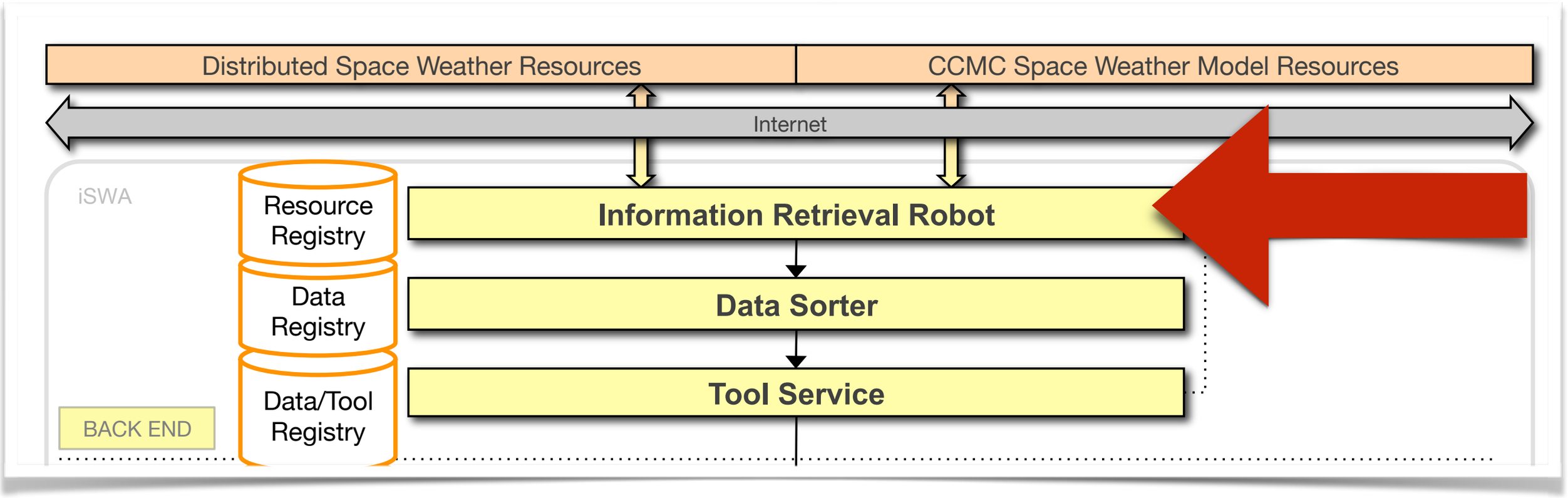
Cygnet Registry

Configurable Web-Based Dissemination Service

Internet

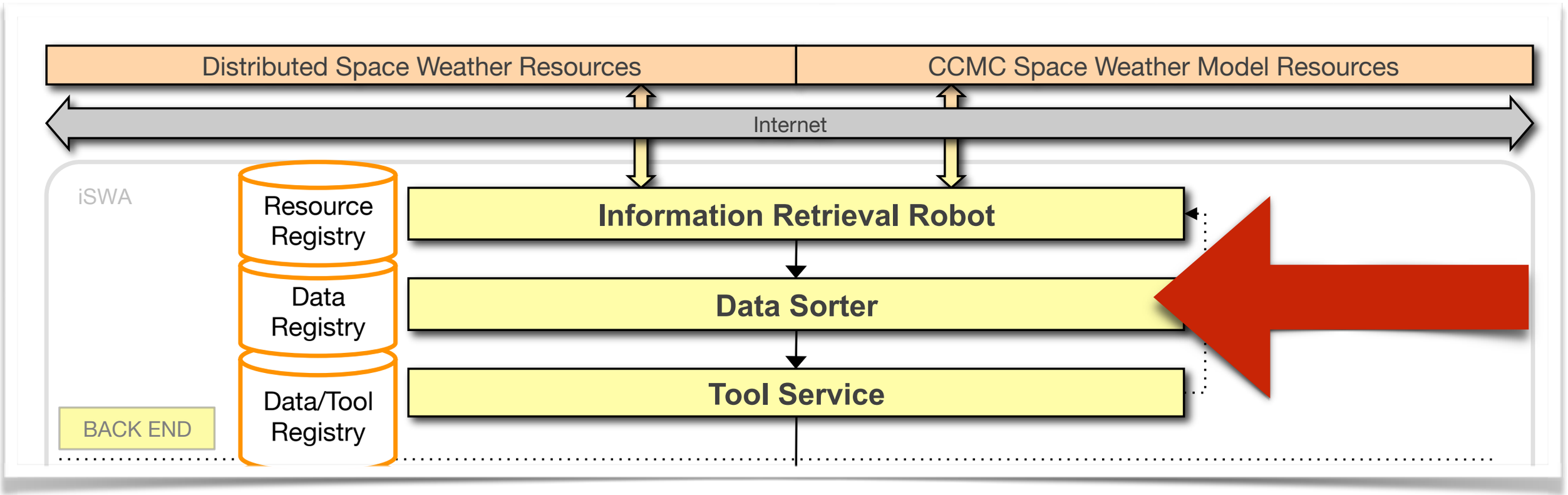


User Configurable Displays



Information Retrieval Robot

- Resources and specific feeds are registered
- Feeds are assigned priority and intervals
- Fetches and stages data feeds
- Composed of perl scripts, database, crontabs

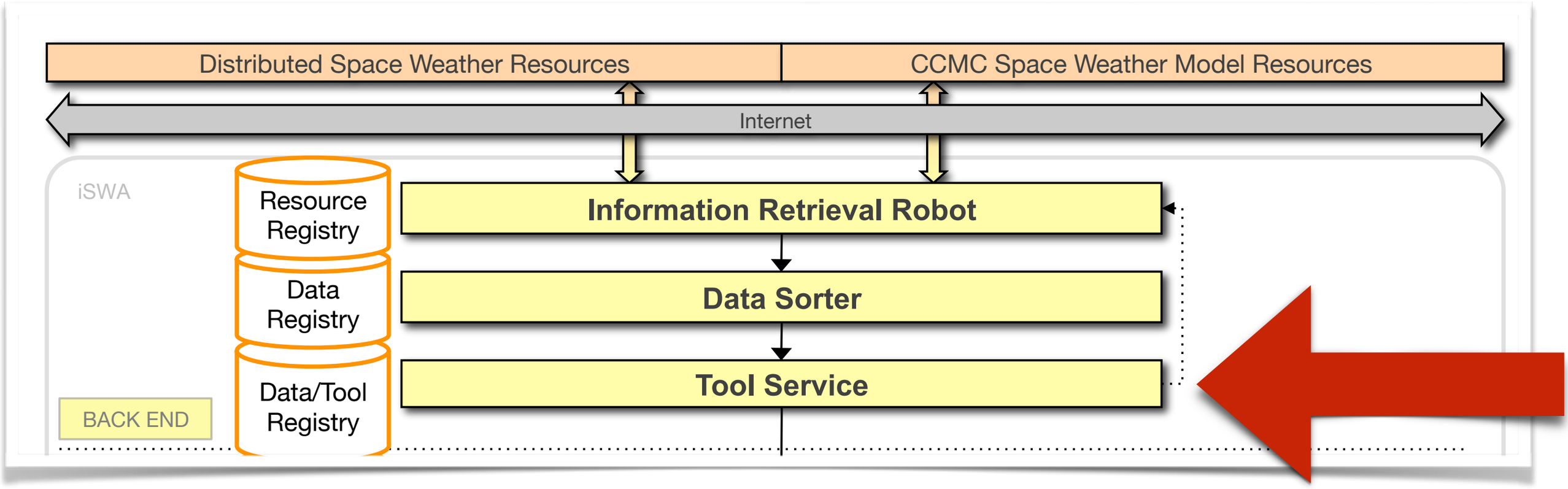


Data Sorter

- Places file in data tree
  iswa.ccmc.gsfc.nasa.gov/iswa_data_tree/
- Adds record to database with timestamp/path
- Composed of perl scripts, database, crontabs

Types of Data

- Images, sets of images, ascii, fits, binary
- Some are ready to be consumed
- Additional processing needed to be consumed



Tool Service

- Provides hook for additional data processing
- ASCII parsing numerical data
- Unit conversions, Unzip, image creation

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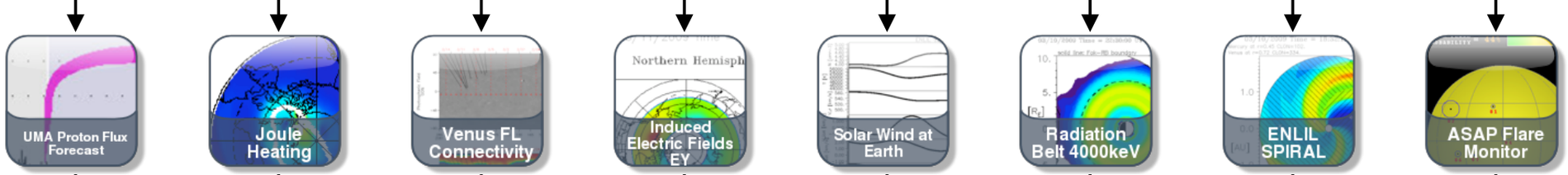

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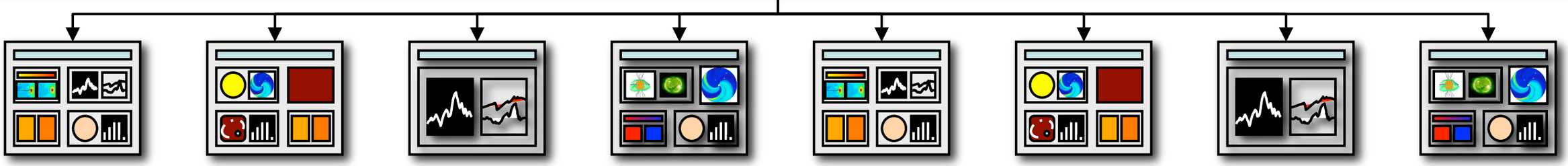

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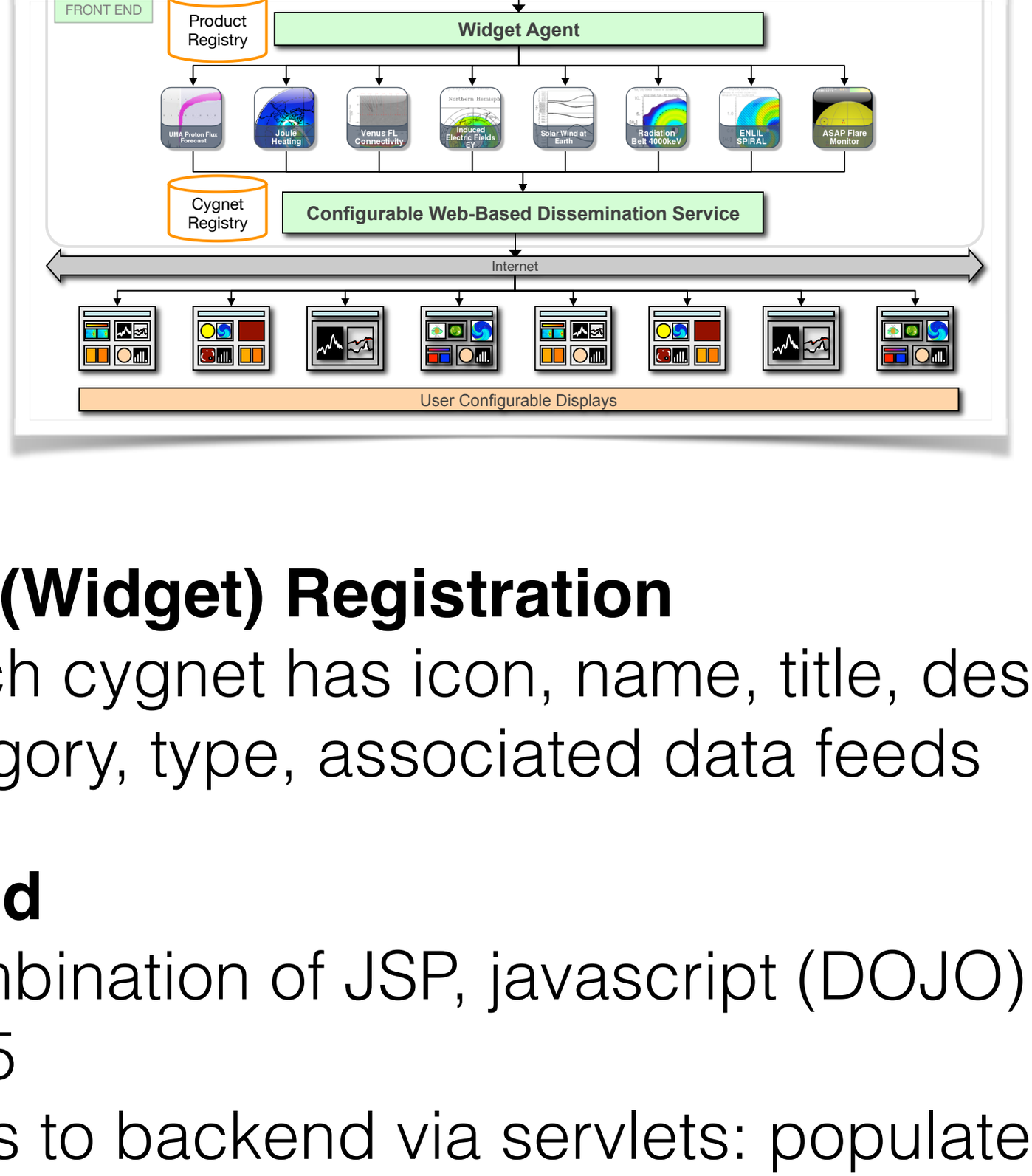


Cygnet (Widget) Registration

- Each cygnet has icon, name, title, description, category, type, associated data feeds

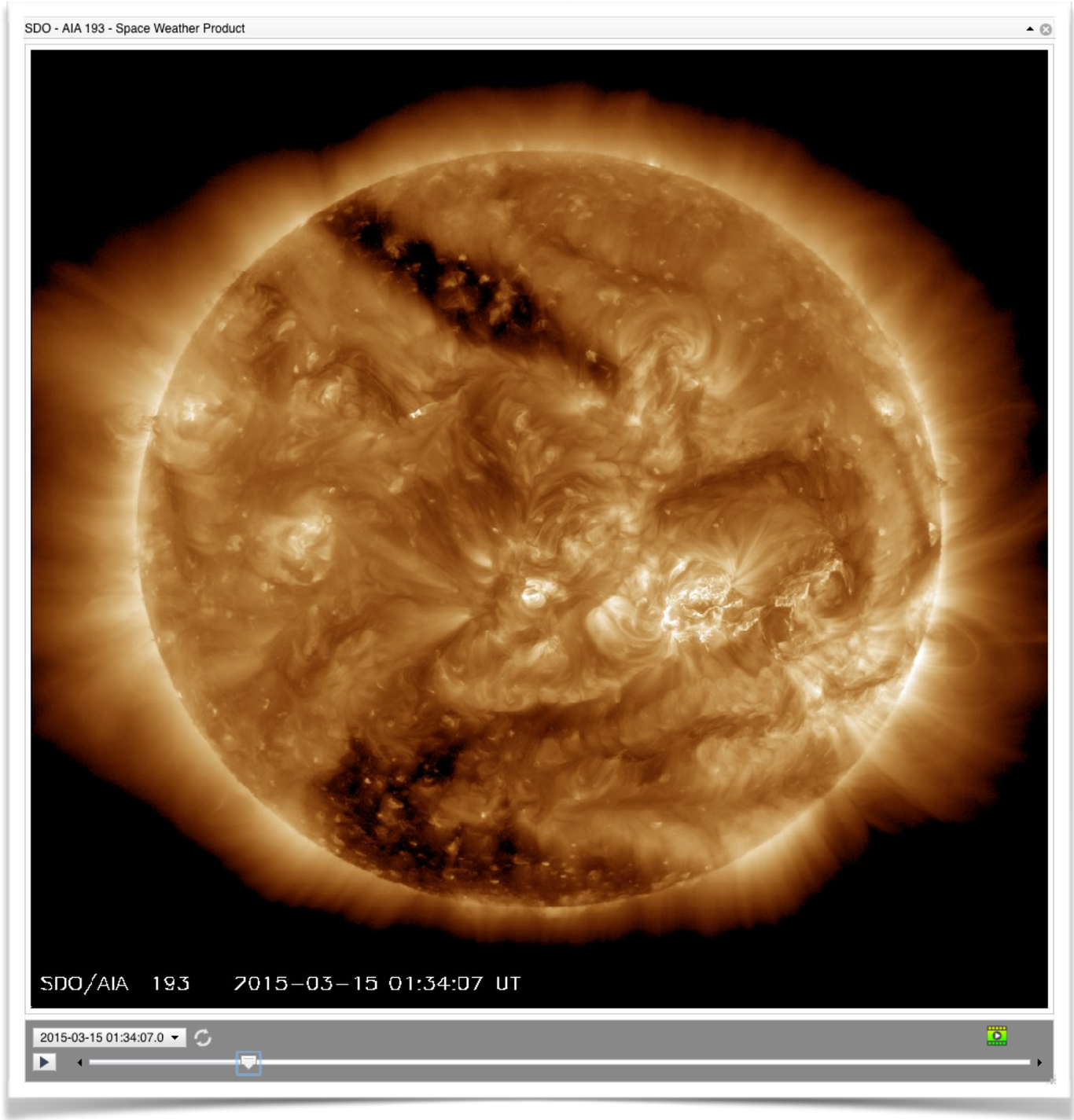
Frontend

- Combination of JSP, javascript (DOJO), and html5
- Talks to backend via servlets: populated cygnet catalog, fetch data (images, json, xml, urls)

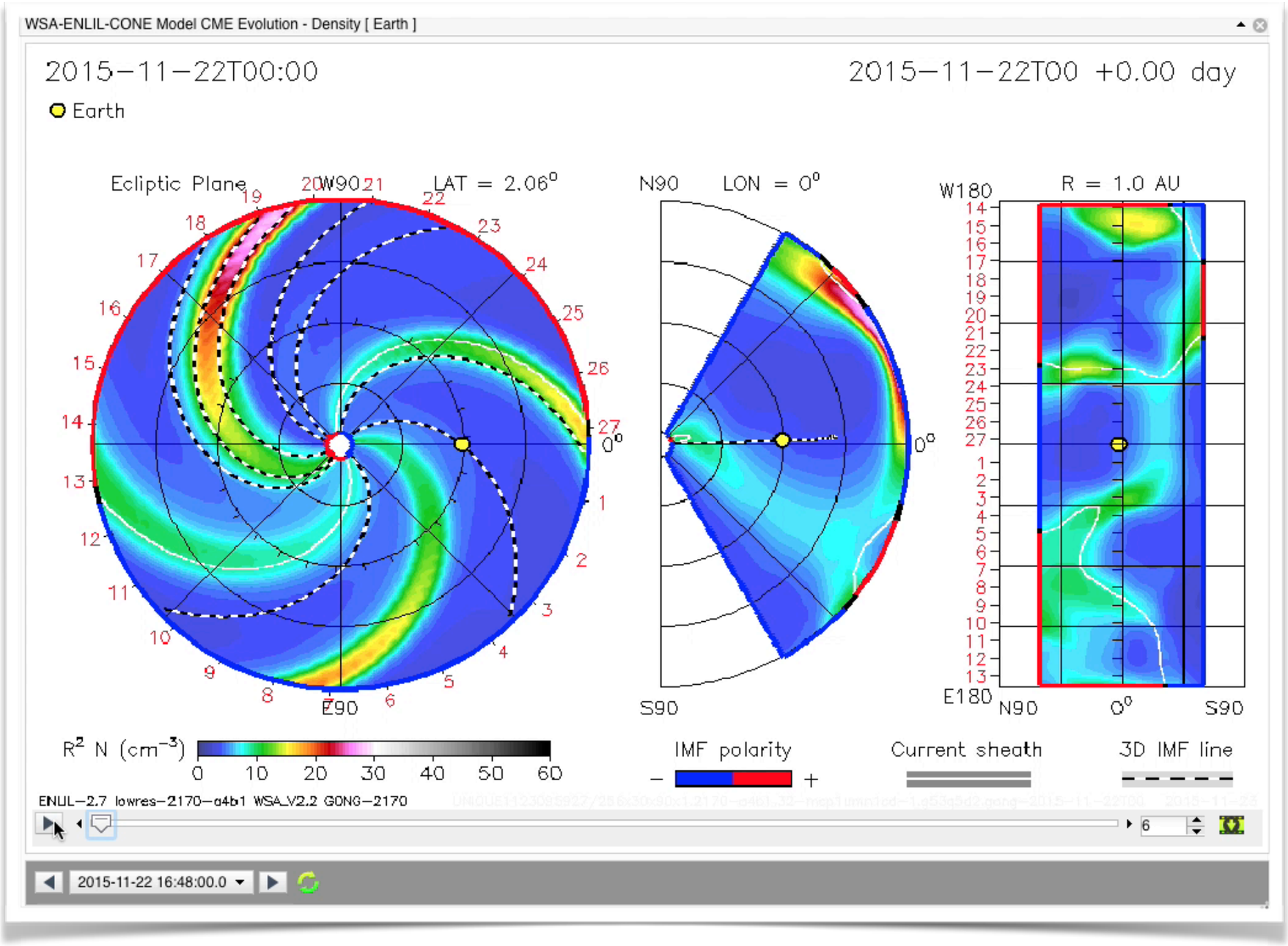
Cygnet

- Base Cygnet : Dojo extension of dijit.Widget
    - resize
    - set timestamp
    - get/set state
    - close
- Various types of Base Cygnets

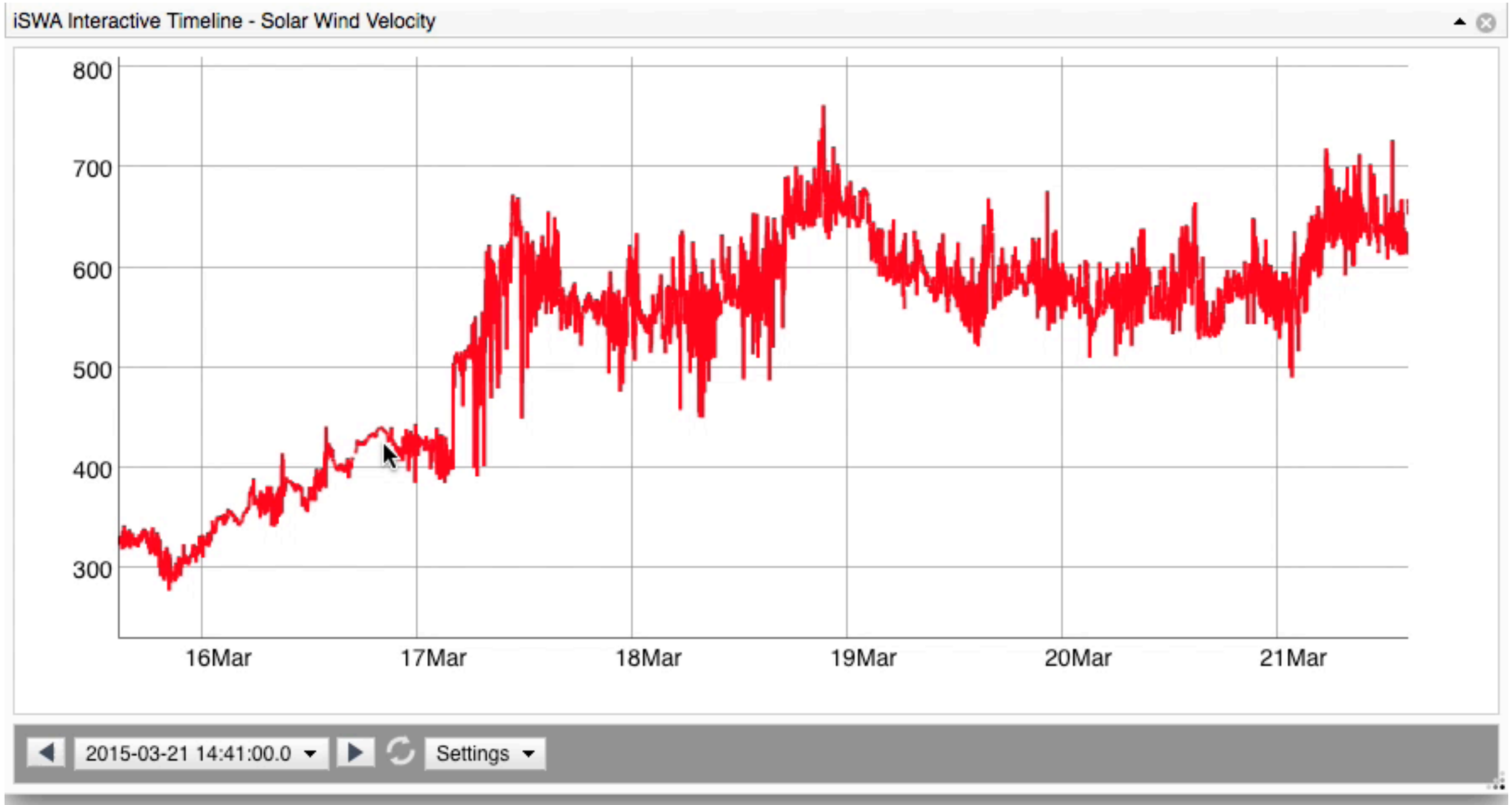
Cygnet Types: Image



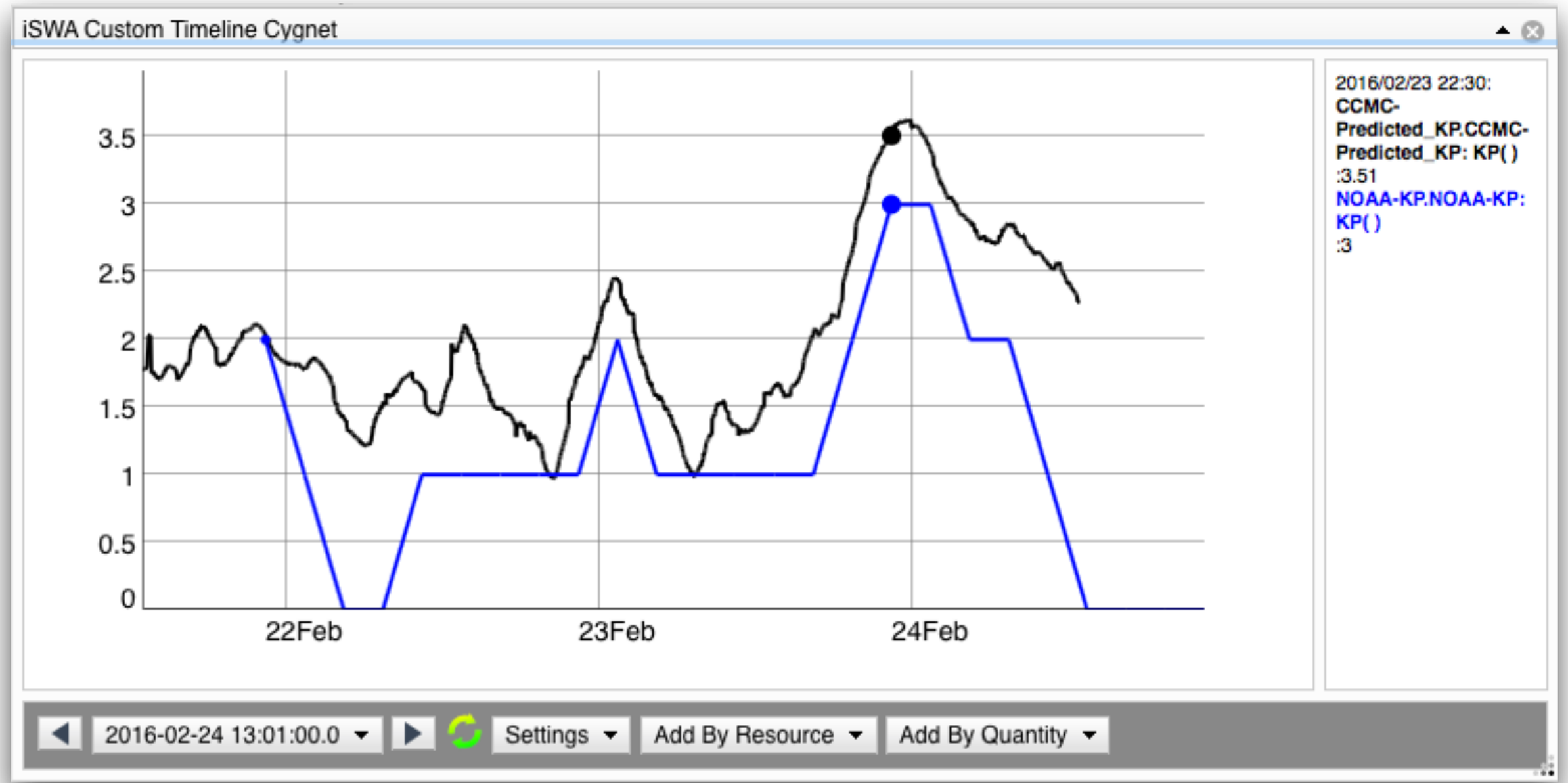
Cygnet Types: Event



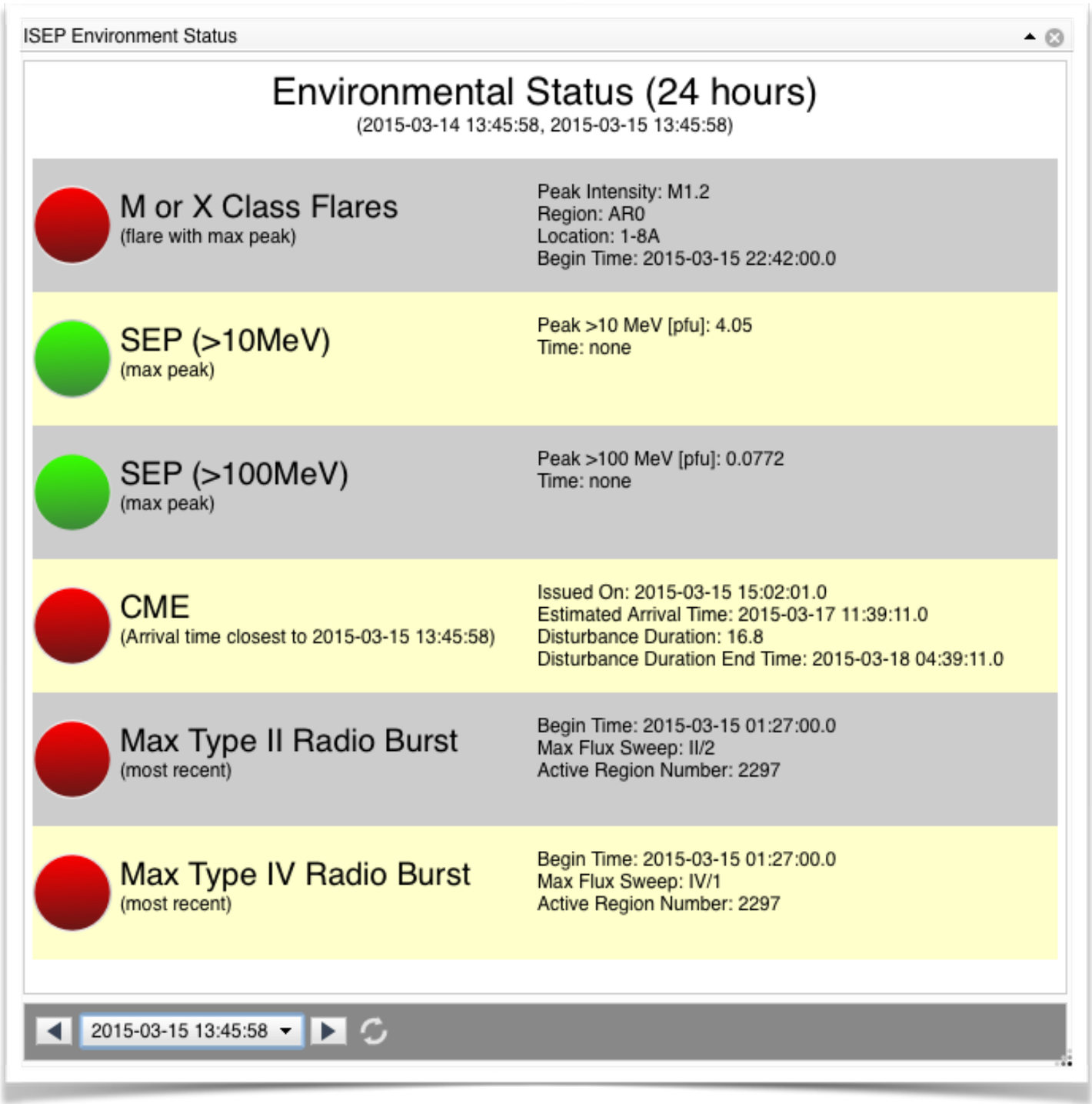
Cygnet Types: Timelines



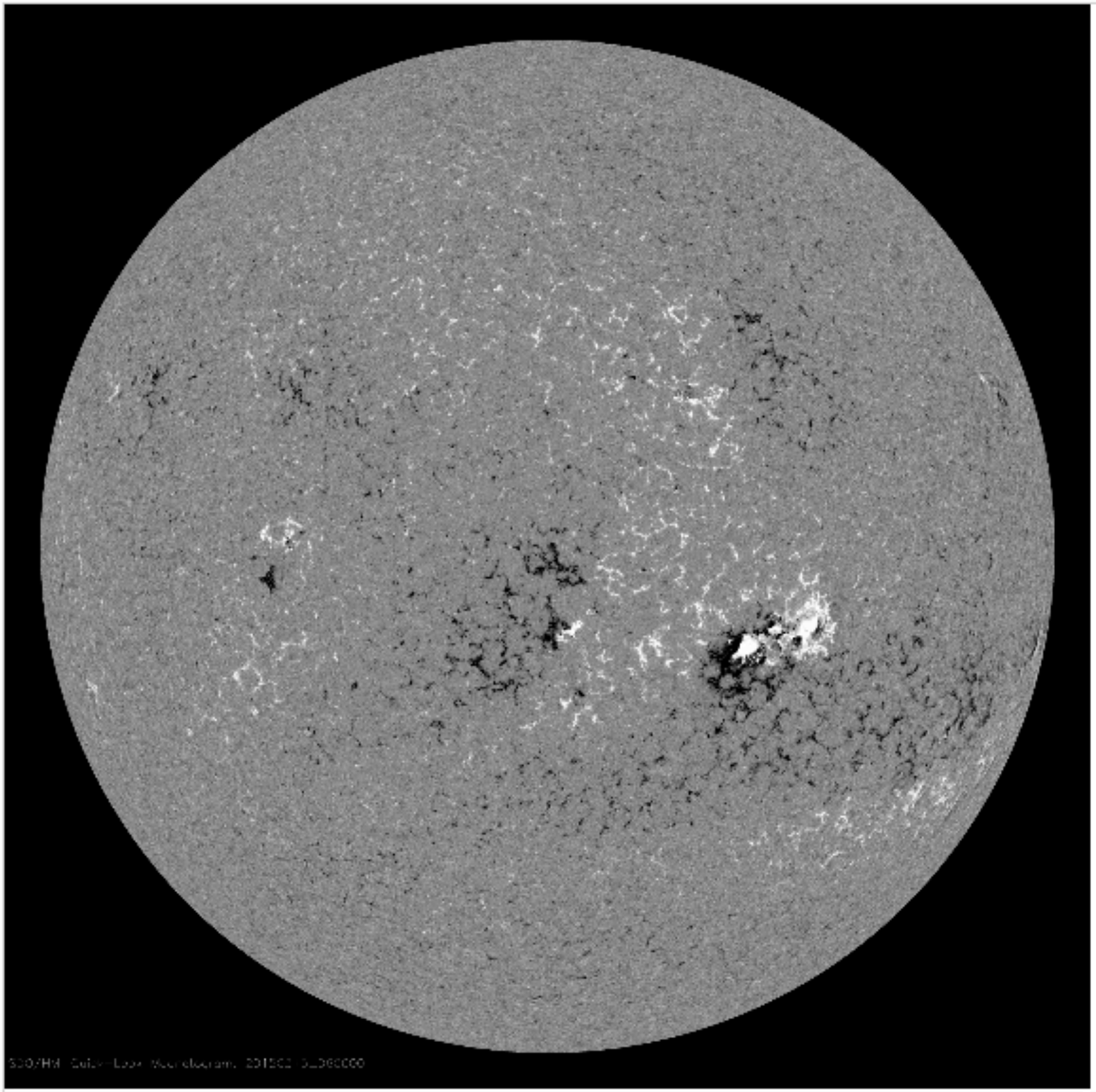
Cygnet Types: Custom Timeline



Cygnet Types: Composite



Magnetic Connectivity Solarscape Viewer



2015-03-15 06:09:01 | Background | Features

Other Cygnet Types

- Image Gallery
- Simple Text
- Pure HTML
- Other Composite Types

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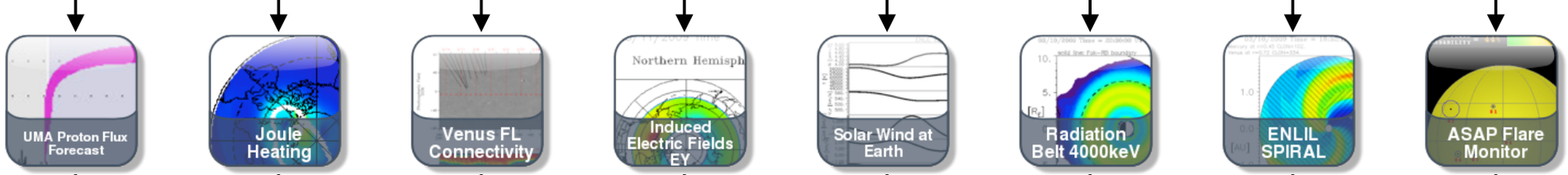

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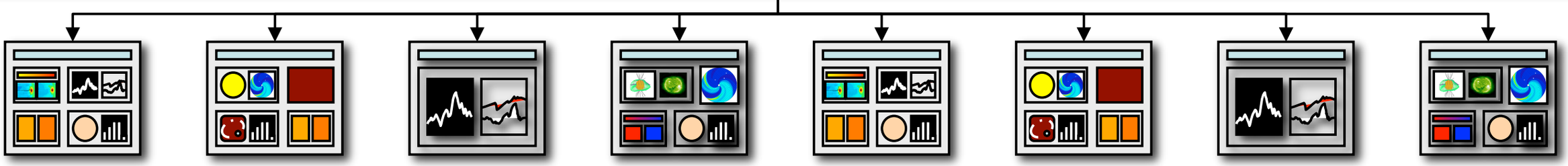
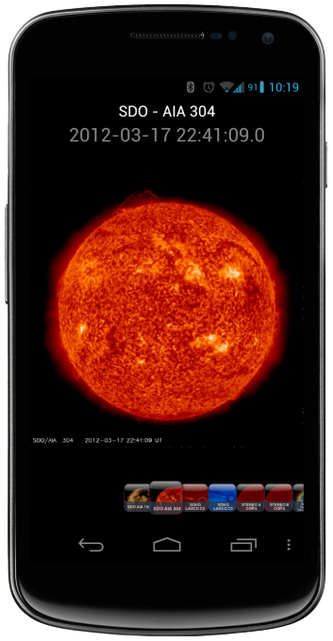
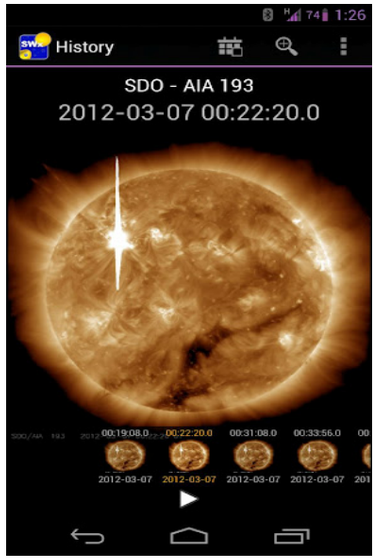
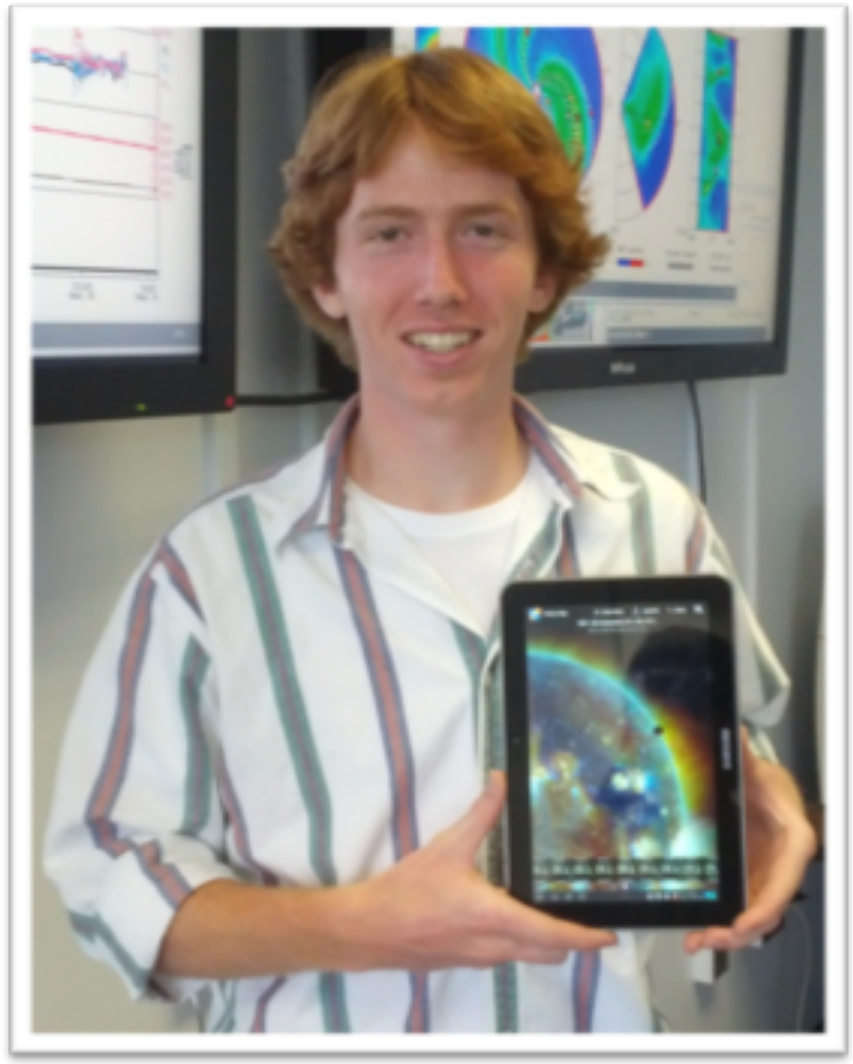


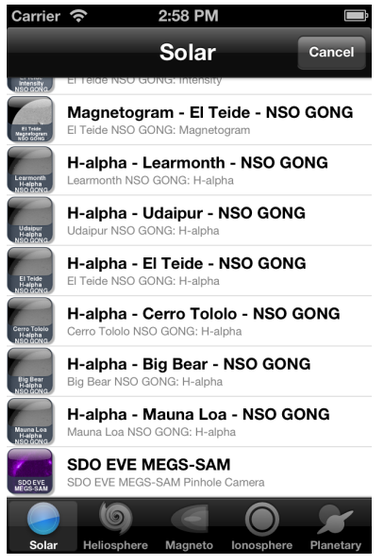
User Configurable Displays

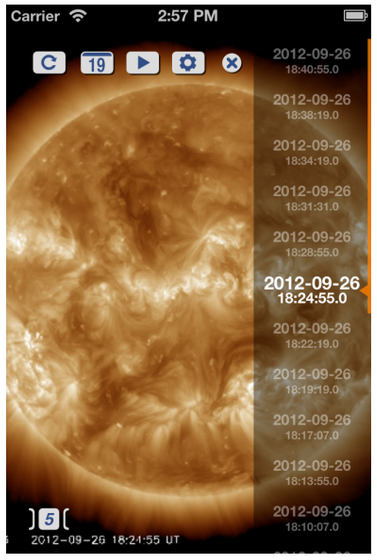
NASA Space Weather











Stats

- 569 Unique Data Feeds
- 84 Million Files Registered
- 408 Consumable Display Products
- 132k Android App Downloads
- 147k iOS App Downloads

?s