CCMC Metadata Effort

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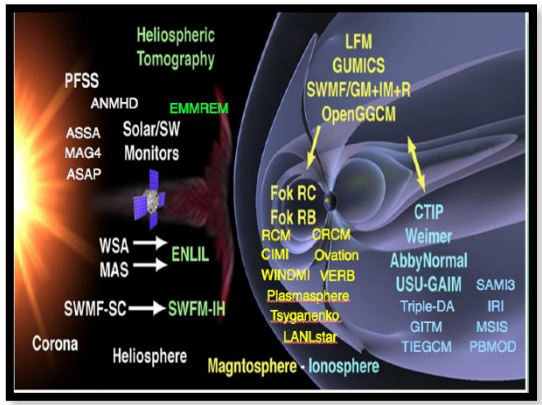
CCMC

CCMC Assets & Services

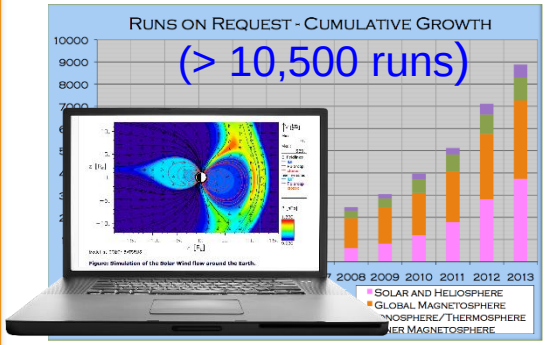
Models



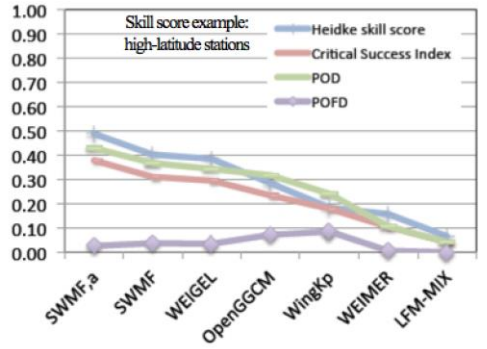
(expanding collection: > 60)

Simulation

Services



Assessment, Metrics & Validation



Multi-Purpose

Tools, Systems, Databases

SEA[5]

Space Weather

Services

for NASA's missions

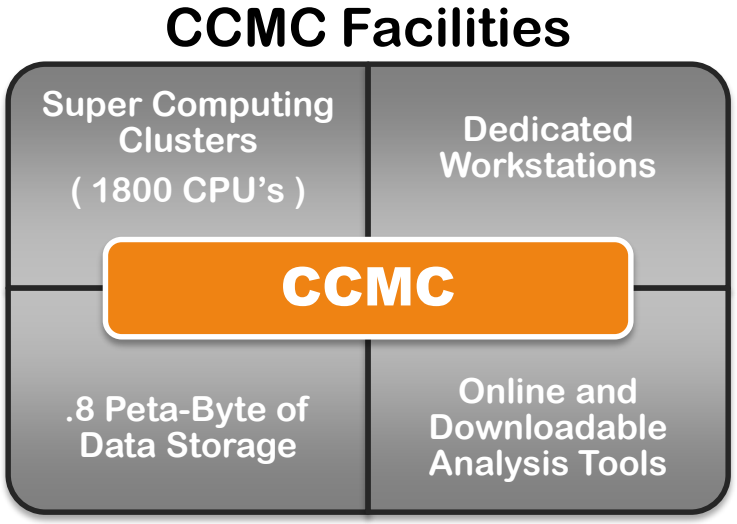
Space **W**eather **R**esearch **C**enter

Hands-on

Education

Model Simulation Runs-On-Request

http://ccmc.gsfc.nasa.gov

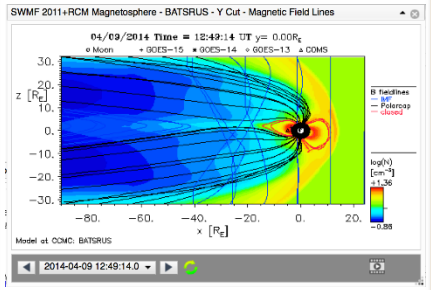


- 60+ Available Models (covering from the Sun to Earth)
- User Configurable Input Parameters
- Data Downloads + Data Format Standardization/Access Software
- Simulation Archive
- Searchable Database
- Online Visualization Tools
- Downloadable Analysis Software (Space Weather Explorer)
- Automated Movie Generation Tools

CCMC Tools, Systems, & Databases

for Research, Analysis, Metrics & Validation, Forecasting

Continuous Real-time Simulations



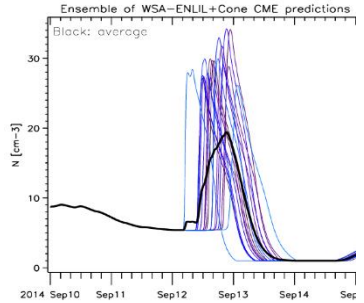
Event-Triggered Real-time Simulations

1-Click

Input Parameters Generation Tools

StereoCAT

Ensemble Simulations



iNtegrated Space Weather Analysis System

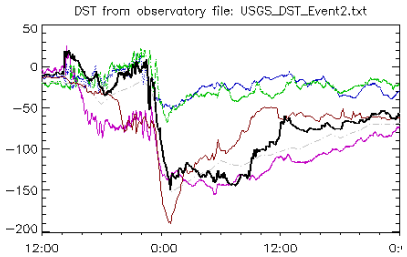
Databases:

Run Results, Events, Impacts interpretations

DONKI

Forecasting Methods ScoreBoards

M&V Suite to Trace Model Improvements



Tools

- Develope multi-purpose tools:
  - The integrated Space Weather Analysis (iSWA) system
  - The Database Of Notifications, Knowledge, Information (DONKI) system
  - Scoreboards Effort: CME Scoreboard, Flare Scoreboard, SEP Scoreboard (coming soon)
  - Space Environment Automated Alerts & Anomaly Analysis Assistant (SEA5) system
  - Run-On-Request and online visualization tool
- A large collections of unique data sets needed by the community for space science research and space weather forecasting

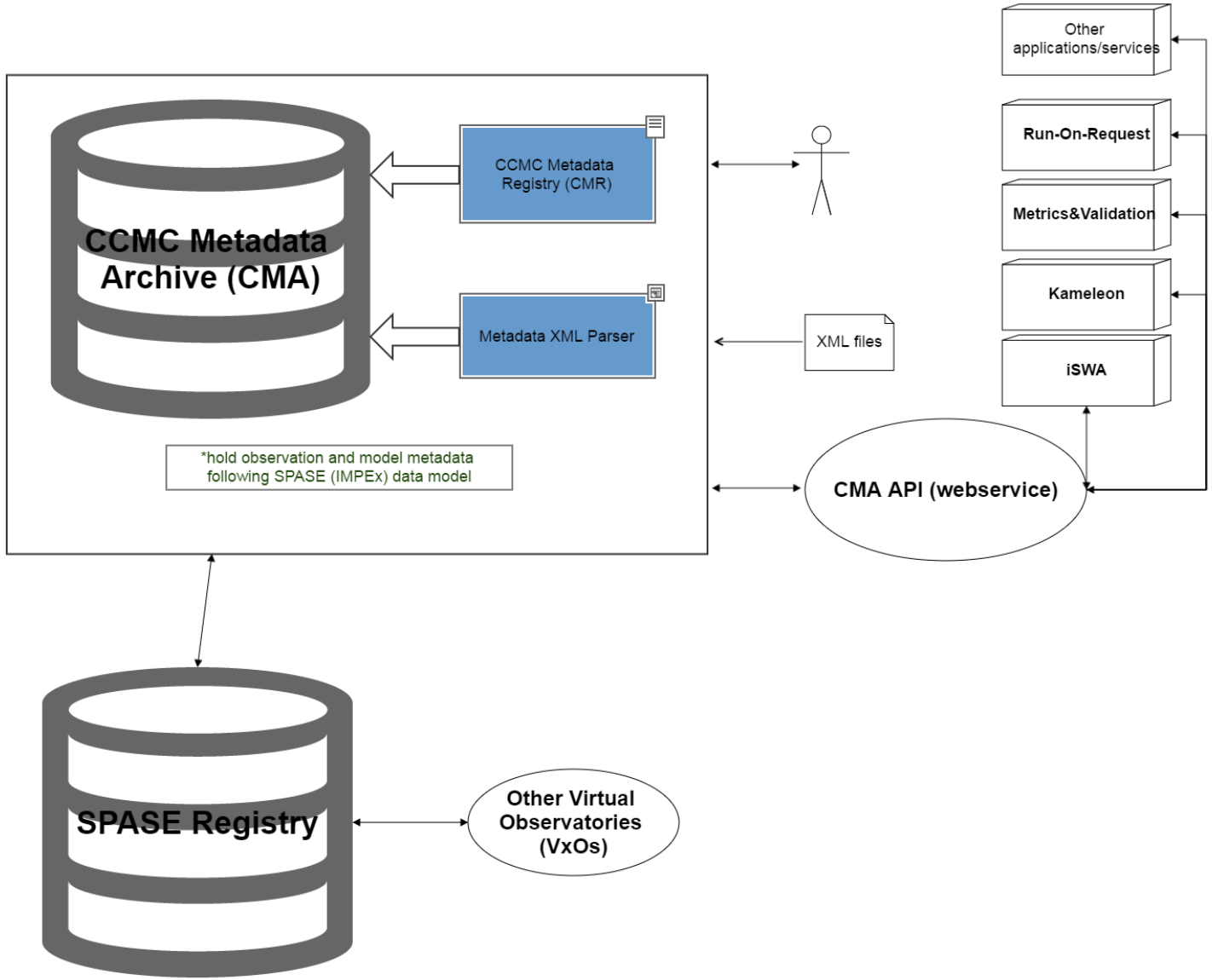
What is missing?

- Metadata
  - We need data about our data!
- Why?
  - Data discovery, model-data comparison, validation of models
  - Why do we need to use a standard for metadata?
    - Common language and format for ease of data comparison and sharing
    - Our choice: SPASE with IMPEx extension

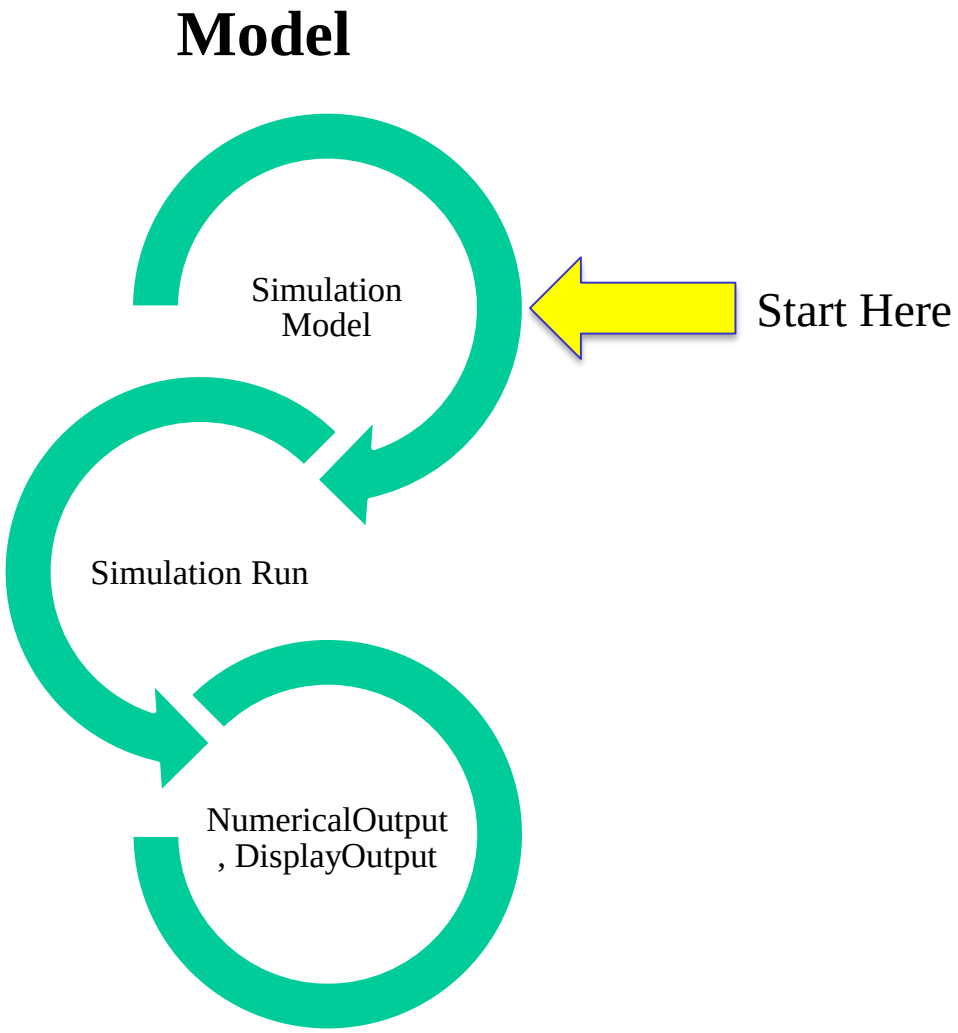
Improvement Plan

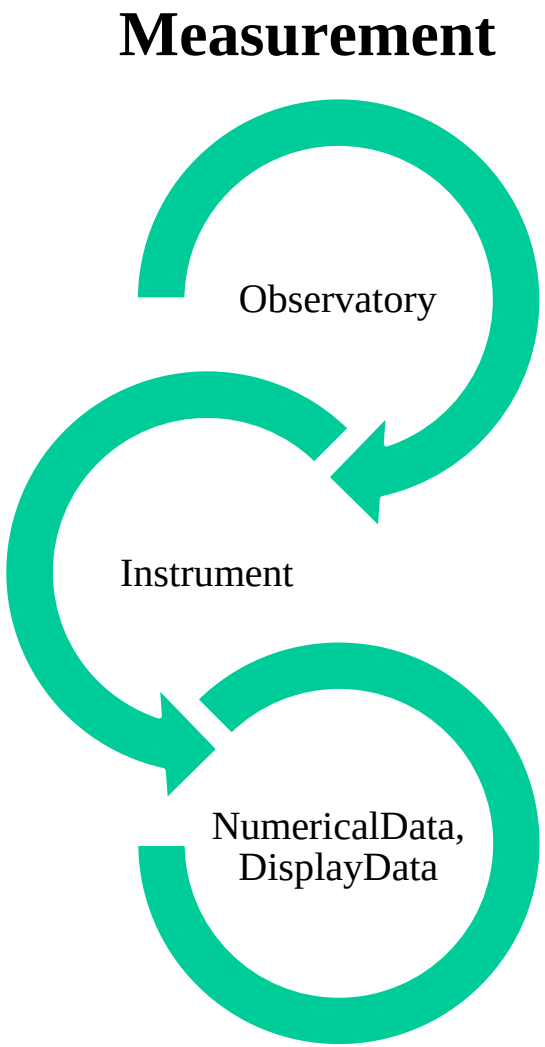
- Re-architecture of the CCMC backend databases (run-on-request, iSWA, Metrics&Validation etc.)
  - Provide a hub for the community to easily search and obtain simulations data and real-time spacecraft observation data for their own research
  - Interconnect and compare simulations from scientific models with observation data
- Need to have meta-data for our data to achieve those goals

CCMC Metadata Registry (CMR)



Where to start?





Metadata for Simulation Model

- User Interface to enter metadata about simulation model
- **Web service** call to get a **SimulationModel** Object with all the info about a simulation model
  - **JSON Example:**
    - https://kauai.ccmc.gsfc.nasa.gov/ROR2/WS/get/ModelInfo?SpaseResourceID=spase://CCMC/SimulationModel/CTIPe/Version1.0&mediaType=json
    - https://kauai.ccmc.gsfc.nasa.gov/ROR2/WS/get/ModelInfo.json?SpaseResourceID=spase://CCMC/SimulationModel/CTIPe/Version1.0
  - **XML Example:**
    - https://kauai.ccmc.gsfc.nasa.gov/ROR2/WS/get/ModelInfo?SpaseResourceID=spase://CCMC/SimulationModel/CTIPe/Version1.0&mediaType=xml
    - https://kauai.ccmc.gsfc.nasa.gov/ROR2/WS/get/ModelInfo.xml?SpaseResourceID=spase://CCMC/SimulationModel/CTIPe/Version1.0

Space Weather Modeling Capabilities Assessment

- Information Architecture for Interactive Archives (IAIA) Working Team
  - https://ccmc.gsfc.nasa.gov/assessment/topics/data.php
  - Mission Statement: Facilitate the development of a global network of distributed web-based resources for the purpose of model-data comparison
  - International collaboration effort: SPASE experts, IMPEx experts
    - Full list of participants: https://ccmc.gsfc.nasa.gov/challenges/IAIAinfo/Participants.php

Focus on output