

# CCMC Infrastructure and Computational Resources

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- Two goals are driving much of the computational development in Heliophysics:
  - (1) More accurate physical descriptions of phenomena
  - (2) Pushing models/simulations towards eventual operational capabilities
- (1) compels harnessing ever larger resources, scaling calculations to many 1000s of cores. I see no end in sight to the possible demand.
- (2) requires balancing likely available resources, sufficient accuracy, and robust capability to deal with imperfect data sources.
- (2) is certainly the popular focus right now. We should not lose sight of (1).
- In particular, how can we provide better access to more “science quality” results?

# What Resources are Required for CCMC Runs?

- Many Heliophysics computational groups have annual allocations of > million core hours (some of have much more).
  - A ~1000 core calculation that requires 10 minutes of wall clock time is not a big deal, and shouldn't be for the CCMC
  - ~1000 core/~24 hour calculations should be possible
- Meeting these needs requires CCMC to have a good system for assigning jobs locally or to remote supercomputing resources.
- Larger simulations  $\Rightarrow$  More data to deal with. Need to decide where this resides, what is brought back locally.
- Developers desiring such resources for runs on demand need to provide quick-look visualizations and analysis.
- Alternative hardware (e.g. GPUs) may provide another path

# The Future: How to Create Access to “Hero” Simulations

- Computational groups often create a special simulation (or set of) used frequently for analysis and publication.
  - Time dependent simulations can use  $10^5$  -  $10^6$  core hours and create terabytes of data
  - It is not realistic for the CCMC to provide resources to repeat such calculations
  - The CCMC could be a portal for accessing this data
- Requirements:
  - Significant amount (Petabytes) of disk space (not necessarily at CCMC)
  - High internet bandwidth
  - Ready-made quick look visualizations for overview
  - Perhaps developers provide some visualization guides (e.g. Visit sessions)
- Executing this well will require a lot of planning