Cross-Disciplinary Time Domain Science Cases

TIME DOMAIN BREAKOUT SESSION

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Connections

- https://zoom.us/j/582605547

- https://docs.google.com/document/d/1xAaDfeOreuRLMWdUs3KDxVu10DAGrs8gRQ_NV00bKec/edit?usp=sharing

Background

- Time Domain by itself is *NOT* a science case
- NASA Science Mission Directorate (SMD) has called for community input on how best to handle "cross-disciplinary big-data problems"
  - Cross-Disciplinary means across the four science division in NASA (Planetary, Earth, Helio, Astro)
- Two workshops held
  - August: NASA Archives
  - October: Industry partners plus NASA Archives
  - November: Written request for information
- Both the National Academies Exoplanet Report and Astrobiology report advocated more cross-disciplinary studies
  - These reports will be key inputs into Astro2020 decadal process

From the Point of View of the Astro2020

- Are there scientific problems applicable to cross-disciplinary science that are also "Big Data" that the Archives can then help support or drive ?
  - Science Questions First …
  - Archive Contributions flow from Science Questions

Suggested Science Question

- Stellar/Solar Cycles and the Impact on the Earth and Exoplanets
  - Solar/Stellar activity affects habitability of planets (both solar system and exoplanets)
  - Connects Astrophysics, Heliophysics, Planetary, and Earth Sciences
  - Large photometric stellar variability datasets from CoRoT, Kepler/K2, TESS and Gaia
  - Large solar variability datasets from ground and space (SOHO)
  - Long term monitoring of solar systems from orbit and ground (Mars, Jupiter, Saturn …)
- Combine data sets to build models of stellar/solar that could be used to
  - Predict when the Sun may produce CME events
  - Stellar variability and energy rates and cycles – in particular, rates of CME-like events
  - Effects of stellar and solar events on planetary systems – including exoplanets

Other Cross-Disciplinary Time Domain Science Questions ?

- What are your ideas?

Charge to this Panel

- What are the most important missions and facilities for accomplishing high priority science in the 2020s?

- Evaluate the size and complexity of the data sets that are expected to arise from these missions.

- What theory and simulation data sets will be needed to interpret observational data sets?

- If the data were available now, would existing data facilities be sufficient for achieving the science goals?

- How do the current astrophysics archives and platforms need to evolve to support new science opportunities with the data sets in the 2020s?

- What science could be done with existing data sets that isn't happening because of difficulties in exploiting the data?

- What are the key plots and sound bites that we need to show the Decadal Committee?

- What else?