The GSFC Exoplanet Modeling and Analysis Center. A. M. Mandell[1], A. A. Pulkkinen[1], and S. Domagal-Goldman[1], [1]Goddard Space Flight Center, Greenbelt, MD, 20771. Email: Avi.Mandell@nasa.gov.

Introduction: The study of the formation, evolution and characteristics of extrasolar planets cuts across all scientific boundaries of NASA science, from Earth Science and Heliophysics to Planetary Sciences and Astrophysics: exoplanets and their host stars are coupled together through stellar radiation and space-weather interactions such as stellar winds and outflows (a combination of stellar Astrophysics coupled with Heliophysics-based models), while planetary interiors and surfaces are connected to the planet's atmosphere through surface processes, atmospheric dynamics, and even the potential impact of biological activity (studied by both Planetary and Earth Sciences). Astrophysics also provides the context – the study of the universe, galaxies, stars, their properties, and evolution – while also serving as the purveyor of the observing platforms that are used to study planetary systems around other stars; additionally, Planetary Science missions that combine in-situ and remote sensing studies of Solar System bodies can provide important context for interpreting exoplanet observations. Given this complexity and the inherent couplings across many diverse science areas, a comprehensive interdisciplinary viewpoint is needed to fully characterize the planetary environments and the potential for life to exist on worlds orbiting other stars.

As we prepare for the launch of the James Webb Space Telescope (JWST), a revolutionary tool for the study of both Solar System and extrasolar planets, and plan for future exoplanet imaging missions such as Wide-Field Infrared Space Telescope (WFIRST) and future flagship ultra-violet/optical/infrared (UVOIR) telescopes, the time is ripe for developing a community-accessible modeling and analysis framework that can help facilitate the investigation and interpretion of observations of atmospheres and surfaces of a planets both within our Solar System and beyond.

Decription: The GSFC Exoplanet Modeling and Analysis Center is meant to provide a cohesive and accessible platform for the planetary atmosphere modeling and analysis community to host their software for modeling and interpreting current and future NASA observatory data examining the atmospheres and surfaces of both Solar System planets and exoplanets. The platform would allow external researchers to install their software on a dedicated NASA computer cluster, and GSFC scientists and software experts would aid in navigating installation issues and would help to develop web interfaces for using the tools. GSFC scientists would also help to develop interfaces between modeling and analysis tools, so models from different researchers could be compared in a rigorous manner and could be linked up to provide a holistic modeling framework that could bring together physics-based models with data analysis and interpretation tools (see Figure 1). Examples of models include atmospheric chemistry models, planetary atmosphere radiative transfer, planetary parameter retrieval algorithms, and data modeling tools.

The EMAC will leverage the capabilities and resources existing within the GSFC Community Coordinated Modeling Center, an existing computing center for assisting the Heliophysics community with the development and hosting of models related to solar physics. The CCMC operates a large computing facility (1000s of processors), which is overseen by a core team of computer support staff and heliophysics scientists with modeling experience. The EMAC will operate with a very similar structure and will initially leverage CCMC capabilities, but will be designed to facilitate the hosting and integration of exoplanet and planetary atmosphere models. EMAC will begin official operations in early 2017, and will be introduced to the community through a series of virtual workshops.

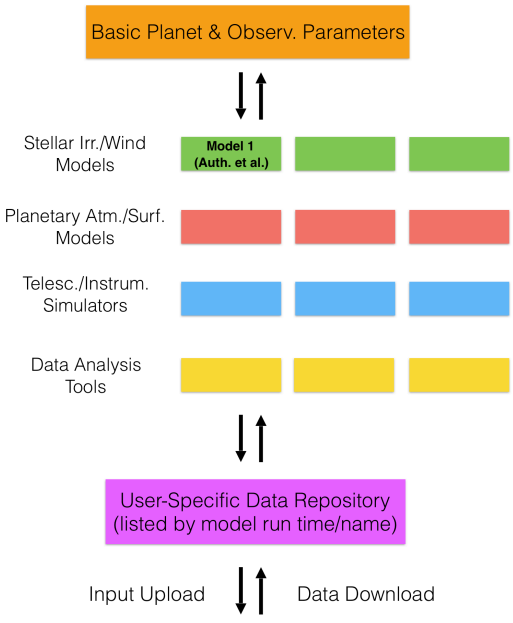

Figure 1: Example of the model integration architecture for EMAC, which will facilitate inter-model integration and comparison.