JPL SURP Strategic Topic Areas - 2008

Topic Area:	3. Discovery and Characterization of Exoplanets
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The field of extrasolar planets is among the richest and fastest-growing in astrophysics. More than 200 extrasolar planets are known, primarily from radial velocities (RV), and they form the observational foundation of the field. Exploring the observational diversity of this field will help NASA make well-informed strategic choices for the next generation of space-based instruments for exoplanets. Future developments will likely be in two broad areas. First, the searches will be extended to sample more of parameter space, notably lower-mass and longer-period planets than can be reached by RV, and a range of stellar types. A particular emphasis will be on Earth-like planets in the 'habitable zones' around nearby solar-type stars, to establish the fundamental requirements for missions that might search for signs of life. Second, efforts will continue to broaden our understanding of exoplanets by characterizing their orbital parameters, physical properties such as mass and radius, and the chemical properties of their atmospheres (and eventually their surfaces).

Objectives: This Topic Area is intended to support observations to discover and characterize exoplanet systems and instrument and algorithm developments needed to enable those efforts. Support for searches will encourage the development of novel approaches, rather than incremental improvements to existing methods. Instrument developments include, for instance, new systems for starlight suppression, or critical components of such systems. We will also consider support for exoplanet theory and modeling, using unique JPL capabilities, for instance supercomputer facilities, or in collaboration with JPL scientists.

Techniques: This proposal call is open to any observational technique that promises significant progress in any of the above areas. Examples might include ways to expand the parameter space for searches, for instance to very late-type stars via direct imaging with a coronagraph or nulling interferometer, dilute aperture imaging (e.g., with closure phase), or binary stars via astrometry. Secondary transits, recently pioneered by Spitzer observations, would be an example of a method for physical and chemical characterization of an exoplanet. Another might be high-contrast direct imaging of young Jupiters in the infrared.

Instrumentation and algorithms: Proposals may include hardware necessary to execute observations. While there is no explicit restriction on hardware expenses, the level of funding will not support major projects (such as a facility-class extreme AO system for an 8-m class telescope). Minor upgrades for existing facilities will be considered if they are enabling and their utility can be readily demonstrated. Projects that require the development and verification of essential technologies prior to implementation of an instrument are beyond the scope of this Topic Area. There is no wavelength specification for instruments or observations. We encourage the development of novel algorithms, for instance, for the analysis of data from existing facilities, or needed improvements in telescope control or data acquisition. An example might be improvements in calibration techniques for secondary eclipse data. For instrument development, performance modeling is assumed to be part of an overall plan for developing, deploying and operating a new or upgraded instrument.

Evaluation criteria: The main focus of this Topic Area is the discovery and/or characterization of exoplanets. Proposals should identify the prospects for scientific results from the proposed work. Preference will be given to proposals that demonstrate a clear science return, or a firm path toward science results. SURP is not constituted to fund and support multi-year efforts. We recognize that instrument proposals may not promise immediate scientific return, but they should identify a clear path to observation of exoplanet targets, and the expected scientific return. The same applies to proposals focused mainly on algorithm development.