



The Nexus for Exoplanet System Science

<https://nexss.info>

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3/9/16



**NExSS:
NASA Exoplanet System Science
Research Coordination Network**

A Cross-division Initiative



Objectives

To further our joint strategic objective to explore exoplanets as potential habitable and inhabited worlds outside our solar system.

- Exoplanet research cuts across divisions in SMD including Planetary Science (PSD), Heliophysics (HPD), Earth Science (ESD) and Astrophysics (APD)

To leverage existing Programs in SMD to advance the field of Exoplanet Research, specifically research in comparative planetology, biosignature and habitat detection, and planet characterization.

Establish a mechanism to break down the barriers between, divisions, disciplines and stove piped research activities.



What is a Coordination Network?

A virtual structure to support groups of investigators to communicate and coordinate their research, training and educational activities across disciplinary, organizational, divisional, and geographic boundaries.



What Research Coordination Networks have accomplished?

Provided opportunities to share information and ideas, foster new collaborations, including international partnerships, and address interdisciplinary topics.

Provided innovative ideas for implementing novel networking strategies, collaborative technologies.

Supported the development of community standards for data and meta-data.

Supported the means by which investigators can

- coordinate ongoing or planned research activities,
- and in other ways advance science and education through communication and sharing of ideas.

Implementation

Astrophysics

Exoplanet Detection
Star Characterization
Existing Mission Data
Analysis
JWST

PSD Astrobiology

Comparative Planetology
Planetary atmospheres
Exoplanet Detection
Biosignatures
Habitability

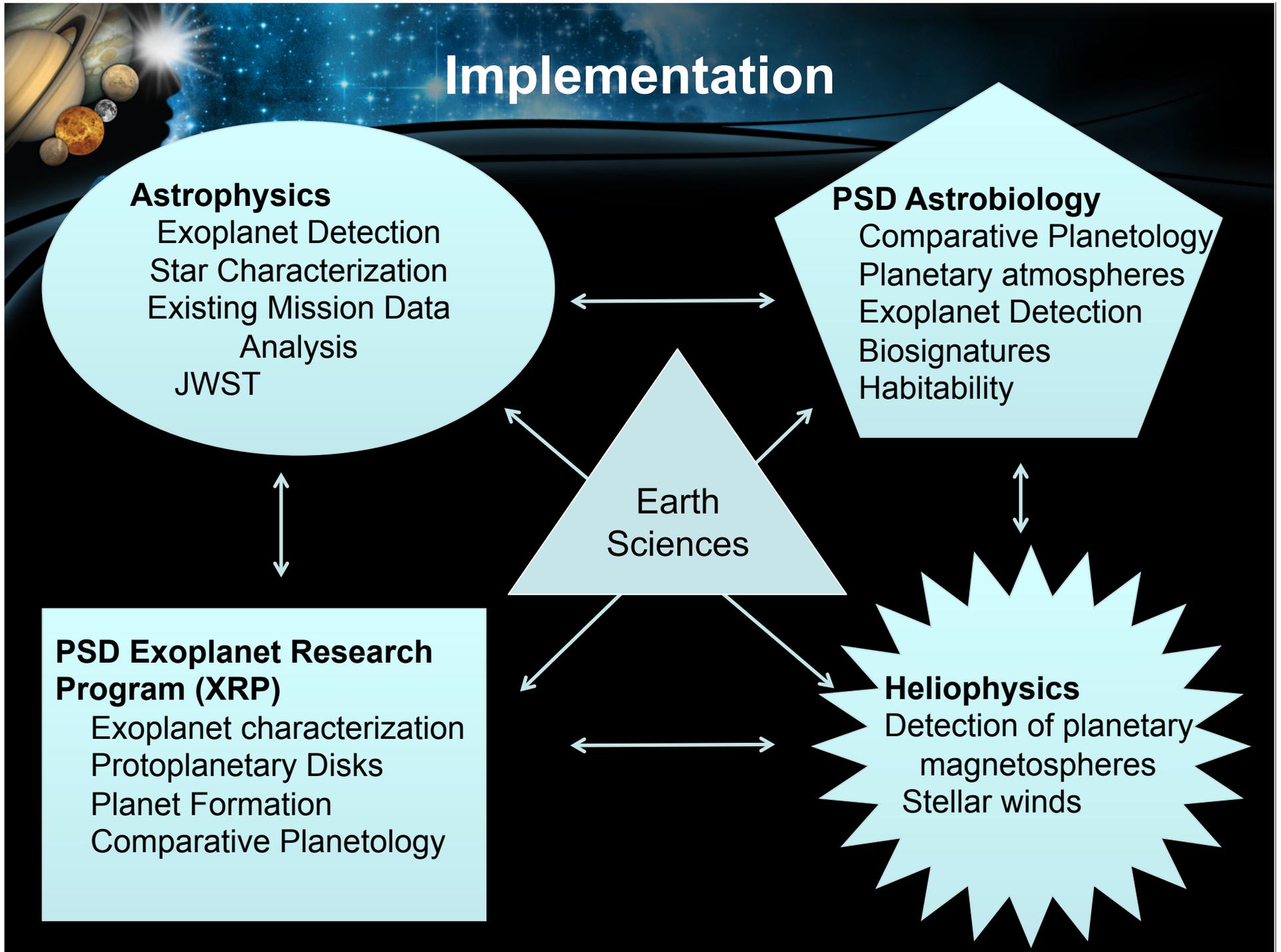
Earth
Sciences

PSD Exoplanet Research Program (XRP)

Exoplanet characterization
Protoplanetary Disks
Planet Formation
Comparative Planetology

Heliophysics

Detection of planetary
magnetospheres
Stellar winds



Kickoff Workshop

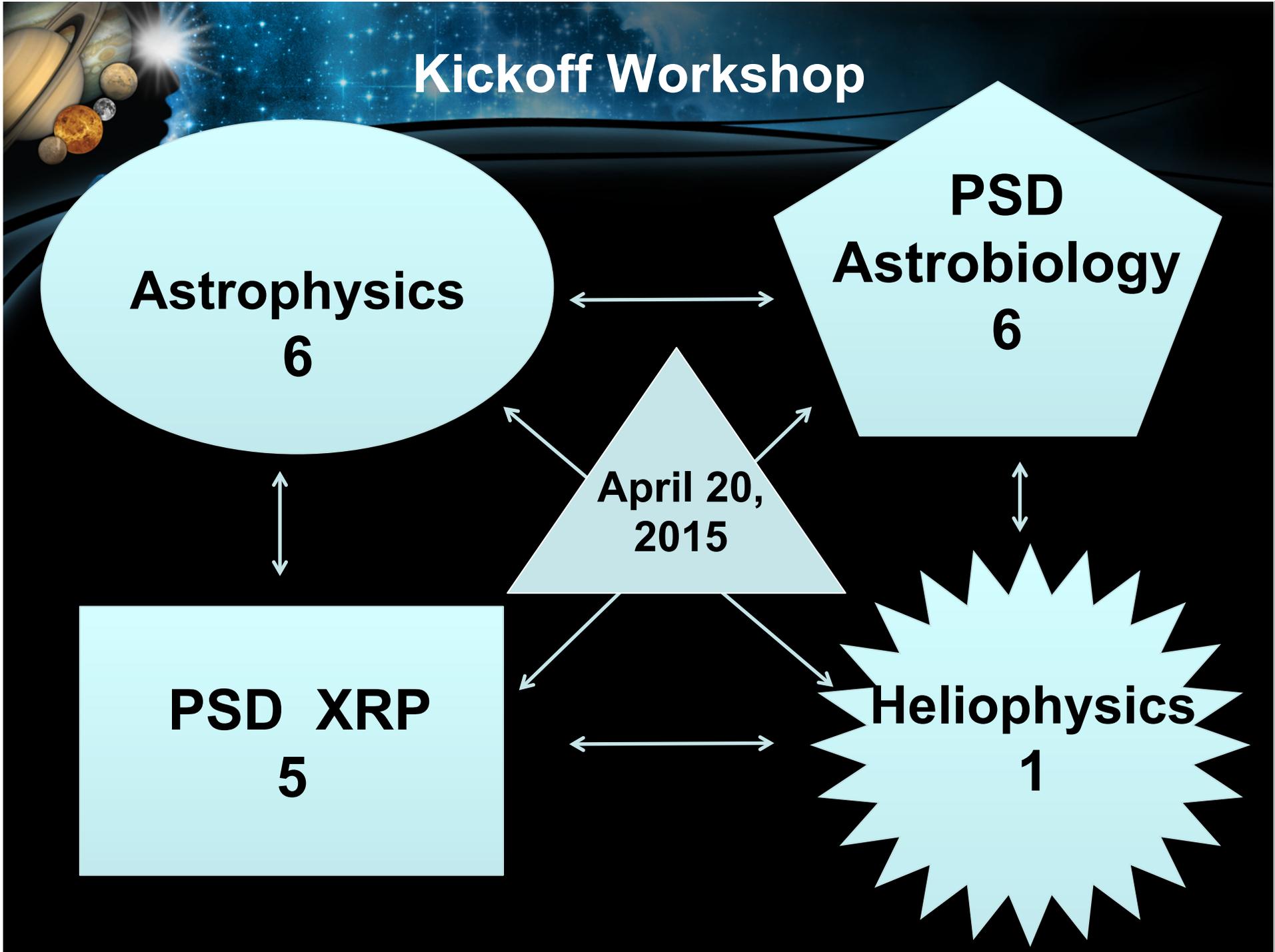
Astrophysics
6

**PSD
Astrobiology**
6

**April 20,
2015**

PSD XRP
5

Heliophysics
1





Measure of Success

Investigators carry out and propose interdisciplinary research through new collaborations

Produces a plan for utilization of current space telescopes

Spawns ideas for new and exciting missions

Identifies new targeted technologies needed not yet reported elsewhere

Influences Decadals for both PSD and APD

Enhances International engagement

NExSS white paper: Laboratory Work for Understanding Exoplanet Atmospheres (led by J. Fortney, >30)

- Needs for future measurements
 - Pressure-induced line broadening parameters (self- , foreign)
 - Optical properties of particles, haze formation
 - Reaction rate constants
 - Photoabsorption cross-sections at high T
 - Lab spectroscopy of continuum absorption
 - Oxygen absorption by early magma ocean
- Draft released for community comment
- Relevant to APDA ROSES NRA highlighting timeliness of Laboratory Astrophysics research in support of JWST

Workshops:

Upstairs Downstairs: Consequences of Internal Planet Evolution for the Habitability and Detectability of Life on Extrasolar Planets

- Tempe, AZ, Feb. 17-19 (led by PSD)
- Joint NExSS-NAI-NSF effort, in-person + virtual participation (Workshop Without Walls) + winter school for students/postdocs

Biosignatures workshop (led by PSD, APD), July 2016

- Joint NExSS-NAI-ExEP effort
- Partnering with tentatively approved ExoPAG SAG-13 in support of JWST, WFIRST, HabEx/LUVOIR studies

Exoplanetary Space Weather, Climate and Habitability Workshop

-Fall 2016

Identifying which stars are the best place to search for habitable planets and life

Other activities, collaborations:

- Other workshop ideas (priorities identified by poll of teams)
 - How to identify potentially habitable planets (ESD, PSD)
 - Space weather constraints on habitability (HPD, APD)
 - Stellar, disk histories favoring habitability (APD, PSD)
- Cross-team, cross-discipline collaborations occurring in NExSS
 - Planetary scientists and astrophysicists to characterize short-period rocky planets
 - Statistical and machine learning approaches to detect low-mass planets in presence of stellar activity
 - Heliophysicists and astrophysicists to estimate mass loss in young Sun-like stars
- Monthly webinars since June 2015, monthly PI telecons, possible full NExSS team meeting summer/fall 2016

MANY WORLDS

Movement in The Search For ExoLife

Posted on 2016-01-22 by Marc Kaufman



A notional version of an observatory for the 2030s that could provide revolutionary direct imaging of exoplanets. GSFC/JPL/STScI

Assuming for a moment that life exists on some exoplanets, how might researchers detect it?

About Many Worlds

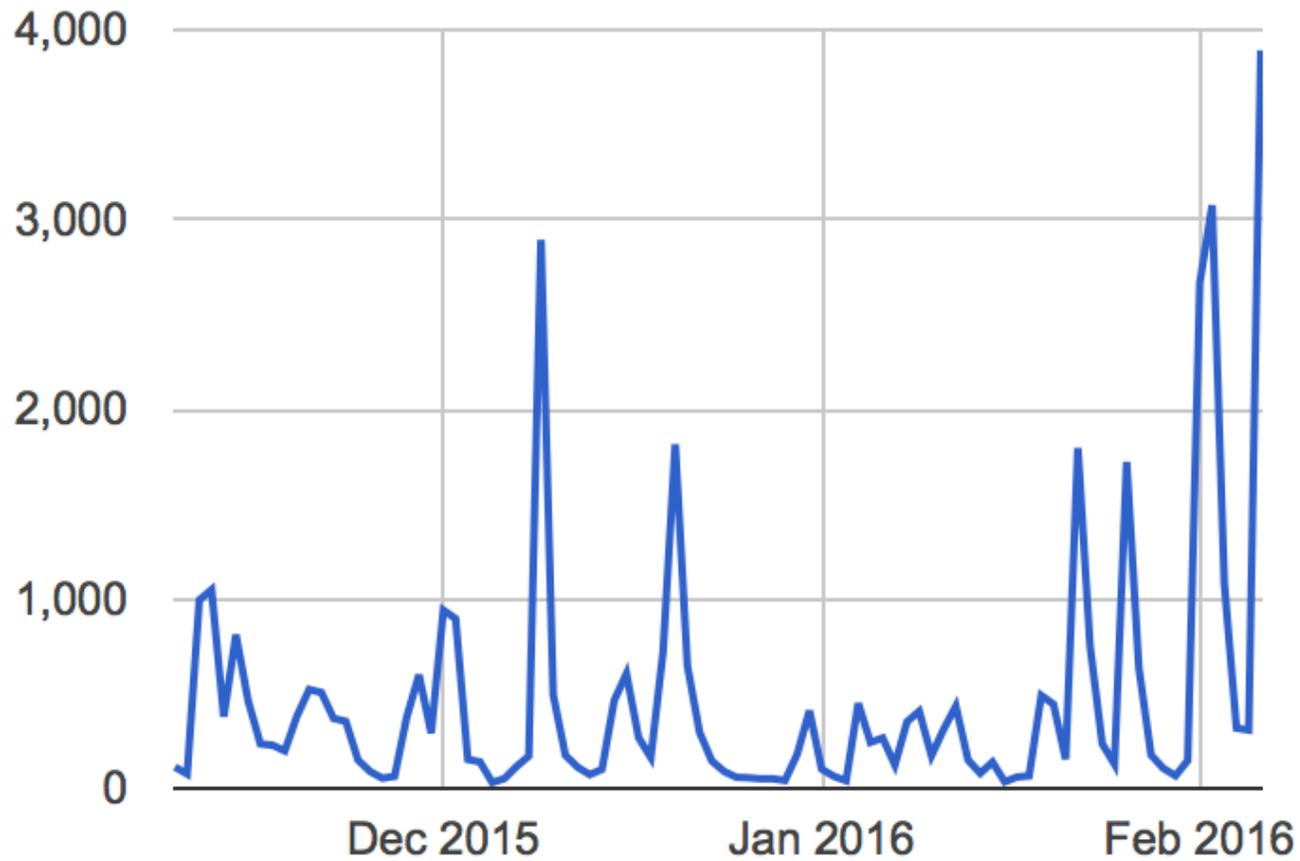
There are many worlds out there waiting to fire your imagination.

Marc Kaufman is an experienced journalist, having spent three decades at The Washington Post and The Philadelphia Inquirer, and is the author of two books on searching for life and planetary habitability. While the "Many Worlds" column is supported by the Lunar Planetary Institute/USRA and informed by NASA's NExSS initiative, any opinions expressed are the author's alone.

This site is for everyone interested in the burgeoning field of exoplanet detection and research, from the general public to scientists in the field. It will present columns, news stories and in-depth features, as well as the work of guest writers. Many Worlds will be updated on most Tuesdays and Fridays, and sometimes in between.

To contact Marc, send an email to marc.kaufman@manyworlds.space.

Many Worlds Blog Traffic





NExSS Face to Face (May 2016) and Exoplanet Talk Show on NASA TV



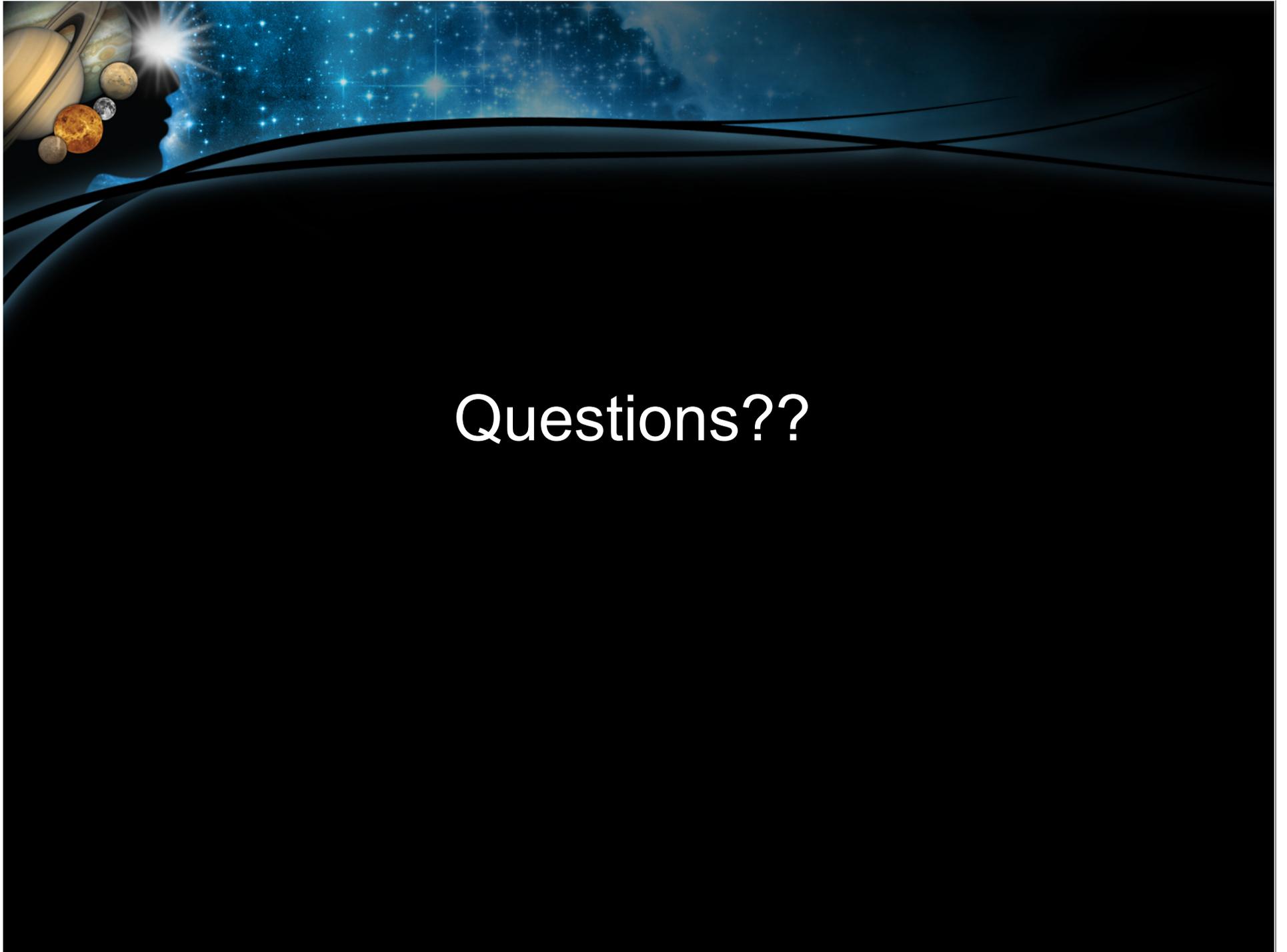


E.4 HABITABLE WORLDS

NASA's Habitable Worlds Program includes elements of the Astrobiology Program, the Mars Exploration Program, the Outer Planets Program (all in the Planetary Science Division) and Exoplanet research in the Astrophysics Division. A common goal of these programs is to identify the characteristics and the distribution of potentially habitable environments in the Solar System and beyond.

11/18/2016
(Step-1)

01/20/2017
(Step-2)



Questions??