Jet Propulsion Laboratory
California Institute of Technology

Exoplanet Biosignatures Workshop Without Walls

Theme 3:

Confidence Standards for Biosignature Observations and Interpretation

Dr. Nick Siegler
Program Chief Technologist
NASA Exoplanet Exploration Program
Jet Propulsion Laboratory

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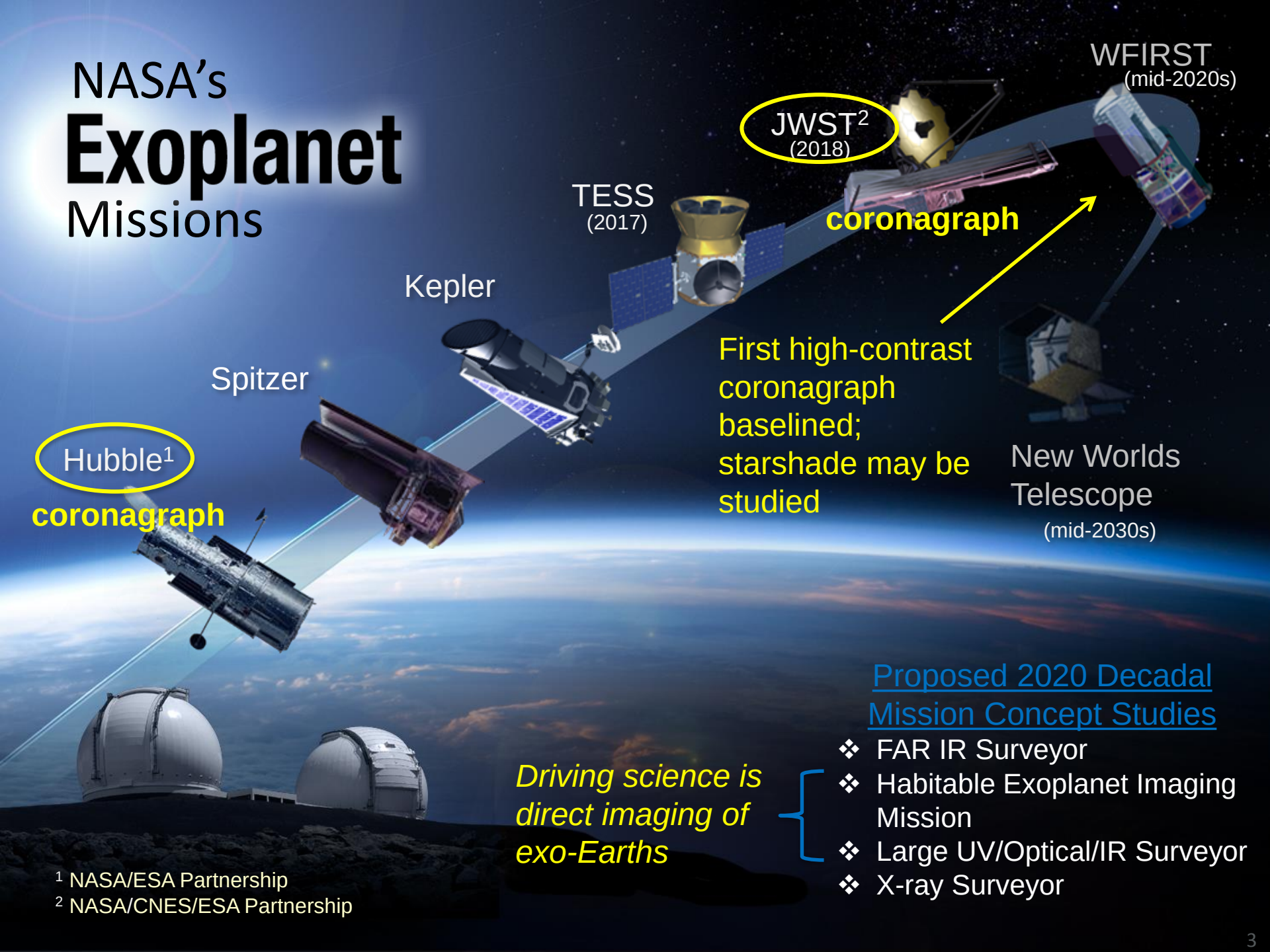
Theme 3: Confidence Standards for Biosignature Observation and Interpretation

- 8:30 - 8:35: Moderator: **Nick Siegler**
- 8:35 - 9:05: What can we measure now and in the future? **Heike Rauer**
- 9:05 - 9:35: What can we model/ascertain now and in the future? Tony Del Genio
- 9:35 - 10:30: Q&A/Discussion
- 10:30 - 10:45: Break
- 10:45 - 12:30: Breakout Groups
  - ❖ Breakout Group 1
  - ❖ Breakout Group 2
  - ❖ Breakout Group 3
  - ❖ Online Breakout Group
- 12:30 - 1:30 Lunch
- 1:30 - 2:00 Report-back from Breakout Groups
- 2:00 - 2:30 Final words, instructions for last-day work session, discussion of future work/meetings/goals
- 2:30 - 4:30: Working groups (for white paper)
  - ❖ Working Group 1
  - ❖ Working Group 2
  - ❖ Working Group 3
  - ❖ Online Working Group

NASA's Exoplanet Missions



Driving science is direct imaging of exo-Earths

Proposed 2020 Decadal Mission Concept Studies

- FAR IR Surveyor
- Habitable Exoplanet Imaging Mission
- Large UV/Optical/IR Surveyor
- X-ray Surveyor

[1] NASA/ESA Partnership
[2] NASA/CNES/ESA Partnership

What do we want the newspaper headlines to read?

"All the News That's Fit to Print"

The New York Times

LATE CITY EDITION

Weather: Rain, warm today; clear tonight. Sunny, pleasant tomorrow. Temp. range: today 80-66; Sunday 71-66. Temp.-Hum. Index yesterday 69. Complete U.S. report on P. 50.

10 CENTS

VOL. CXVIII. No. 40,721

NEW YORK, MONDAY, JULY 21, 1969

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NASA DISCOVERS EVIDENCE OF LIFE ON AN EXOPLANET

Observed gases consistent with life on Earth

Clear signs of biosignatures

EAGLE (the lunar module): Houston, Tranquility Base here. The Eagle has landed.

HOUSTON: Roger, Tranquility, we copy you on the ground. You've got a bunch of guys about to turn blue. We're breathing again. Thanks a lot.

TRANQUILITY BASE: Thank you.

HOUSTON: You're looking good here.

TRANQUILITY BASE: A very smooth touchdown.

HOUSTON: Eagle, you are stay for T1. [The first step in the lunar operation.] Over.

TRANQUILITY BASE: Roger. Stay for T1.

HOUSTON: Roger and we see you venting the ox.

TRANQUILITY BASE: Roger.

COLUMBIA (the command and service module): How do you read me?

HOUSTON: Columbia, he has landed Tranquility Base. Eagle is at Tranquility. I read you five by. Over.

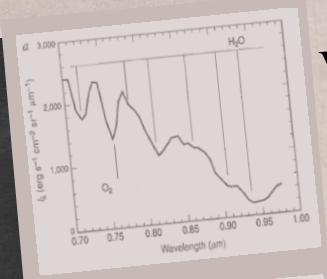
COLUMBIA: Yes, I heard the whole thing.

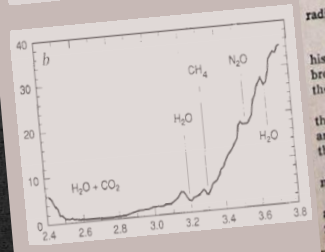
HOUSTON: Well, it's a good show.

COLUMBIA: Fantastic.

TRANQUILITY BASE: I'll second that.

APOLLO CONTROL: The next major stay-no stay will be for the T2 event. That is at 21 minutes 26 sec-





...from the leg of the landing craft after taking the first step on the surface of the moon

We are not alone!

By JOHN NOBLE WILFORD

Special to The New York Times

HOUSTON, Monday, July 21—Men have landed and walked on the moon.

Two Americans, astronauts of Apollo 11, steered their fragile four-legged lunar module safely and smoothly to the historic landing yesterday at 4:17:40 P.M., Eastern daylight time.

Neil A. Armstrong, the 38-year-old civilian commander, radioed to earth and the mission control room here:

"Houston, Tranquility Base here. The Eagle has landed."

The first men to reach the moon—Mr. Armstrong and his co-pilot, Col. Edwin E. Aldrin Jr. of the Air Force—brought their ship to rest on a level, rock-strewn plain near the southwestern shore of the arid Sea of Tranquility.

About six and a half hours later, Mr. Armstrong opened the landing craft's hatch, stepped slowly down the ladder and declared as he planted the first human footprint on the lunar crust:

"That's one small step for man, one giant leap for mankind."

His first step on the moon came at 10:56:20 P.M., as a television camera outside the craft transmitted his every moved to an awed and excited audience of hundreds of millions of people on earth.

Tentative Steps Test Soil

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NASA DISCOVERS OXYGEN AND WATER ON EXOPLANET

60% Chance of Life Experts Say

A world with a liquid ocean

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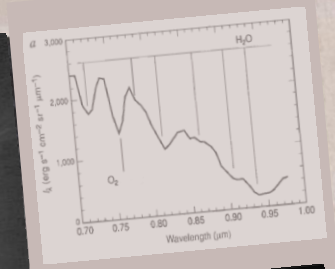

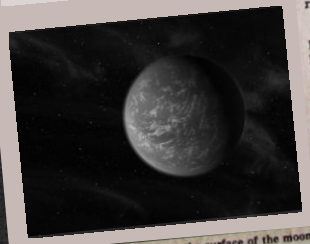

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Could be non-biological

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