James Webb Space Telescope early science observations revealed

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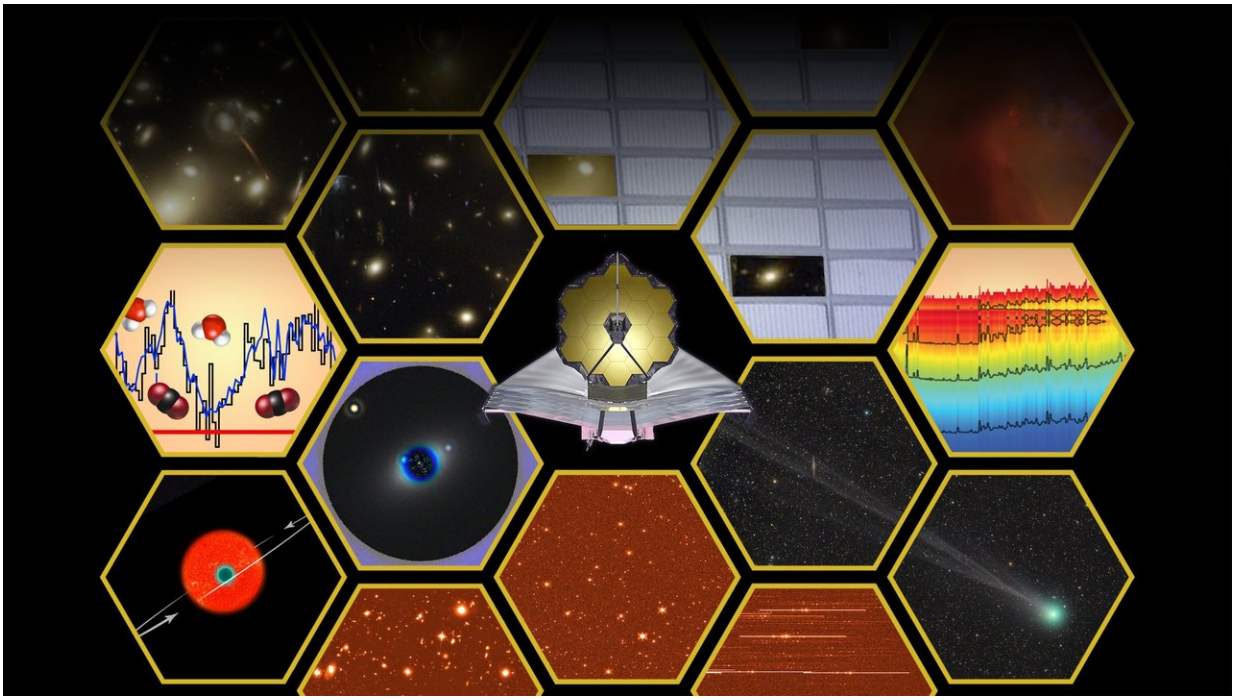

Credit: NASA, ESA, and A. Feild (STScI)

Astronomers around the world will have immediate access to early data from specific science observations from NASA's James Webb Space Telescope, which will be completed within the first five months of Webb's science operations. These observing programs were chosen from a Space Telescope Science Institute call for early release science proposals, and include examining Jupiter and its moons, searching for

organic molecules forming around infant stars, weighing supermassive black holes lurking in galactic cores, and hunting for baby galaxies born in the early universe.

"I'm thrilled to see the list of astronomers' most fascinating targets for the Webb telescope, and extremely eager to see the results. We fully expect to be surprised by what we find," said Dr. John C. Mather, Senior Project Scientist for the Webb telescope and Senior Astrophysicist at NASA's Goddard Space Flight Center, Greenbelt, Maryland.

The resulting observations will comprise the Director's Discretionary Early Release Science (DD-ERS), and cover the gamut of Webb science targets, from planets in our solar system to the most distant galaxies. The program provides the entire scientific community with immediate access to Webb data so they have the opportunity to analyze the data and plan follow-up observations.

"We were impressed by the high quality of the proposals received," said Dr. Ken Sembach, Director of the Space Telescope Science Institute (STScI) in Baltimore, Maryland. "These observing programs not only will generate great science, but also will be a unique resource for demonstrating the investigative capabilities of this extraordinary observatory to the worldwide scientific community."

The observations will also exercise all four of Webb's science instruments, so that the astronomical community can explore Webb's full potential. Webb has a minimum scientific lifetime of five years, so the scientific community will have to rapidly learn to use its advanced capabilities.

"We want the research community to be as scientifically productive as possible, as early as possible, which is why I am so pleased to be able to dedicate nearly 500 hours of director's discretionary time to these ERS

observations," said Sembach.

One of the most widely anticipated areas of research by Webb is to study planets orbiting other stars. When such an exoplanet passes in front of its host star, starlight filters through the planet's atmosphere, which absorbs certain colors of light depending on the chemical composition. Webb will measure this absorption, using its powerful infrared spectrographs, to look for the chemical fingerprints of the atmosphere's gasses. Astronomers initially will train their gaze onto gaseous Jupiter-sized worlds like WASP-39b and WASP-43b because they are easier targets on which to apply this technique. The results will help guide observing strategies for smaller, mostly rocky and more Earth-like super-Earths, where atmospheric composition may give hints of a planet's potential habitability.

Webb also will peer into the distant universe, examining galaxies whose light has been stretched into infrared wavelengths by the expansion of space. This infrared region is beyond what Hubble can detect. Galaxy clusters are particularly rich sources of targets, since a cluster's gravity can magnify light from more distant background galaxies. DD-ERS observations will target regions of the sky already examined by Hubble's Frontier Fields program, such as the galaxy cluster MACS J0717.5+3745 . Webb data will complement Hubble's, giving astronomers new insights into these cornucopias of galaxies.

Since Webb must remain shielded from sunlight, its field of view is limited to specific areas of the sky at certain times of year. As a result, the potential targets listed above may shift depending on the launch date.

More than 100 proposals for DD-ERS observations were submitted in August 2017. Of those, 13 programs requesting 460 hours of telescope time were selected following review by panels of subject matter experts and the STScI director.

Additional information about the selected DD-ERS proposals is available online.

Provided by ESA/Hubble Information Centre

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