

Why doesn't Webb have deployment cameras?

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Credit: NASA's James Webb Space Telescope from Greenbelt, MD, USA, CC BY 2.0

As NASA's James Webb Space Telescope makes its way out to its intended orbit, ground teams monitor its vitals using a comprehensive set of sensors located throughout the entire spacecraft. Mechanical, thermal,

and electrical sensors provide a wide array of critical information on the current state and performance of Webb while it is in space.

A system of surveillance cameras to watch deployments was considered for inclusion in Webb's toolkit of diagnostics and was studied in-depth during Webb's design phase, but ultimately, this was rejected.

"Adding cameras to watch an unprecedentedly complicated deployment of such a precious spacecraft as Webb sounds like a no-brainer, but in Webb's case, there's much more to it than meets the eye," said Paul Geithner, deputy project manager—technical for the Webb telescope at NASA's Goddard Space Flight Center. "It's not as straightforward as adding a doorbell cam or even a rocket cam."

First of all, Webb is big, undergoes many configuration changes during deployment, and has many specific locations of import to deployment. Monitoring Webb's deployments with cameras would require either multiple narrow-field cameras, adding significant complexity, or a few wide-field cameras that would yield little in the way of helpful detailed information. Wiring harnesses for cameras would have to cross moving interfaces around the observatory and add more risk of vibrations and heat leaking through, presenting a particular challenge for cameras located on the cold side of Webb.

Then there's the issue of lighting. Webb is very shiny, so visible cameras on the Sun-facing side would be subject to extreme glare and contrast issues, while ones on the cold, shaded side would need added lighting. Although infrared or thermal-imaging cameras on the cold side could obviate the need for illumination, they would still present the same harnessing disadvantages. Furthermore, cameras on the cold side would have to work at very cold cryogenic temperatures. This would either require 'ordinary' cameras to be encapsulated or insulated so they would work in extreme cold, or development of special-purpose cryogenic-

compatible cameras just for deployment surveillance.

Notwithstanding these challenges, engineers mocked up and tested some [camera](#) schemes on full-scale mockups of Webb hardware. However, they found that deployment surveillance cameras would not add significant information of value for engineering teams commanding the spacecraft from the ground.

"Webb's built-in sense of 'touch' (for example, switches and various mechanical, electrical, and temperature sensors) provides much more useful information than mere surveillance cameras can," said Geithner. "We instrumented Webb like we do many other one-of-a-kind spacecraft, to provide all the specific information necessary to inform engineers on Earth about the observatory's health and status during all activities." Engineers can also correlate years of data from ground testing with telemetry data from flight sensors to insightfully interpret and understand flight sensor data.

Provided by NASA

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