

SPIE 2022 Abstract

An overview of contamination control for the James Webb Space Telescope launch campaign

The James Webb Space Telescope (JWST) is a large, infrared space telescope operating at Lagrange point 2. JWST is a joint effort between NASA, ESA, and CSA and was launched from the Centre Spatial Guyanais (CSG) on an Ariane 5 rocket in December 2021. The three-month launch campaign utilized enhanced contamination controls to meet JWST's strict cleanliness requirements. Prior to launch, JWST was permitted to only be exposed to ISO Class 7 cleanrooms, whereas the processing facilities at CSG are ISO Class 8. NASA, ESA, Arianespace, and CNES implemented temporary upgrades to the nominal contamination control operations for the launch campaign unique to JWST, including the use of vetted, portable High Efficiency Particulate Air (HEPA) filter walls, pre-entrance cleanliness acceptance surveys of each facility and the intra-plant transporter, tightened cleanroom protocols, upgraded garmenting and laundering techniques, cleaning of Self-Contained Atmospheric Protection Ensemble (SCAPE) suits, increased maintenance, staffed pre-cleaning stations, adaptation of the house purge network, and a contamination control enclosure atop the Ariane 5 launcher prior to fairing encapsulation. The Ariane 5 fairing interior and Vehicle Equipment Bay membrane also received multiple cleanings, detailed inspections, and verification sampling to achieve necessary cleanliness levels. The fairing itself was specially sealed to protect the inner environment with just a small, doored porthole accessible via diving board for final closeout of the purge interface. All of these enhancements together allowed JWST to meet its contamination requirements for launch, ensuring successful post-separation deployments and mission science.