

Roles of earth observation satellites for climate change policy: New data from the GOSAT-GW mission

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The Japanese Global Observing SATellite for Greenhouse gases and Water cycle (GOSAT-GW) is an Earth-observing satellite to conduct global observations of atmospheric carbon dioxide (CO₂), methane (CH₄), and nitrogen dioxide (NO₂) simultaneously from a single platform. GOSAT-GW is the third satellite in the series of the currently operating Greenhouse gases Observing SATellite (GOSAT) and GOSAT-2. One of its two sensors, the Total Anthropogenic and Natural emissions mapping SpectrOMeter-3 (TANSO-3) is a high-resolution grating spectrometer designed to measure the column-averaged dry-air mole fractions of CO₂ and CH₄ (denoted as XCO₂ and XCH₄, respectively), as well as the vertical column density of tropospheric NO₂, by utilizing the wavelength bands of 0.45, 0.76, and 1.61 μm for NO₂, O₂, and CO₂ and CH₄, retrievals, respectively. GOSAT-GW flies in a sun-synchronous orbit with a local overpass time of approximately 13:30 and a 3-day ground-track repeat cycle. The TANSO-3 sensor has two observation modes in the push-broom operation: Wide Mode, which provides globally covered maps with a 10-km spatial resolution within 3 days, and Focus Mode, which provides snapshot maps over targeted areas with a high spatial resolution of 1–3 km. The objectives of the GOSAT-GW mission include (1) monitoring atmospheric global-mean concentrations of greenhouse gasses (GHGs), (2) verifying national anthropogenic GHG emissions inventories, and (3) detecting GHG emissions from large sources, such as megacities and power plants. With a projected operational lifetime of seven years, GOSAT-GW will provide vital space-based constraints on both anthropogenic and natural GHG emissions. The results of the first-light measurements will be presented, possibly in comparison to other satellites and the TCCON and COCCON observations.

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