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Aerosols scattering effects on retrieving atmospheric CO₂ from simulated TanSat Visual Near-Infrared Hyperspectral Sensor measurements

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Abstract

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In 2011, a National High Technology research and Development Program, Chinese Carbon Dioxide Observation Satellite mission (TanSat) was sponsored by the Ministry of Science and Technology of China. The TanSat main payload is a Visual Near-Infrared Hyperspectral Sensor. In the paper, we do the aerosols scattering effects analysis on retrieving atmospheric CO₂ using simulated sensor measurements data.

Light path modification due to scattering by aerosols is closely related to the type, mode and vertical distribution. Aerosols, urban aerosols and maritime aerosols in particular, have significant influence on the measured radiance. Under the conditions of typical surface reflectance is 0.15, the radiance change caused by the aerosols in coarse mode is negative, and tendency of radiance change caused by aerosols in accumulation mode is different by aerosol type and the characterizations of vertical distribution. However, the aerosols in coarse mode introduced the negative radiance change under various vertical distribution conditions. In addition, the trend of negative radiance change decreases along with the aerosol height distribution increasing.