5.029 Observing Air Quality from Geostationary Constellation.

Presenting Author:
Jhoon Kim, Yonsei University, Department of Atmospheric Sciences, Seoul, Korea, jhoonkim1@gmail.com

Co-Authors:
Jay Al-Saadi, NASA LaRC, Langley, VA, U.S.A.
Ben Veihelmann, ESA ESTEC, Noordwijk, the Netherland
Kelly Chance, Harvard Smithonian Center for Astrophysics, Cambridge, MA, U.S.A.

Abstract:

Satellite remote sensing has played a significant role in providing a global picture of air quality, filling the gaps of ground-based networks. Monitoring of air quality is very important in understanding the globalization of air pollution, climate change, and assessing the public health impacts of air pollution. With the recent developments of spec-trometers in UV-visible wavelengths with sub-nm spectral resolution and of retrieval algorithms, we now can gener-ate estimates of the column amounts of atmospheric O_3, NO_2, SO_2, HCHO, CHOCHO and other constituents in the troposphere. To date, all the UV-visible satellite missions to monitor trace gas concentrations in the atmosphere have been in low Earth orbits (LEOs), usually allowing one observation per day. With the advent of new UV-visible instruments on geosta-tionary Earth orbit (GEO) platforms, the diurnal variation of these components can be captured. By the early 2020s, the geostationary belt is expected to be occupied by three UV-visible spectrometers: The NASA Tropospheric Emissions: Monitoring of Pollution (TEMPO) over North America, the Copernicus Sentinel-4 ultraviolet visible near infrared spectrometer (developed by ESA) over Europe, and the KARI Geostationary Environment Monitoring Spectrometer (GEMS) over Asia, with the Tropospheric Monitoring Instrument (TROPOMI) and Ozone Mapping Profiler Suite (OMPS) flying underneath in LEO. Recognized by the Committee on Earth Observation Satellites (CEOS) Atmospheric Composition Virtual Constella-tion (AC-VC), the geostationary constel-lation of UV-visible spectrometers will enlighten us on the global distribution of ozone, aerosol, and their precursors. To integrate the dataset for global measure-ments, consistent data quality is very important, thus inter-calibration among the three different UV-visible satellite instruments and the standardiza-tion and harmonization of data products and data quality are now under discussion. Together with geostationary meteorological satellite programs, these three missions will contribute to monitoring global air quality, long range transport, and top-down emission sources.