Project summary

- Acquire and quality-check a large number of input variables needed for the ML models from as many countries as possible in Asia;
- Refine the AOD, FMF, PM$_1$, and PM$_{2.5}$ retrieval algorithms adapted to the four sensors;
- Develop integrated products of FMF, PM$_1$, and PM$_{2.5}$ from these multi-national satellite datasets together with a large set of ancillary input variables;
- Use of the new PM products, meteorological data and chemical transport model to analyze and understand the spatiotemporal variations of fine-mode aerosols in Asia.

Objectives: generate integrated aerosol and air quality products (AOD, FMF, PM$_1$, and PM$_{2.5}$) using ML methods by merging data from both polar (MODIS and VIIRS) and geostationary (AHI and GEMS) sensors in Asia and analyze their variations.
Status/Updates
• Reconstruct long-term PM$_{2.5}$ records in Eastern Asia (China) using MODIS and VIIRS using ML (Wei et al., 2022)
• Estimated global daily 1-deg aerosol fine-mode fraction from MODIS over land, including Asia, using a new hybrid Physical and Deep Learning (DL) method (Yan et al., 2022)

Needed Satellite Products
• MODIS, VIIRS, AHI, and GEMS

Known Issues or Concerns
• Sparse distributions of ground monitoring stations
• Strong Spatiotemporal heterogeneities of air pollution.

Recent/Relevant Publications