



Atmospheric Profiling Synthetic Observation System (APSOS)

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A NSFC (National natural Science Foundation of China) funded research facility aims to deepen our understanding about the interactions within neutral atmosphere layers, i.e. boundary layer, troposphere/tropopause, stratosphere, mesosphere/mesopause, and lower thermosphere (from surface to ~ 110 km altitude) as well as the response of atmospheric processes to solar activities from the top and natural and anthropogenic influences from the earth surface. Although there have been multi-satellite monitoring of global atmospheric parameters which are powerful to support global climate, weather, and environment research and operational application, there are still lack of simultaneous observation vertically for whole neutral atmosphere with high vertical and temporal resolutions, and long term observations.

This proposed 5-year project is to develop a state-of-the-art synthetic observation system for profiling multiple parameters of the whole (neutral) atmosphere, at both high vertical and high temporal resolution. The objectives of this project are: 1) to obtain the vertical structure and multi-scale spatial and temporal changes of atmospheric temperature and wind, greenhouse gases, pollution gases, clouds, aerosols, and water vapor; 2) to study the vertical structure, the movements and changes, and the constituent transport in the whole atmosphere. This project is to build an "Atmospheric Profiling Synthetic Observation System (APSOS)" The proposed APSOS is consisted of a Na/Rayleigh/Raman Temperature & Wind Lidar, an Ozone Lidar, a CO₂ Lidar, a NO₂ /SO₂ Lidar, an Aerosol-Cloud-Water Vapor Lidar, a W-band Cloud Radar, a Superconducting THz Spectrometer, an Integrated Platform for Data Retrieval and Validation, and an Integrated Telescope System composed by seven 1000mm segments of 1m diameter, with equivalent telescope diameter of 2.5 meters. All the core units of the APSOS are self-contained for technical development, while they complement each other for data retrieval. Upon finishing, the APSOS will be operated routinely for measuring multiple atmospheric parameters at both high vertical resolution and high temporal resolution.

APSOS is developed by the Institute of Atmospheric Physics, joint with Wuhan Inst. of Sci. and Tech., Wuhan Univ., and 38th Radar Research Inst. APSOS will be implemented at Tibet/Yangbajing(4300m ASL), the site of International Cosmic Ray Observatory, CAS for long term observation after completed.

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