Global measurement system of wind using LIDAR and Imaging FTS

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We present the concept of synergy space-borne- lidar and FTS system of observations of global wind velocity. Main aims of the observing system is to provide three dimensional wind with high vertical resolution and also to provide a unique data sets of three dimensional water vapor, temperature to study cloud generation mechanism and its interaction to convection.
We propose measurement system of wind, water vapor, temperature, clouds, and aerosols by using FTS on Geostationary satellites with Doppler lidars and radars. Wind as atmospheric circulation is the most important element in climate and weather studies. Air- and ship-traffic are also using wind information as most prioritized one to ensure their safe operation. Current systems cannot measure global distribution of winds. Recent progress of Doppler lidar technology made precise wind measurement possible in three-dimensional manner, limited to narrow swarth over its orbit. A wind lidar satellite was already launched by European Space Agency, and NASA is also planning to launch. In Japan, NICT and JAXA are studying wind LIDAR. Also, recent geostationary weather satellite made possible to distinguish wind distribution by altitude using water vapor band imagery. Measurement error is still considerably large. The basic concept is to combine wind lidar and FTS on Geostationary satellites to complement each other. To cover the globe using geostationary orbit, we need about four satellites at each region. Using current weather satellite network is the most demanded approach. For LIDAR satellites, NASA, ESA and JAXA/NICT can make a strong network to maintain LIDAR data to calibrate the results of retrieved wind from imaging FTS on Geostationary satellite. The temporal requirement for the system is 1km horizontal resolution, 300m height distribution, <1m/s windspeed accuracy and wind vector. Since the FTS will offer high resolution data of water vapor and temperature, it can provide a unique opportunity to study cloud formation in relation to convection when space-borne cloud radar and lidar will be available with FTS.

Keywords: Geostationary satellite, Doppler, lidar, FTS, cloud, wind