專題演講

Analysis and Improvement of Soot Impacts on Satellite Retrievals of Aerosol Property

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Place： 太遙中心 R3-111 室

摘要/Abstract：

Aerosols are the main source of uncertainty in total radiative forcing estimates but they probably eliminate partial of global warming effects. By contrast, the contribution of soot to global warming is much higher because of its unique extreme absorption capacity. As a result, to analyze and improve soot impacts on satellite aerosol retrievals, there are three related topics in this article. First, we studied the relative humidity effect on the optical properties of soot. According to hygroscopic growth factors at different relative humidity levels, we employed the diffusion-limited cluster-cluster aggregation (CCA) to model soot aggregates and calculated their optical properties by the generalized multisphere Mie-solution (GMM). Furthermore, the relative humidity effects on the satellite apparent reflectance were examined by radiative transfer model simulation. In the meantime, MODIS AOD retrievals in the haze case studies indicated that the mean biases of AOD retrievals are +42.42%, -1.80% and -33.15% in the sort of RH<65%, RH=65%~75% and RH>75%. On the second topic, an approach in determining mixing weight of soot from dust- soot aerosols is proposed to improve the accuracy of retrieving properties of polluted dusts by means of satellite remote sensing. Based on a pre-computed database, a fan-shaped look-up table can be drawn out accordingly for determining the mixing weight and optical properties of polluted dusts simultaneously with auxiliary regional dust properties and surface reflectivity. The results show that the mean absolute differences could be reduced from 30% to 6% in AOD. In the last section, we suggested a new satellite retrieval method by the soot component consideration—Simultaneous Radiation Solution (SRS). In the method, the radiative transfer equation would be simplified into a linear form to solve total transmittance and atmospheric reflectance by simultaneous equations. The aerosol optical properties are then determined using lookup tables pre-constructed by radiative transfer model. Currently, the application of SRS to Himawari- 8 can indeed detect the main pollution hot spots and prove outstanding performance with AERONET measurements comparison in Taiwan. In the long term, the satellite remote sensing would be worthwhile to invest and grow.

※歡迎聽講※

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