Atmospheric trace gases monitoring by UV-vis spectroscopic techniques

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Due to rapidly economic development, air pollution has become an important issue in China. Phenomena such as regional haze in winter and high O_3 concentration in summer are strongly related to increasing trace species. For better understanding the air pollution formation, it is necessary to know spatial and temporal distribution of trace species in the atmosphere. UV-vis spectroscopic techniques are of great advantages for trace species monitoring to meet several requirements, e.g. versatility, high sensitivity, good temporal resolution and field applicability.

We have studied and developed various trace gases monitoring techniques and instruments based on UV-vis spectroscopic technique for in-situ measurements and remote sensing, e.g. LP-DOAS, IBBCEAS, CRDS, MAX-DOAS and mobile DOAS for NO_2, SO_2, HCHO, HONO, NO_3, and N2O5 etc. The principle, instrumentation and inversion algorithm are presented. As typical applications of these techniques, investigation of the evolution of HONO and NO_3 radicals over Beijing area, measurements of regional pollution in NCP and YRD are discussed in the aspects of HONO and nocturnal NO_3 radical characteristics, trace gases (NO_2, SO_2 etc.) temporal and spatial distribution, pollution transport pathway, emission sources.