Cloud properties derived from satellite remote sensing and their relationships with other factors in East Asia

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The cloud optical properties such as the optical depth and effective particle radius are important for calculating earth radiation budget. Effect of cloud modification or cloud-aerosol interaction is the most uncertain among cloud-relevant climatic issues. It has been one of the hottest topics in our recent research community. China had undergone substantial political changes since early 1980's, and then subsequent social and economical effects have drastically increased in industrial production and the number of car and so on. With this background, we examine the variability of cloud properties which were derived from AVHRR (Advanced Very High Resolution Radiometer) data to study the effect of industrial growth on clouds in the East Asia. We have analyzed 10-year data from 1985 to 1994, and found gradual decreases in the effective particle size for both oceanic and continental clouds. Although a part of decrease in the particle size might be due to additional pollution for this area, there are, however, several causes to bring artifacts in the retrievals such as sensor degradation, discontinuity of platform and orbital shift. So considerable efforts should be addressed to reduce the artifact. Also we compare the cloud properties with SO2 emission and precipitation amount. As for SO2 emission, the results support Twomey effect, indicating that larger optical depth, smaller particle size are observed with an increase in SO2 emission as shown in figures below. And as for precipitation amount, we find a good seasonal agreement with the effective particle size. This phenomenon would be explained from scavenging of particles by precipitation. This kind of work is important for validation of GCM output, and provides precious information to parameterizations on cloud-relevant processes.