



Influence of Asian Continental Flow on the Lower Tropospheric Ozone and Carbon Monoxide over the Pacific Rim

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Continuous measurements of ozone (O₃) and carbon monoxide (CO) were carried out at Mei-Fong (24.05 [U+F0B0]N, 120.10 [U+F0B0]E, 2269m above sea level), a remote mountain site in Taiwan, to investigate the influence of long-range transported air pollution on O₃ and CO variations in the subtropical Pacific region. Data collected from March 2009 to September 2010 suggested that the average mixing ratios were 37 ± 14 ppb for O₃ and 188 ± 82 ppb for CO at this remote mountain site. The diurnal variations for both O₃ and CO were also observed. The higher levels for O₃ and CO in the afternoon were attributed to the transport of boundary layer pollution to the site during the daytime upslope flow. Monthly means of both O₃ and CO showed the maximum in spring and in the continental air masses from Southeast Asia, Coastal China, and Korea/Japan. On the contrary, the lower O₃ and CO levels found in summer were due to the maritime air masses originated from the Philippine Sea and Tsushima Strait. The relationship between O₃ and CO was analyzed using the nighttime data to minimize the local influence. The results showed that a fairly good correlation between O₃ and CO from March to September. The contribution of CO from the Asian outflow maximized in spring (88 ppb) and minimized in summer (27 ppb). The photochemical buildup of O₃ resulting from anthropogenic emissions in continental Asia was also estimated to be 15 ppb in spring, while its production was insignificant, an average of 4 ppb, in summer. A positive correlation between O₃ and CO plus high ozone in springtime suggested that the enhancements of O₃ were likely contributed by the regional photochemically produced O₃ over this region.