Seasonal and decadal variations of stable carbon isotopic composition of oxalic, malonic and succinic acids in marine aerosols from the western North Pacific

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Low molecular weight (LMW) dicarboxylic acids such as oxalic (C_2), malonic (C_3), and succinic (C_4) acids are major species of ambient organic aerosols [1]. To better understand dynamics of diacids in marine aerosols, we collected marine aerosol samples in 2001-2013 on weekly basis at Chichijima Island (27°04'E; 142°13'N) in the western North Pacific, an outflow region of Asian aerosols and their precursors and determined stable isotopic composition ($\delta^{13}C$) of diacids (C_2-C_9) and oxoacids (C_2-C_9) using GC/C/IRMS after BF_3/n-butanol derivatization [2].

We found relatively high $\delta^{13}C$ values (-22‰ to -2‰, av. -12‰) for oxalic acid. The $\delta^{13}C$ values increased from winter to summer. The summertime maxima may be associated with photochemical aging of organic aerosols with a significant enrichment of ^{13}C in oxalic acid in the remote marine atmosphere. It may be caused by kinetic isotopic fractionation during the photochemical degradation of oxalate-Fe complex[3] and/or the gas/particle partitioning of glyoxal and glyoxylic acid, which are important sources of oxalic acid. We also found a gradual decrease in $\delta^{13}C$ of oxalic acid from 2001 to 2013. The decadal trend will be discussed in terms of changes in the atmospheric oxidation capability in the western North Pacific.

[1] Kawamura and Bikkina (2016) *Atmos. Res.*, **170**, 140-160. [2] Kawamura and Watanabe (2004) *Anal. Chem.* **76**, 5762-5768. [3] Pavuluri and Kawamura (2012) *Geophys. Res. Lett.*, *39*, L03802.