

## CO<sub>2</sub> soundings over the eastern/western equatorial Pacific

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Two balloon-borne campaigns using “CO<sub>2</sub> sonde” had been conducted over the eastern equatorial Pacific (EEP) in February 2012 and the western equatorial Pacific (WEP) in February-March 2015. (we denote hereafter the former as “EEP camp” and the latter as “WEP camp”). In addition to the CO<sub>2</sub> soundings, ozone/water vapor soundings, flask whole air samplings, continuous measurement of ozone in the EEP camp, and ozone/water vapor/cloud particle soundings in the WEP camp also had been conducted. In this study, the CO<sub>2</sub> distribution obtained from these campaigns is examined from a dynamical standpoint focusing on meteorological difference between the EEP and the WEP. The precision of CO<sub>2</sub> sonde is 1 ppm below 5 km, 1.5 ppm above 5 km, and worse than them above 10 km. The CO<sub>2</sub> profiles had small-scale variations, in particular, above 4/6 km for the EEP/WEP camps with low relative humidity. Because CO<sub>2</sub> has a long chemical lifetime in the troposphere, its distribution may depend on dynamical processes, such as transport from the source/sink regions and mixing during the transport. As a result of the back-trajectory analysis, it was indicated that the origin of the air mass above 4 km was the upper troposphere over the central Pacific, and those below 4 km was the lower troposphere surrounding the north and south American continents for the EEP camp. This result was compared to the CO<sub>2</sub> concentrations observed by the NOAA ground-based observatories, and we found that the CO<sub>2</sub> abundance strongly depended on the air mass origin. In contrast, for the WEP camp, much of the air parcels had encountered with convections within a few days, and we could not find the dependency of CO<sub>2</sub> abundance on the air mass origin. The cause of this missing relation between CO<sub>2</sub> amount and transport may be poor representativeness of CO<sub>2</sub> data or poor accuracy in trajectory calculation, due to the quite active convections.

Key words: CO<sub>2</sub> sonde, equatorial Pacific, Walker circulation, trajectory, transport