

## Annual Carbon Dioxide Cycle at a Boreal Site in Finland

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Seasonal variations and source areas of CO<sub>2</sub> were studied by utilizing air-parcel back trajectories and tropospheric concentration measurements at a boreal Global Atmosphere Watch (GAW) site in Pallas, Finland, locally and regionally characterized by a very limited number of pollution sources. The average growth rate of CO<sub>2</sub> concentrations was about 1.9 ppm yr<sup>-1</sup> according to a 6-yr-long measurement period starting in October 1996 (Figure 1). Although the location of the site is continental and mesoscale land cover is rotationally symmetrical, the air masses coming from different source sectors show some differences in their annual CO<sub>2</sub> concentration cycles (Figure 2). Air masses from north and west sectors show annual variation of 17 ppm, possibly affected by long-range transport of marine air. A larger variation of 20 ppm was observed in air masses from the more continental south and east sectors. During late autumn, the concentrations in air masses from the south sector were high in comparison with other sectors. According to trajectory analysis, the site was equally affected by continental and marine air masses. Source areas of CO<sub>2</sub> could be detected in the northern parts of Central Europe.

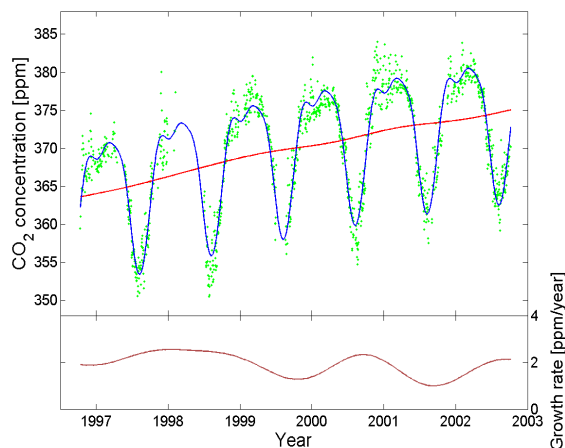


Figure 1. CO<sub>2</sub> concentrations and growth rate at Pallas, Finland.

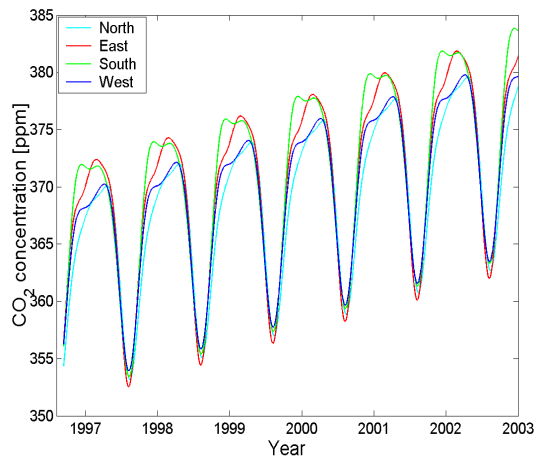


Figure 2. Annual CO<sub>2</sub> cycles in air masses coming from different source sectors.