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## Airborne in-situ measurements of vertical, seasonal and latitudinal distributions of carbon dioxide over Europe

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**Abstract.** Airborne in-situ observations of carbon dioxide (CO<sub>2</sub>) were made during 7 intensive measurement campaigns between November 2001 and April 2003 as part of the SPURT project. Vertical profiles and latitudinal gradients in the upper troposphere/lowermost stratosphere were measured along the western shore of Europe from the subtropics to high northern latitudes during different seasons. In the boundary layer, CO<sub>2</sub> exhibits a strong seasonal cycle with the maximum mixing ratios in winter and minimum values in summer, reflecting the strength of CO<sub>2</sub> exchange with vegetation. Seasonal variations are strongest in high latitudes and propagate to the free troposphere and lowermost stratosphere, although with reduced amplitude. In the lowermost stratosphere, the CO<sub>2</sub> seasonal cycle is phase-shifted relative to the free troposphere by approximately 3 months, with highest mixing ratios during the summer. Modelling studies support the interpretation that altitude gradients of CO<sub>2</sub> are likely due to stratosphere-troposphere-transport.

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