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Use of CO_2 vertical profiles from the NOAA/ESRL Aircraft Network to estimate carbon sources and sinks over continental North America in a direct carbon budgeting approach

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We estimate the net carbon dioxide (CO_2) surface flux over continental North America from the NOAA/ESRL Global Monitoring Division (GMD) Aircraft Network. The vertical CO_2 profiles made at 19 aircraft sites over the last 10 years are first interpolated using a geostatistical interpolation technique called Kriging which uses transport fields from weather analysis. The resulting gridded climatology of a single year displays clear signals of latitudinal, longitudinal and vertical gradients, which gives insights on the transport and sources of CO_2 over North America. The climatology is then used in a direct carbon budgeting flux estimation. Direct budgeting puts a control volume on top of North America, balances air mass in- and outflows into the volume and solves for the surface flux. This independent estimate will be compared with forward and classic inverse estimates of net North American flux.