

Atmospheric CO₂ record from continuous measurements at Jubany Station, Antarctica

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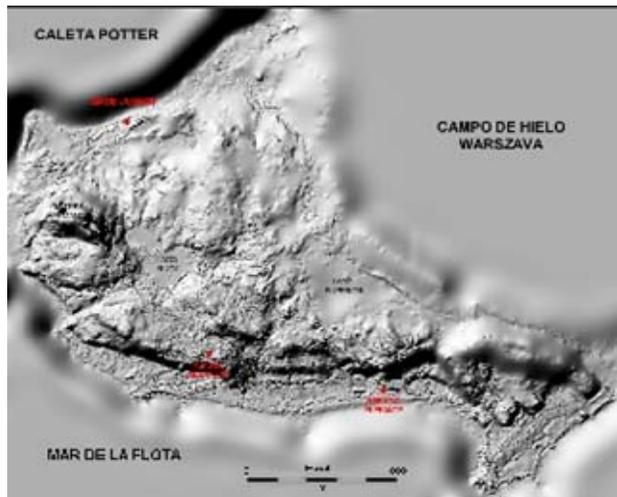
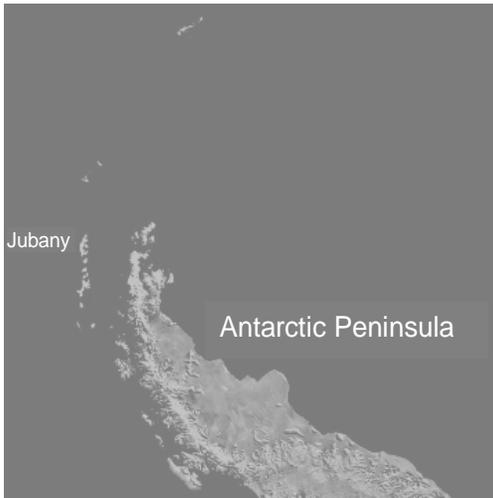
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Location

The Italian PNRA (National Research Program in Antarctica) began continuous atmospheric carbon dioxide measurements at Jubany in 1994. The laboratory at Jubany Station is operated year-round by the DNA (Argentine Antarctic Department) through an agreement with PNRA. The [Antarctic station at Jubany](#) (62° 14'S, 58° 40'W) is situated on King George Island, in the South Shetland archipelago north of the Antarctic Peninsula. The [laboratory](#) is situated at an elevation of 15 m.s.l. on the SE slope of Potter Bay. The bay, which has a maximum width around 1 km, is surrounded by permanent glaciers except the sector where the base lies. In some years the sea stretch of the bay freezes for 2-3 months.



Jubany Station, Antarctica 62°14' S, 58°40' W 15 m right MSL

Period of Record

March 1994 - December 2006

Methods

The measuring system is based on a Siemens U5 NDIR analyzer equipped with a serial interface controlled by software running on a PC. Atmospheric water vapor and humidity contained in the cylinders are removed by passing air for approximately one minute through a U glass tube placed in a cryogenic trap (-70°C). The air intake is located on a 10m-high mast situated 40m away from the laboratory building. The Jubany Laboratory has now at its disposal a set of 6 CO₂-in-air station whose concentration, versus the World Meteorological Organizations's standard scale, was determined at the United States' National Oceanic and Atmospheric Administration's Climate Monitoring and Diagnostics Laboratory. The analyzer scale is automatically recalibrated every 3 hours by using two working standards (zero and span) which differ by 20-25 ppm. The accuracy achieved in the calibration phase and in the atmospheric CO₂ measurement permits reporting to ± 0.1 ppm.

Trends

On the basis of annual averages calculated from monthly averages, CO₂ levels at Jubany have risen from 356.75 in 1994 to 378.75 in 2006. The reduced and poorly defined concentration peak of 1997-1998 was also observed at other Antarctic stations in the WMO Global Atmospheric Watch network, and may have been caused by any one or a combination of several things, including sea surface temperature anomalies, air temperature anomalies, and changes in general atmospheric circulation. Among all the factors affecting the atmospheric CO₂ concentration the most convincing cause seems related to the 1997-1998 El Niño and subsequent La Niña episodes. The hypothesis is based on the behavior of SOI and CO₂ concentrations at several Antarctic and non-Antarctic sites and from cross correlations between the two parameters.

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