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Decadal evolution of carbon sink within a strong bloom area in the subantarctic zone

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The fate of the Southern Ocean atmospheric CO_2 sink is under question. Here we assess seasonal to decadal changes of surface fCO_2 within an extended sink area along the track between Kerguelen and Amsterdam islands in the subantarctic zone. Data from 17 oceanographic cruises were used, from 1991 to 2011 and two distinct regions were examined, separated by the Subantarctic Front (SAF). The region south of the SAF displays a strong summer phytoplankton bloom of up to -28 mmol C $m^{-2}d^{-1}$ within a calm area, constrained by physics and topography. On an annual basis, this region is a 6-fold more important sink than that deduced from Takahashi climatology, highlighting the importance of key-areas separate examination before proceeding to spatial integration. Our data point towards a decadal decline of the CO_2 sink in the Southern part of the SAF, most probably due to both warming and less Fe input to surface waters from reduced water mixing.