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Round-the-globe racing events to fill the pCO2 data void in the Southern Ocean

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The ocean absorbs around a quarter of the annual man-made CO_2 emissions, with the Southern Ocean being responsible for the lion-share of this uptake. Despite the disproportional role of the Southern Ocean in taking up anthropogenic CO2, it still remains one of the most sparsely observed ocean regions. While autonomous measurement devices have started to fill this void, high quality shipboard measurements remain limited. One fleet with the potential to fill this gap has thus far received little attention: sailboats. There is growing willingness among skippers to help science, providing a opportunity to collect valuable measurements of the sea surface partial pressure of CO2 (pCO2) during round-the-world racing events. Using the latest membrane sensor technology, we have thus far – together with professional racing teams - collected high frequency measurements of the sea surface pCO2 from nearly all ocean basins and most notably in remote southern hemisphere ocean regions where no shipboard pCO2 data were collected in the past 70 years (based on the SOCAT database). Our results highlight the potential for equipping sail yachts as a low-cost solution to fill data gaps and provide a new constraint for high resolution model studies.