

EGU21-12750

<https://doi.org/10.5194/egusphere-egu21-12750>

EGU General Assembly 2021

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



CO₂ increase and ocean acidification in the Southern Indian Ocean over the last two decades

Coraline Leseurre, Claire Lo Monaco, Gilles Reverdin, Nicolas Metzl, Jonathan Fin, and Claude Mignon

Sorbonne Université, Laboratoire d'Océanographie et du Climat : Expérimentations et Approches Numériques (LOCEAN), Paris, France (coraline.leseurre1@gmail.com)

The Southern Ocean is recognized as a major player in the sequestration of anthropogenic carbon. As pH is naturally low at high latitudes, the increase in oceanic CO₂ raises particular concerns in this region were surface waters could become rapidly under-saturated with respect to carbonate. We used repeated observations collected by the French monitoring program OISO (Ocean Indien Service d'Observation) in the surface ocean and the mixed layer over the last two decades (1998-2018), conducted on board the Marion Dufresne (IPEV/IFREMER). We used complementary data, available in SOCAT, to expand the study area, in order to investigate the evolution of CO₂ and ocean acidification in the Southern Indian Ocean (45°S-57°S). South of the polar front in the High Nutrients Low Chlorophyll (HNLC) region, our results show an increase in the fugacity of CO₂ (fCO₂) in surface waters during summer, close to the increase in the atmosphere (on the order of +2 μatm yr⁻¹) associated with a decrease in pH in the range of the mean global ocean trend (on the order of -0.0020 yr⁻¹). However much larger changes are found in the phytoplankton blooms in the vicinity of Crozet and Kerguelen Islands for both fCO₂ (between +3.0 μatm yr⁻¹ and +5.0 μatm yr⁻¹) and pH (ranging from -0.0033 yr⁻¹ to -0.0059 yr⁻¹). In all regions, the trends observed during summer are mainly driven by an increase in total carbon that is consistent with the accumulation of anthropogenic carbon evaluated below the summer mixed layer.