

SAMBAR: Enhancing the SAMOC Basin-Wide Array

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The [South Atlantic Meridional Overturning Circulation \(SAMOC\)](#) is a CLIVAR-endorsed contribution to the international effort to monitor the MOC in the Atlantic basin. It resulted from discussions held during the [OOPC/CLIVAR/IAI SACOS Workshop](#), in 2003, in Angra dos Reis, Brazil, and started officially in 2007, in the [SAMOC-1 Workshop](#) in Buenos Aires, Argentina. SAMOC includes a cross-basin array to measure the meridional fluxes across the 34.5°S latitude line, from Brazil to South Africa. This SAMOC Basin-wide Array (SAMBA) is a climate observing system that includes continuous sampling employing PIES (Pressure Inverted Echo Sounder) and C-PIES (PIES equipped with Currentmeter), tall moorings and other bottom mounted instruments such as Acoustic Doppler Current Profilers (ADCPs), sensors for conductivity and temperature (microCATs) and bottom pressure recorders (BPRs). Oceanographic cruises are conducted nominally twice a year to acoustically retrieve the data stored in the PIES/C-PIES, to perform hydrographic surveys and to carry out maintenance operations of the moored instruments. The first cruise was carried out in 2009 and, as of August 2019, over 25 expeditions have been conducted near the eastern and western ends of the array, onboard Brazilian, Argentine and South African vessels. In January 2017 a complete cross-basin SAMBA cruise, from Cape Town to Montevideo, was carried out on board the German vessel *FS Maria S. Merian* (Fig. 1). This SAMBA/GO-SHIP cruise consisted of full-water depth (down to 5200m) sampling with a variety of instruments such as: Conductivity-Temperature-depth (CTD) profilers; oxygen (O₂) and fluorescence sensors; under water video profiler (UVP); rosette and lowered ADCP (LADCP). Repeat cross-basin cruises are planned for the next decade.

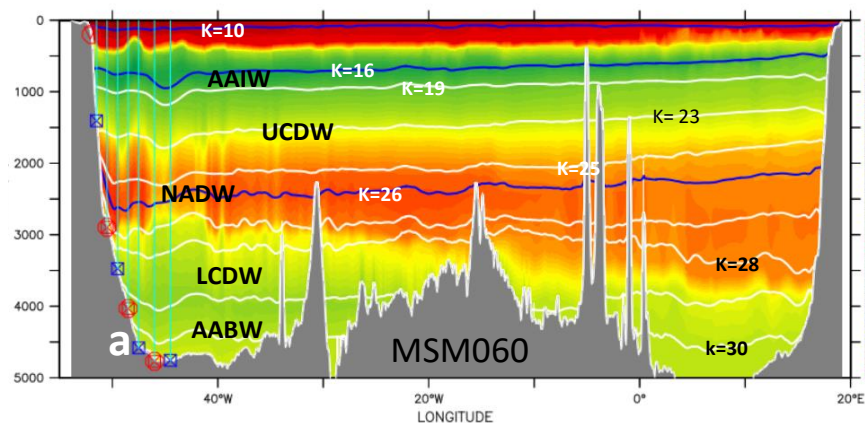


Figure 1: Salinity profile sampled during the *FS Maria S. Merian* cruise (MSM060) in January 2017 (Courtesy from J. Kartensen).

Until recently, the moored instruments were restricted to the eastern and western ends of the array. In 2017, following recommendations from a SAMOC Working Group sponsored by POGO, a proposal to enhance the observational grid was submitted to the São Paulo State Research Foundation (FAPESP), in Brazil. This new project, named SAMBAR, was approved and started in December 2017 (<https://bv.fapesp.br/en/auxilios/98525>).

As part of the SAMBAR proposed enhancements, in a cruise onboard the [NOc Alpha-Crucis](#) in January 2019, a deep currentmeter platform was moored at 39°23'W, 31°14'S, to measure the Antarctic Bottom Water (AABW) flow through the Vema Channel. During the same cruise, two additional C-PIES were deployed in the central region of SAMBA (points E and F, in Figure 2). These two new C-PIES are equipped with two data pods each, programmed to be released in January 2020 and January 2021. If everything works well, a cruise to the points E and F will be required only in early 2022. In each of the new three sites (Vema Channel, “E” and “F”) a deep microCAT was attached to the line a few tens of meters above the sea floor, following OceanSITES specification. In another SAMBAR cruise, a new C-PIES (dubbed “0A”) was deployed over the shelf break on the western end of SAMBA in April 2019, to enhance the sampling of the Brazil Current variability.

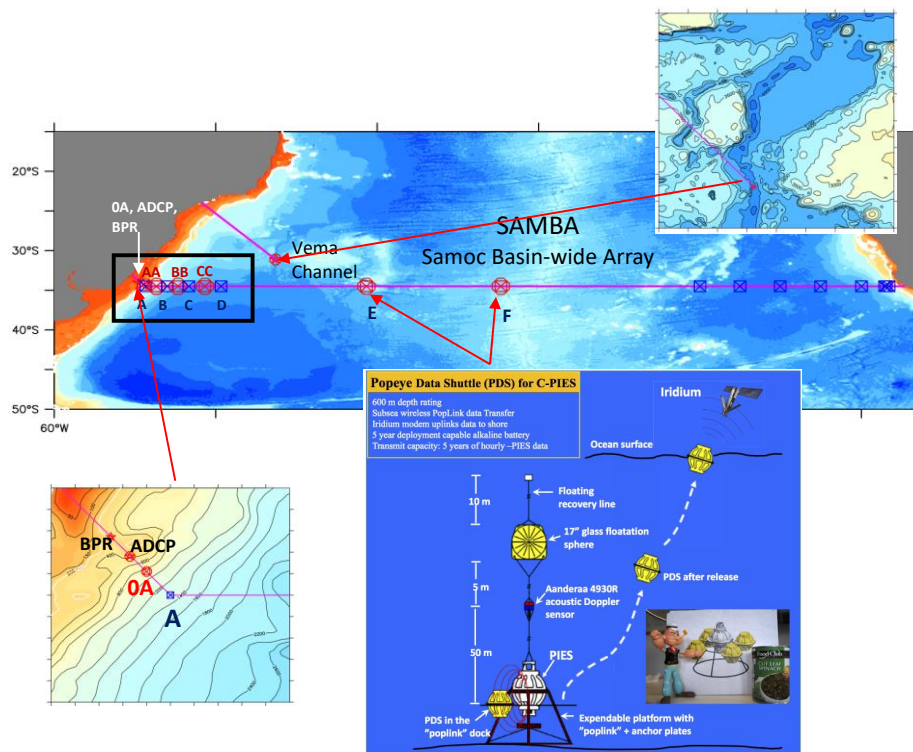


Figure 2: In January of 2019 three new C-PIES were deployed on the SAMBA line: 0A, E and F. Sites E and F are equipped with two “Popeyes” data shuttles (PDS) each, programmed to be released in January 2020 and January 2021. To sample the AABW flow, a currentmeter was installed near the bottom in the Vema Channel.

Two tall moorings will also be deployed in the Brazil Current region in the near future, as part of two projects funded by the European H2020 program: iAtlantic (iA) and TRIATLAS (TA). Figure 2 shows the present status of the western end of the SAMBA Array, indicating the future location of the two tall moorings.

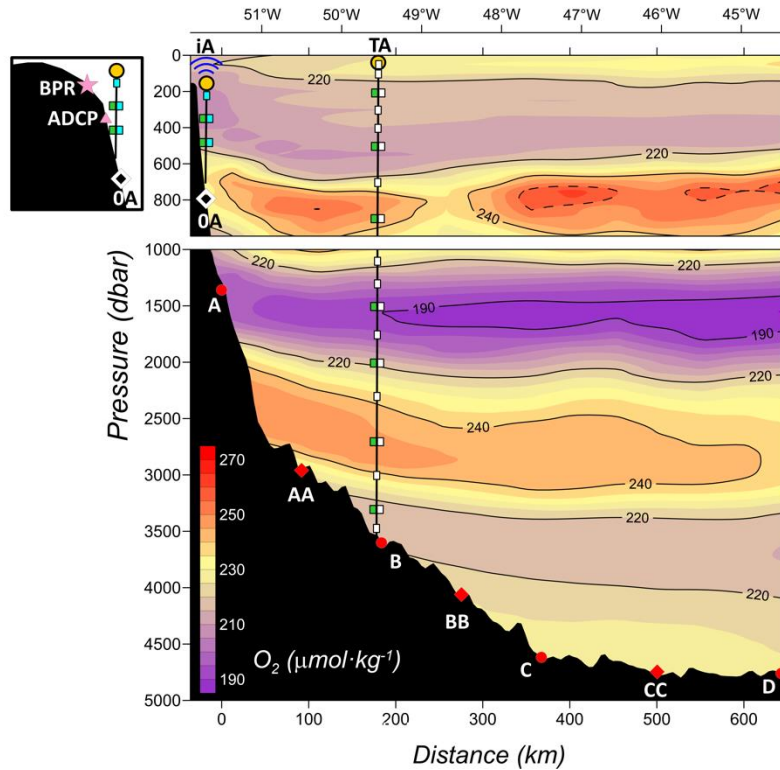


Figure 3: Present status of the observational array on the western end of SAMBA, indicating the location of the tall moorings to be deployed by European H200 projects iAtlantic (iA) and TRIATLAS (TA). (adapted from Valla et al., *J. Geophys. Res – Oceans*, 123, 4624–4648, 2018).