





## An Operational Daily Current Bulletin of Santos and Campos Basins

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Introduction

## **Results and Conclusions**

The oceanic basins of southeastern Brazil are of extreme relevance for the oil and gas industry, representing one of the most productive deep-water areas of the world.

The bulletins are published daily and provide key information, including the main current features, the strongest current recorded in the last 24 hours, and a brief summary describing the prevailing conditions. With over two years of archived bulletins, they serve as a resource for analyzing past scenarios. The impact on operations has been significant, leading to increased productivity as ships can now avoid departing during unfavorable conditions and better plan offshore activities. Additionally, the bulletins have enhanced operational safety by ensuring that no critical activities take place when strong currents are indicated. It is estimated that this product impacts over 100 ships. The daily analysis of the main Informações atualizadas em 06/06/2025 08:00 Current features has advanced Valores de corrente superficial registrados nas Unidades de Coleta de Dados (UCDs) nas últimas 24h: the understanding of current variability across the Santos and Campos Basins. This consistent effort has provided case studies for valuable examining a variety of eddies, Int entre 1 e 1,5 nó Int  $\geq$  1,5 nó contributing to a deeper and comprehensive Figure 2: Table indicating the strongest and more weakest current registered in the last 24 h. The knowledge local Of yellow and red cells show stations where oceanographic dynamics. stronger current has been registered.

This region is dominated by the western boundary current (WBC) of the South Atlantic Gyre, so called Brazilian Current (BC). Although not as strong as other WBC, the BC can reach up to 1 m/s in its core. Furthermore, due to the interaction with the Intermediate Western Boundary Current (IWBC), the combined current system is prone to baroclinic instability, generating, occasionally, meanders and eddies, such as the Cape São Tomé Eddy (CSTE), and Cape Frio Eddy (CFE).

The intensifications and variabilities associated with those oceanic features poses a threat to dozens of offshore operations per day, including shallow diving, offloading and more, which may not be executed in current above 0.5 m/s. In this context, the Operational Oceanography team of Petrobras developed a daily ocean current bulletin, to support the execution and planning of offshore operations sensible to stronger currents (>0.5 m/s).

The main public of the bulletin are planning engineers and operators, that must be aware of areas under strong current to avoid programing sensible activities and resources, such as support vessels, in those places, during the intensification.



The current core identification is achieved by analyzing thermal fronts in the SST and by tracing the maximum horizontal velocity of the geostrophic approximation, calculated from sea surface height (SSH) relative to the geoid (Figure 1). Both SST and SSH datasets are obtained from satellite observations, accessed through the CMENS (Copernicus Marine Environment Monitoring Service) and AVISO (Archiving, Validation, and Interpretation of Satellite Oceanographic data) databases, respectively. In the Campos Basin, the SST data shows a closer alignment with in-situ measurements. Whereas in the Santos Basin, the SSH-derived geostrophic field shows a better adjustment with in-situ measurements. The satellite data is also validated continually, by comparison to the *in situ* measurements which provide hourly the mean current flow measurements. These measurements undergo quality control proccedures before being made available for general use.

Campo	UCD	Mín	Máx
Jubarte	FPSO MARIA QUITERIA	0,14	0,41
Albacora	P-25	0,87	1,38
Marlim	P-19	0,08	1,07
Marlim Leste	FPSO NITEROI	0,29	0,54
Marlim Leste	P-53	0,39	0,89
Marlim Sul	P-40	0,54	1,11
Voador	FPSO ANITA GARIBALDI	0,86	1,26
Cherne	PCH-2	0,47	1,69
Corvina	P-09	0,64	1,17
Tartaruga Verde	FPSO CAMPOS DOS GOYTACAZES	0,52	0,91







Figure 1: Current analysis in 04/04/2023 for Campos (A, B) and Santos (C, D) Basins. The streamlines denote the main flow of the Brazil Current (BC), and the arrows represent the geostrophic current approximation derived from sea surface height (SSH) satellite measurements. Panels A and C show the current velocity (shaded), while panels B and D display the sea surface temperature (SST).



Figure 3: Main bulletin feature for Campos (A) and Santos (B) Basins. The streamlines denote the main flow of the Brazil Current (BC), and the yellow and red contours show regions where stronger current is expected. This analysis is for the 04/04/2023.



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