

The Santander Atlantic Time-Series Station (SATS): A Time Series combination of a monthly hydrographic Station and The Biscay AGL Oceanic Observatory.

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Long-Term Time Series Stations have been developed in order to document seasonal to decadal scale variations in key physical and biogeochemical parameters. Long-term time series measurements are crucial for determining the physical and biological mechanisms controlling the system. The Science and Technology Ministers of the G7 in their Tsukuba Communiqué have stated that ‘many parts of the ocean interior are not sufficiently observed’ and that ‘it is crucial to develop far stronger scientific knowledge necessary to assess the ongoing changes in the ocean and their impact on economies.’

Time series has been classically obtained by oceanographic ships that regularly cover standard sections and stations. From 1991, shelf and slope waters of the Southern Bay of Biscay are regularly sampled in a monthly hydrographic line north of Santander to a depth of 1000 m in early stages and for the whole water column down to 2580 m in recent times. Nearby, in June 2007, the IEO deployed an oceanic-meteorological buoy (AGL Buoy, 43° 50.67'N; 3° 46.20'W, and 40 km offshore, www.boya-agl.st.ieo.es).

The Santander Atlantic Time Series Station is integrated in the Spanish Institute of Oceanography Observing System (IEOOS).

The long-term hydrographic monitoring has allowed to define the seasonality of the main oceanographic facts as the upwelling, the Iberian Poleward Current, low salinity incursions, trends and interannual variability at mixing layer, and at the main water masses North Atlantic Central Water and Mediterranean Water. The relation of these changes with the high frequency surface conditions recorded by the Biscay AGL has been examined using also satellite and reanalysis data.

During the FIXO₃ Project (Fixed-point Open Ocean Observatories), and using this combined sources, some products and quality controlled series of high interest and utility for scientific purposes has been developed. Hourly products as Sea Surface Temperature and Salinity anomalies, wave significant height character with respect to monthly average, and currents with respect to seasonal averages. Ocean-atmosphere heat fluxes (latent and sensible) are computed from the buoy atmospheric and oceanic measurements. Estimations of the mixed layer depth and bulk series at different water levels are provided in a monthly basis.

Quality controlled series are distributed for sea surface salinity, oxygen and chlorophyll data. Some sensors are particularly affected by biofouling, and monthly visits to the buoy permit to follow these sensors behaviour. Chlorophyll-fluorescence sensor is the main concern, but Dissolved Oxygen sensor is also problematic. Periods of realistic smooth variations present strong offset that is corrected based on the Winkler analysis of water samples. Also Wind air temperature and humidity buoy sensors are monthly compared with the research vessel data.

Next step will consist in working on a better validation of the data, mainly ten-year data from the Biscay AGL buoy, but also the 25 year data of the station 7, close to the buoy. Data will be deperated an analyzed and the final product will be published and widening to improve and get the better use of them.