Shipboard ADCP data: from acquisition to standardization and distribution in European RI

Julie Gatti, Françoise Le Hingrat, Michèle Fichaut, Léa Franc, Tina Odaka, Pascale Lherminier
French Research Institute for Exploitation of the Sea, IFREMER (France), julie.gatti@ifremer.fr

Most of the Research Vessels in the French Oceanographic Fleet (FOF) are equipped with Shipboard ADCP (SADCP) mounted on the hull and acquire underway ocean current measurements, from the coast to the open sea. The SADCP dataflow (Figure 1) is described here from the data acquisition to the dissemination through European portals.

1 SADCP data acquisition

A **SADCP** acquires currents measured along each of its beams (Figure 2).

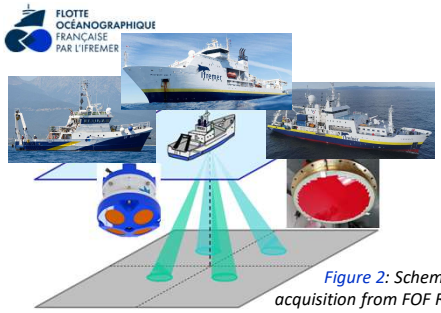


Figure 2: Schema of SADCP data acquisition from FOF Research Vessels.

A software is needed to transform beam velocities into earth coordinates, and remove the motion of the ship to obtain: ocean velocity, using ancillary measurements such as heading and position.

2 SADCP data (post-)processing and qualification

To use high-quality current data, the Laboratory for Ocean Physics and Satellite remote sensing (LOPS) developed the **CASCADE** software to compile, correct and qualify the data provided by a SADCP. It has also been used for several years in an operational context by the SISMER, French National Oceanographic Data Center.

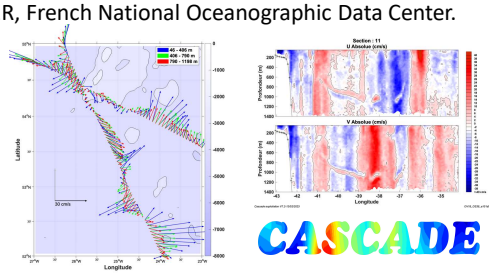


Figure 3: Example of SADCP 38kHz data visualization from OVIDE 2018 survey using CASCADE software. Left panel: vectors of current in 3 different depth layers. Right panel: section of zonal (U) and meridional (V) current near Greenland.

CASCADE software converts the *STA/*LTA (for "Short/Long Term Average") files generated by the acquisition RDI software VMDAS in a single **oceanSITES NetCDF** survey file and cleans the data according to adjustable parameters. It is possible to diagnose and correct for a misalignment or a bad amplitude of the SADCP. Data can then be filtered or averaged along specific sections or stations. Graphic outputs of many kinds are displayed and saved to check the processing and illustrate a data report (Figure 3).

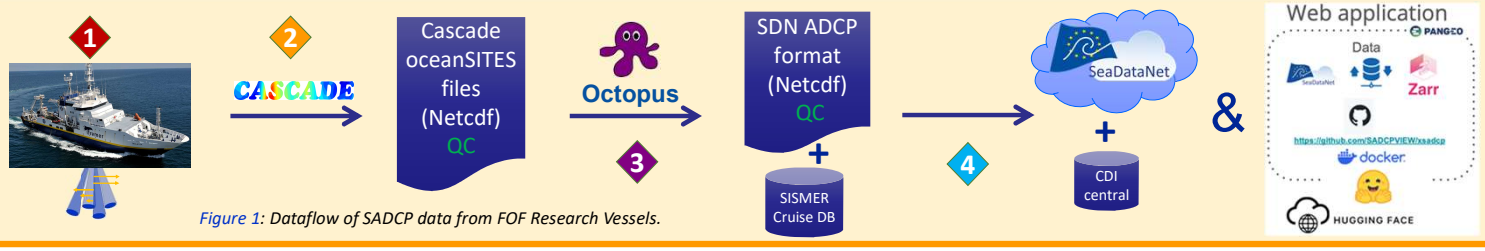
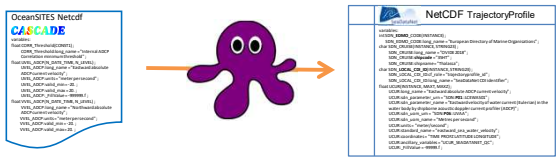


Figure 1: Dataflow of SADCP data from FOF Research Vessels.

3 SADCP data standardization : Octopus converter

In the framework of EuroGO-SHIP, a converter has been developed to convert SADCP data at OceanSITES netCDF format (as the output of the CASCADE software) to the standardized **SeaDataNet NetCDF TrajectoryProfile** format. It has been integrated into the SeaDataNet **Octopus** software which is already specialised in conversions to SeaDataNet format from different input formats like EGO for glider data sets.

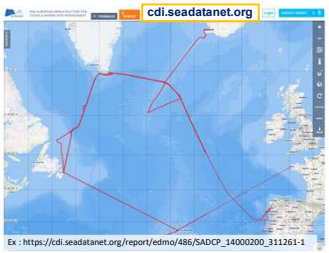
The SeaDataNet NetCDF (CF) format is encoded in CF-compliant NetCDF together with the usage metadata relying on SeaDataNet standards (common controlled Vocabularies, Quality Flag scale).



All French SADCP data issued from CASCADE software will be converted to SeaDataNet format, beginning by a demonstration on the OVIDE-A25 section which has been carried out biennially since 2002.

4 SADCP data distribution into SeaDataNet RI and EuroGO-SHIP Web app

Standardized metadata (Common Data Index or CDI) are created to disseminate these standardized SADCP's files to the pan - European **SeaDataNet Research Infrastructure**. The CDI service gives users a highly detailed insight in the availability and geographical spreading of marine data sets, that are managed by the SeaDataNet data centres. Moreover, it provides a unique interface for requesting access, and if granted, for downloading data sets from the distributed data centres across Europe.



In a second step, the **SADCP Viewer**, a Pangeo based webapp, has been set up to access directly to GO-SHIP data through the SeaDataNet infrastructure and allow the users to visualize them.

The SADCP-Viewer relies heavily on the Pangeo software stack. The Pangeo ecosystem was created by a community of engineers and geoscientist specifically to address big data geoscience challenge.

Perspectives

The next step is to write a converter from **CODAS** short format to SeaDataNet NetCDF TrajectoryProfile format. This will allow to enlarge the SADCP sources of ocean currents to data processed by CODAS by French and other international research institutes.

References :

- Kermabon Catherine, Lherminier Pascale, Le Bot Philippe (2023). CASCADE V7.2: Software for processing, qualifying and visualizing SADCP data. User's guide. https://doi.org/10.13155/100082
- Octopus, Ifremer-SeaDataNet, Octopus 1.10.0 (2024). https://www.seadatanet.org/Software/OCTOPUS
- Lowry Roy, Fichaut Michele, Schlitzer Reiner, Maudire Gilbert, Bregent Sophie, Gatti Julie (2024) - SeaDataNet Datafile formats: ODV, MEDATLAS, netCDF. Deliverable D8.5, 69 p. https://doi.org/10.13155/56547
- Odaka, T.E. et al. (2020). The Pangeo Ecosystem: Interactive Computing Tools for the Geosciences: Benchmarking on HPC. https://doi.org/10.1007/978-3-030-44728-1_12
- Hummon, 2009. CODAS + UHDAS Documentation. https://currents.soest.hawaii.edu/docs/adcp_doc/index.html

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