

Data Processing Procedures and Conventions

Lagrangian Drifter Data

Freely drifting buoys or floats in the ocean are of basically two types. The first type has a surface float, whose position is tracked by satellites at fairly regular intervals throughout the day, which is attached to a subsurface drogue element. The drogue element can be of various types including a parachute, holey sock at depths of a few meters to around 100-m below the surface. Near-surface drifters have a special cross-shaped drogue element that extends about 1-m below the sea surface. These are known as Davis-type drifters. The second type is completely subsurface and either track a constant pressure or density surface. Location of the float is found from two to three sub-surface sound sources, which are moored at fixed positions in the region where the floats are deployed. The float stores the arrival times of the "pings" from the sound sources and when it surfaces at the end of the deployment, which may last from several months to several years, the data is retrieved via a satellite link. Both types of floats are usually assigned an ID by the agency that retrieves the data through the satellites. Most often this is Service ARGOS for ocean-related position data. More recently GPS drifters have been developed where greater positional accuracy is required, such as in estuaries or coastal waters. At SAIC, drifter data files are identified by their ID and prefix which indicates the type of drifter. Service ARGOS often reuses ID's and so alphanumeric modifiers will be added to make the ID unique for a given drifter deployment. Commonly used prefixes are given below.

Prefix	Description
ARG	Service ARGOS tracked Drifter with surface float element.
GPS	GPS tracked Drifter with surface float element.
RFS	RAFOS subsurface float (travel times stored on float).
SFR	SOFAR subsurface float (travel times stored at sound sources).

In many deployments, a single track is obtained over the lifetime of the drifter. For surface floats, this is either determined by the battery capacity or by the number of days the satellite system is programmed to listen. For subsurface floats, the track is from deployment to the preprogrammed surfacing date. In some cases the track may be split into more than one segment because of grounding or unauthorized retrievals and subsequent redeployments for surface floats. Interruption of communications either from the sound sources or with satellites may also cause substantial gaps that require segmenting the tracks. In these cases the segments are indicated by modifying the 3-character prefix by replacing the final letter with 1, 2, etc.

Because position fixes are often not at equal time intervals and/or there are short gaps in the location data, the QA/QC'd position fixes are smoothed and interpolated to equal intervals (Δt). The smoothing is designed to remove high-frequency fluctuations such as noise, inertial and tidal

signals, often with a smoothing time scale of 30 or 36 hours (see comments in the *netcdf* file). The smoothing and interpolation to fixed intervals are performed by the objective method of iterative corrections using Gaussian influence functions (Pedder 1993). These files are denoted with a prefix that contains 'S' in the second position and optionally 'M' in the third position. Thus, a smoothed float track derived from a RAFOS track with prefix 'RF1' uses the prefix 'RS1'.

Many drifters also measure ancillary variables such as temperature and pressure. For instance, a drifter with a surface float and a subsurface element may measure temperature at several depths between the surface and the drogue. RAFOS floats usually measure temperature, pressure and sometimes salinity. In the file listings, the "Number of Scalars" greater than 0 indicates these types of data. The individual files should be interrogated to determine the types and depths of these ancillary measurements.

QA/QC Procedures

The location data for a given drifter is inspected and obvious bad fixes removed. A location quality control flag is supplied for each fix, which is based on the numeric flags supplied by Service ARGOS for the accuracy of each fix. For RAFOS floats, the location quality flag is determined by the number of sound sources that were received by the float at each interrogation. Details of the flag values and meanings are given in the *netcdf* files, according to the COARDS/CF-1.0 conventions. Scalar QA/QC is very similar to that for mooring time series with missing values flagged.

Archive Files

Drifter data (both locations and scalars) for each track or track segment are archived in a classic [netcdf](#) file. The *netcdf* file name is the 3-character prefix followed by an underscore and the drifter ID (all in lower case), which is appended by ".nc". SAIC's *netcdf* files follow the [COARDS/CF-1.0](#) conventions. Thus, *arg_20015d.nc* contains the data from the drifter with ID of **20015D**. More than one type of data can be present in an archive as discussed above. *Netcdf* files are self-documenting, so the structure should be reasonably self-explanatory.

Pedder, M.A. 1993. Interpolation and filtering of spatial observations using successive corrections and Gaussian filters. *Mon. Weather Rev.* 121: 2889-2902.