

**Distributed Oceanographic Match-up Service (DOMS)  
Translation Specification: SAMOS In Situ Data**

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### **Introduction**

To make the DOMS matchup output meaningful and easy to use the collaborating partners must standardize their data within the DOMS prototype. This document defines the translation of SAMOS data from their native netCDF files on the SAMOS THREDDS server into Apache Solr (the in-situ indexing approach chosen for DOMS).

All SAMOS data is extracted from NetCDF files on a THREDDS server, using the following non-standard libraries for python (v3.7):

- numpy (for fast data operations)
- netCDF4 (for working with NetCDF datasets)
- siphon (for interacting with THREDDS)
- solrpy3 (for populating solr index directly from python)

The code that performs this data translation is located within the “doms” python package developed and maintained thus far by Adam Stallard at COAPS. The package resides on github, and is accessible by COAPS personnel and a few members of the wider DOMS team.

### **Date and time:**

Convert SAMOS NetCDF time convention value to [ISO 8601](#).

SAMOS NetCDF field: time

SAMOS NetCDF description: number of minutes since January 1<sup>st</sup>, 1980.

ISO 8601 form: YYYY-MM-DDThh:mm:ssZ

CF name = time

### **Latitude:**

No conversion

SAMOS NetCDF field: lat

SAMOS NetCDF description: decimal degrees with +North and -South

Precision: .0001f

CF name = latitude

**Longitude:**

Convert from SAMOS convention (0.00 to 359.99) to DOMS convention (-179.99 to 180.00)

SAMOS NetCDF field: lon

SAMOS NetCDF description: decimal degrees (-180 West to +180 East)

Precision: .0001f

CF name = longitude

**Platform:**

Set static value for all SAMOS data

DOMS Index Code	DOMS Description
1	<a href="#">ship</a>

**Device:**

SAMOS data does not carry device information. However, this may be added in a future update to the SAMOS dataset.

DOMS Index Code	DOMS Description
0	<a href="#">unknown</a>

**Mission:**

Set = 1, SAMOS

**Quality:**

SAMOS NetCDF variable: flag

SAMOS NetCDF dimensions: time, qcindex

Note: qcindex is an attribute associated with every variable for which quality information is stored. The qcindex is used as the 2nd dimension's index into the flag variable.

\*\_quality = 0, if flag is any of [A, G, I, N, O, Z] (This is GOOD quality)

\*\_quality = 1, otherwise (This is suspect, erroneous, or UNKNOWN quality)

Records with date, time, latitude, or longitude that have ANY flag other than Z, are excluded from DOMS entirely.

Note: \*\_quality for SAMOS includes:

- Sea\_water\_temperature\_quality

- Sea\_water\_salinity\_quality
- Wind\_quality

**Sea\_water\_temperature:**

No conversion.

SAMOS NetCDF variable: TS

SAMOS NetCDF description: Measured temperature in degrees Celcius

Precision: .01f

If not available, sea\_water\_temperature is omitted

CF name = sea\_water\_temperature

**Sea\_water\_temperature\_depth:**

SAMOS NetCDF variable: TS

SAMOS NetCDF attribute: height

If available, the value is recorded and the sign is reversed to represent positive DOMS depth. Note that a SAMOS value of -9999 or -8888 is interpreted as "missing" or "special" and is left out of DOMS.

CF name = sea\_water\_temperature\_depth

**Sea\_water\_temperature\_quality:**

See "quality" (above)

CF name = sea\_water\_temperature\_quality

**Sea\_water\_salinity:**

No conversion.

SAMOS NetCDF variable: SSPS

SAMOS NetCDF description: Calculated observation measured as PSU

Value is recorded, if available. Values of -9999 and -8888 are deemed missing or special and left out of DOMS.

CF name = sea\_water\_salinity

**Sea\_water\_salinity\_depth:**

SAMOS NetCDF variable: SSPS

SAMOS NetCDF attribute: height

If available, the value is recorded and the sign is reversed to represent positive DOMS depth. Note that a SAMOS value of -9999 or -8888 is interpreted as "missing" or "special" and is left out of DOMS.

CF name = sea\_water\_salinity\_depth

**Sea\_water\_salinty\_quality:**

See “quality” (above)

CF name = sea\_water\_salinity\_quality

#### **Wind\_speed:**

No conversion.

SAMOS NetCDF variable: SPD

SAMOS NetCDF description: Earth relative wind speed calculated as m/s based on relative wind, heading, and GPS SOG and COG

Precision: .1f

Note that a SAMOS value of -9999 or -8888 is interpreted as “missing” or “special” and is left out of DOMS.

CF Name = wind\_speed

#### **Eastward\_wind and Northward\_wind:**

SAMOS NetCDF variable: SPD, DIR

SAMOS NetCDF description: See wind speed for SPD. DIR is calculated as degrees clockwise from true north.

Precision (DIR): 1.f

If both SPD and DIR are available, calculate vector components to derive the following:

eastward\_wind, as positive east, with precision = .1 m/s

northward\_wind, as positive north, with precision = .1 m/s

The conversion equation written in python:

```
Import numpy as np
```

```
def wind(dir, spd):
```

```
    """Given a direction and speed, return vector components"""
```

```
    if dir == None or spd == None:
```

```
        return None, None
```

```
    dtor = np.pi / 180.0 # decimal to radians
```

```
    mdir = 270.0 - float(dir)
```

```
    if mdir <= 0.0:
```

```
        mdir += 360.0
```

```
    else:
```

```
        mdir -= 360.0
```

```
    u = float(spd) * np.cos(mdir * dtor)
```

```
    v = float(spd) * np.sin(mdir * dtor)
```

```
    return u, v
```

If any of SPD or DIR are missing, these values are omitted.

Note that a SAMOS value of -9999 or -8888 is interpreted as “missing” or “special” and is left out of DOMS. In this case, this applies when either SPD or DIR have these values.

CF Name = eastward\_wind, northward\_wind

**Wind\_depth:**

SAMOS NetCDF variable: SPD, DIR

SAMOS NetCDF attribute: height

The value of height for SPD takes precedence over that of DIR.

If available, the value is recorded and the sign is reversed to represent negative DOMS depth convention for sensors located above sea level. Note that a SAMOS value of -9999 or -8888 is interpreted as “missing” or “special” and is left out of DOMS.

If none are available, wind\_depth is omitted.

CF Name = wind\_depth

**Wind\_quality:**

See quality (above).

In this case, flag values for SPD take precedence over those of DIR.

CF name = wind\_quality

**Meta:**

SAMOS specific metadata string created for DOMS, not internal to SAMOS.

Has the following pattern:

{Call sign}\_{YYYYMMDD}v{version number/order number}\_{index value}

Example: "KAOU\_20131222v20001\_0766" represents a record from the ship with callsign “KAOU”, on 2013, December 22, using the intermediate quality (v200) first order (01) datafile, located at time-index 766 within the file.

CF Name = meta

**Provenance:**

The source of each record is populated using a THREDDS url with the appropriate NetCDF dataset record and index value associated to each record.