// NetCDF TEMPLATE FOR SPECTRAL WAVE PARAMETERS IN DELAYED MODE - EXAMPLE FOR SPOTTER BUOY FROM NSW

netcdf NCEI\_TimeSeries\_Orthogonal {

dimensions:

TIME= 1; //.................................................... REQUIRED - Number of time steps in the time series.

FREQUENCY= 1; //...................................... REQUIRED - Number of frequency bands used in the spectral analysis.

TimeSeries = 1; //............................................ REQUIRED - Number of time series (=1 for single time series)

variables:

int timeSeries(timeSeries); //............................................................................................ REQUIRED - If using the attribute below: cf\_role. Data type can be whatever is appropriate for the unique feature type.  
 timeSeries:long\_name = "Unique identifier for each feature instance"; //................ REQUIRED  
 timeSeries:cf\_role = "timeseries\_id"; //..................................................................... REQUIRED

double **TIME(TIME)** ;//................................................................. The data type for time should be double (IMOS).

TIME:long\_name = "**time**" ; //................................................ REQUIRED (IMOS) - Provide a descriptive, long name for this variable.

TIME:standard\_name = "**time**" ; //.......................................... REQUIRED (CF) - Do not change

TIME:units = "**days since 1950-01-01 00:00:00 UTC**" ; //.... REQUIRED (CF and IMOS) - Use approved CF convention with approved UDUNITS.

TIME:calendar = "**gregorian**" ; //........................................... REQUIRED - If the calendar is not default calendar, which is "gregorian".

TIME:sampling\_period\_timestamp\_location="**end**" ; //........ REQUIRED - The location of the timestamp within the sampling period assigned to the resulting value. The options are: "**start**", "**middle**", "**end**". (DBCP)

TIME:axis = "**T**" ; //................................................................ REQUIRED (CF) - Do not change.

TIME:comment = "**additional information about time**" ; //.............. RECOMMENDED - Add useful, additional information here like miscellaneous information about the data, not captured elsewhere.

float **FREQUENCY(FREQUENCY)** ;//.......................................... The data type for frequency should be float (IMOS).

FREQUENCY:long\_name = "**frequency**" ; //........................... REQUIRED (IMOS) - Provide a descriptive, long name for this variable.

FREQUENCY:units = "**Hz**" ; //................................................. REQUIRED (CF and IMOS) - The unit of frequency range of the sensor. Use approved CF convention with approved UDUNITS.

FREQUENCY:min = **0.03f** ; // …..................................... REQUIRED - The minimum recorded frequency of the spectral analysis in Hz.

FREQUENCY:max = **0.8f** ; // …...................................... REQUIRED - The maximum recorded frequency of the spectral analysis in Hz.

FREQUENCY:comment = "**additional information about frequency**" ; //.. RECOMMENDED - Add useful, additional information here like miscellaneous information about the data, not captured elsewhere.

double **LATITUDE(TIME)** ;//.......................................................................................................... The data type for latitude should be double (IMOS).

LATITUDE:long\_name = "**latitude of each observation**" ; //.................................................. REQUIRED (IMOS) - Provide a descriptive, long name for this variable.

LATITUDE:standard\_name = "**latitude**" ; //.............................................................................. REQUIRED (IMOS) - This is fixed, do not change.

LATITUDE:units = "**degrees\_north**" ; //................................................................................... REQUIRED - CF recommends degrees\_north, but at least must use UDUNITS.

LATITUDE:axis = "**Y**" ; //.......................................................................................................... REQUIRED - Do not change.

LATITUDE:valid\_min = **-90.0** ; //.............................................................................................. RECOMMENDED - The minimum value for this variable.

LATITUDE:valid\_max = **90.0** ; //.............................................................................................. RECOMMENDED - The maximum value for this variable.

LATITUDE:\_FillValue = **-9999.0** ;//.......................................................................................... REQUIRED - If there could be missing values in the data.

LATITUDE:reference\_datum = "**WGS84 coordinate reference system; EPSG:4326**" ; // ... REQUIRED IN IMOS CONVENTION, BUT NON-CF.

LATITUDE:comment = "**additional information about latitude**" ; //..................................... RECOMMENDED - Add useful, additional information here like miscellaneous information about the data, not captured elsewhere.

double **LONGITUDE(TIME)** ; //....................................................................................................... The data type for longitude should be double (IMOS).

LONGITUDE:long\_name = " **longitude of each observation**" ; //............................................ REQUIRED (IMOS) - Provide a descriptive, long name for this variable.

LONGITUDE:standard\_name = "**longitude**" ; //......................................................................... REQUIRED (IMOS) - This is fixed, do not change.

LONGITUDE:units = "**degrees\_east**" ; //.................................................................................... REQUIRED - CF recommends degrees\_east, but at least use UDUNITS.

LONGITUDE:axis = "**X**" ; //........................................................................................................ REQUIRED - Do not change.

LONGITUDE:valid\_min = **-180.0** ; //.......................................................................................... RECOMMENDED - The minimum value for this variable.

LONGITUDE:valid\_max = **180.0** ; //........................................................................................... RECOMMENDED - The maximum value for this variable.

LONGITUDE:\_FillValue = **-9999.0** ;//......................................................................................... REQUIRED - If there could be missing values in the data.

LONGITUDE:reference\_datum = "**WGS84 coordinate reference system; EPSG:4326**" ; //... REQUIRED IN IMOS CONVENTION, BUT NON-CF.

LONGITUDE:comment = "**additional information about longitude**" ; //..................................RECOMMENDED - Add useful, additional information here like miscellaneous information about the data, not captured elsewhere.

float **A1(TIME,FREQUENCY)** ; //.................................................................................. REQUIRED - This is **a1** Fourier coefficient and is a **CORE** variable part of the first 5 spectral wave parameters (IMOS).

A1:long\_name = "**first term of the Fourier cosine series**" ; //....................... REQUIRED - Provide a descriptive, long name for this variable.

A1:units = 1 ; //................................................................................. REQUIRED - The coefficients are unitless or dimensionless, the value used for that is 1 (UDUNITS).

A1:valid\_min = **-1.f** ; //...................................................................... RECOMMENDED - Pre-defined conservative value limit for this variable.

A1:valid\_max = **1.f** ; //....................................................................... RECOMMENDED - Pre-defined conservative value limit for this variable.

A1:\_FillValue = **-999.** ; //................................................................. REQUIRED - If there could be missing values in the data.

A1:coordinates = "**TIME LATITUDE LONGITUDE**" ; //.......... REQUIRED - A blank-separated list of the names of the relevant variables that include spatio-temporal coordinate information.

A1:comment = "[**Add useful information about this variable and its data, not captured elsewhere.]**" ; //... RECOMMENDED - Add useful, additional information here like miscellaneous information about the data, not captured elsewhere.

float **A2(TIME,FREQUENCY)** ; //................................................................................... REQUIRED - This is **a2** Fourier coefficient and is a **CORE** variable part of the first 5 spectral wave parameters (IMOS).

A2:long\_name = "**second term of the Fourier cosine series**"; //......................... REQUIRED - Provide a descriptive, long name for this variable.

A2:units = 1 ; //.................................................................................. REQUIRED - The coefficients are unitless or dimensionless, the value used for that is 1 (UDUNITS).

A2:valid\_min = **-1.f** ; //....................................................................... RECOMMENDED - Pre-defined conservative value limit for this variable.

A2:valid\_max = **1.f** ; //........................................................................ RECOMMENDED - Pre-defined conservative value limit for this variable.

A2:\_FillValue = **-999.** ; //.................................................................. REQUIRED - If there could be missing values in the data.

A2:coordinates = "**TIME LATITUDE LONGITUDE**" ; //............ REQUIRED - A blank-separated list of the names of the relevant variables that include spatio-temporal coordinate information.

A2:comment = "[**Add useful information about this variable and its data, not captured elsewhere.]**" ; //..... RECOMMENDED - Add useful, additional information here like miscellaneous information about the data, not captured elsewhere.

float **B1(TIME,FREQUENCY)** ; //................................................................................... REQUIRED - This is **b1** Fourier coefficient and is a **CORE** variable part of the first 5 spectral wave parameters (IMOS).

B1:long\_name = "**first term of the Fourier sine series**" ; //........................ REQUIRED - Provide a descriptive, long name for this variable.

B1:units = 1 ; //.................................................................................. REQUIRED - The coefficients are unitless or dimensionless, the value used for that is 1 (UDUNITS).

B1:valid\_min = **-1.f** ; //....................................................................... RECOMMENDED - Pre-defined conservative value limit for this variable.

B1:valid\_max = **1.f** ; //........................................................................ RECOMMENDED - Pre-defined conservative value limit for this variable.

B1:\_FillValue = **-999.** ; //................................................................... REQUIRED - If there could be missing values in the data.

B1:coordinates = "**TIME LATITUDE LONGITUDE**" ; //............ REQUIRED - A blank-separated list of the names of the relevant variables that include spatio-temporal coordinate information.

B1:comment = "[**Add useful information about this variable and its data, not captured elsewhere.]**" ; //...... RECOMMENDED - Add useful, additional information here like miscellaneous information about the data, not captured elsewhere.

float **B2(TIME,FREQUENCY)** ; //.................................................................................... REQUIRED - This is **b2** Fourier coefficient and is a **CORE** variable part of the first 5 spectral wave parameters (IMOS).

B2:long\_name = "**second term of the Fourier sine series**"; //.......................... REQUIRED - Provide a descriptive, long name for this variable.

B2:units = 1 ; //................................................................................... REQUIRED - The coefficients are unitless or dimensionless, the value used for that is 1 (UDUNITS).

B2:valid\_min = **-1.f** ; //........................................................................ RECOMMENDED - Pre-defined conservative value limit for this variable.

B2:valid\_max = **1.f** ; //......................................................................... RECOMMENDED - Pre-defined conservative value limit for this variable.

B2:\_FillValue = **-999.** ; //................................................................... REQUIRED - If there could be missing values in the data.

B2:coordinates = "**TIME LATITUDE LONGITUDE**" ; //............ REQUIRED - A blank-separated list of the names of the relevant variables that include spatio-temporal coordinate information.

B2:comment = "[**Add useful information about this variable and its data, not captured elsewhere.]**" ; //.... RECOMMENDED - Add useful, additional information here like miscellaneous information about the data, not captured elsewhere.

float **ENERGY(TIME,FREQUENCY)** ; //............................................................ REQUIRED - This is **spectral energy density** and is a **CORE** variable part of the first 5 spectral wave parameters (IMOS).

ENERGY:long\_name = "**energy density**"; //................................................... REQUIRED - Provide a descriptive, long name for this variable.

ENERGY:units = "**m2 Hz**" ; //.......................................................................... REQUIRED - Use UDUNITS.

ENERGY:valid\_min = **0.f** ; //............................................................................. RECOMMENDED - Pre-defined conservative value limit for this variable.

ENERGY:valid\_max = **2000000.f** ; //................................................................ RECOMMENDED - Pre-defined conservative value limit for this variable.

ENERGY:\_FillValue = **-999.** ; //....................................................................... REQUIRED - If there could be missing values in the data.

ENERGY:coordinates = "**TIME LATITUDE LONGITUDE**" ; //................ REQUIRED - A blank-separated list of the names of the relevant variables that include spatio-temporal coordinate information.

ENERGY:comment = "[**Add useful information about this variable and its data, not captured elsewhere.]**" ; //........ RECOMMENDED - Add useful, additional information here like miscellaneous information about the data, not captured elsewhere.

// global attributes: (in yellow - content can be found in the [global\_attributes](https://universitytasmania.sharepoint.com/:x:/r/sites/ARDCNationalInfrastructureforin-situwaveobservations/Shared%20Documents/General/Work_Package_2/Data_Metadata_Standards/global_attributes_partners_PLEASE_FILL_IN.xlsx?d=w76c7d5a70a6740a783ebe6ff45af5982&csf=1&web=1&e=LGjzhq) spreadsheet)

:abstract = " " ; // CHECK SPREADSHEET; //.......REQUIRED - A paragraph describing the dataset: type of data contained in the dataset, how the data was created, the creator of the dataset, the project for which the data was created, the geospatial coverage of the data, the temporal coverage of the data. (IMOS)

:acknowledgement = " " ; // CHECK SPREADSHEET; //.......REQUIRED - Information about how to acknowledge the source of the material. For data produced under the IMOS project, the field must be filled as shown in the example. If relevant, also credit other organisations involved in collection of this particular data stream. (IMOS)

:author = " " ; // CHECK SPREADSHEET; //...................REQUIRED - Name of the person responsible for the creation of the dataset. Convention is last name and then first name separated by a comma. (IMOS)

:buoy\_specification\_url = "[link to the buoy specification document online] " ; //.................RECOMMENDED - Point to a manual online that provides complete buoy specifications.

:cdm\_data\_type = "**Station**"; //................REQUIRED - The data type, as derived from Unidata's Common Data Model Scientific Data types and understood by THREDDS. (ACDD)

:citation = " " ; // CHECK SPREADSHEET; //...................REQUIRED - The citation to be used in publications using the dataset should follow the format: “IMOS. [year-of-datadownload], [Title], [Data access URL], accessed [dateof-access]”. (IMOS)

:Conventions = "**CF-1.6**" ; //....................REQUIRED - Name of the format convention used by the dataset. (IMOS)

:data\_centre = "**Australian Ocean Data Network (AODN)**" ; //..................................REQUIRED - Data centre in charge of the data management or party who distributed the resource. (IMOS)

:data\_centre\_email = "**info@aodn.org.au**" ; //..................................REQUIRED - Data Centre contact e-mail address. (IMOS)

:date\_created = "**2021-12-06T13:30:00Z**" ; //..................................REQUIRED - The date in UTC on which the file was created. (IMOS)

:disclaimer = " " ; // CHECK SPREADSHEET; //..............REQUIRED - Statement limiting the liability of the data provider. (IMOS)

:firmware\_version = "**5555**" ;//............................................RECOMMENDED - The version of the software used inside the buoy to do the processing of the data.

:geospatial\_lat\_min = **-32.90296** ; //.......................................... REQUIRED - Describes a simple lower latitude limit. (ACDD)

:geospatial\_lat\_max = **-32.90156** ; //......................................... REQUIRED - Describes a simple upper latitude limit. (ACDD)

:geospatial\_lon\_min = **151.79807** ; //......................................... REQUIRED - Describes a simple lower longitude limit. (ACDD)

:geospatial\_lon\_max = **151.79918** ; //........................................ REQUIRED - Describes a simple upper longitude limit. (ACDD)

:geospatial\_lat\_units = "**degrees\_north**" ; //.................. REQUIRED - Units for the latitude axis described in "geospatial\_lat\_min" and "geospatial\_lat\_max" attributes. Use UDUNITS compatible units. (ACDD)

:geospatial\_lon\_units = "**degrees\_east**"; //..................... REQUIRED - Units for the longitude axis described in "geospatial\_lon\_min" and "geospatial\_lon\_max" attributes. Use UDUNITS compatible units. (ACDD)

:hull\_serial\_number = "**98765**" ; //.............REQUIRED - The serial number of the hull. Spotter and Triaxys have only one serial number for both hull and eletronic\_box. In this case, repeat number in both attributes. (CDIP)

:institution = " " ; // CHECK SPREADSHEET; //........................REQUIRED - Name of the institute or facility where the original data was produced. (IMOS)

:instrument = "**SOFAR Spotter-V2**" ; //........................REQUIRED - The make and model of the instruments from which the data has been collected (IMOS). Options are (and in this format): "**SOFAR Spotter-V1**", "**SOFAR Spotter-V2**", "**Datawell DWR MkIII**", "**Datawell DWR-G4**", "**Datawell DWR4**".

:instrument\_burst\_duration = **1800** ; //....................... REQUIRED - The recording duration in seconds. (IMOS)

:instrument\_burst\_interval = **3600** ; //....................... REQUIRED - The recording interval in seconds. (IMOS)

:instrument\_burst\_unit = "**s**" ; //....................... REQUIRED – Do not change; The unit for instrument burst duration and interval which is seconds. (IMOS)

:instrument\_sampling\_interval = **0.4** ; //....................... REQUIRED - The sampling interval in seconds. (IMOS)

:license = "**http://creativecommons.org/licenses/by/4.0/**"; //........................REQUIRED - Describe the restrictions to data access and distribution. (IMOS)

:platform = "**moored surface buoy**" ; //........................ REQUIRED - The platform that contains the instrument, platform description. They are listed in Reference Table 3 of the File Naming Convention document. (IMOS)

:principal\_investigator = " " ; // CHECK SPREADSHEET; //.............REQUIRED - Name of the principal investigator in charge of the platform. Convention is last name and then first name separated by a comma. (IMOS)

:principal\_investigator\_email = " " ; // CHECK SPREADSHEET; //....REQUIRED - Email of the principal investigator in charge of the platform. Convention is last name and then first name separated by a comma. (IMOS)

:project = " " ; // CHECK SPREADSHEET; //........................ REQUIRED - The scientific project that produced the data. (IMOS)

:source = "**Spectral wave parameters measured and/or calculated by Sofar buoys using GPS information.**" ; //......RECOMMENDED - General description of how the buoy works or the method of production of the original data. If it is observational, source should characterize it. Attention that this will change depending on the buoy model/type. This attribute is defined in the CF Conventions. (ACDD)

:spectral\_analysis\_technique = "**Fast Fourier Transform**" ; // ................ REQUIRED - The spectral analysis technique.

:spectral\_analysis\_technique\_reference = "**Kuik, A. J., van Vledder, G. P., & Holthuijsen, L. H. (1988). A Method for the Routine Analysis of Pitch-and-Roll Buoy Wave Data, Journal of Physical Oceanography, 18(7), 1020-1034. Retrieved Feb 21, 2022, from https://journals.ametsoc.org/view/journals/phoc/18/7/1520-0485\_1988\_018\_1020\_amftra\_2\_0\_co\_2.xml**" ; // ................ REQUIRED - The paper as a reference to the spectral analysis technique used to calculate the spectral coefficients.

:standard\_name\_vocabulary = "**NetCDF Climate and Forecast (CF) Metadata Convention CF standard name table v78**" ; //............ REQUIRED - Table number used for CF standard names. (IMOS)

:site\_name = "**Stockton**" ; //........................REQUIRED - The name of the station where the buoy is deployed.

:time\_coverage\_duration = "**P1Y4M6DT12H30M5S**" ; //....... RECOMMENDED - Describes the duration of the data set. Use ISO 8601:2004 for date and time (https://aquadocs.org/bitstream/handle/1834/4467/54\_2.pdf?sequence=1&isAllowed=y). (ACDD)

:time\_coverage\_end = "**2021-04-09T09:00:00Z**" ; //.......................... REQUIRED - Describes the time in UTC of the last data point in the data set. Use ISO 8601:2004 for date and time. (ACDD)

:time\_coverage\_start = "**2019-12-06T10:30:00Z**" ; //......................... REQUIRED - Describes the time in UTC of the first data point in the data set. Use ISO 8601:2004 for date and time. (ACDD)

:title = " " ; // CHECK SPREADSHEET; //................... REQUIRED - Short description of the dataset. (IMOS)

:watch\_circle = **10** ; //........................ RECOMMENDED - The radius in meter around the mooring which can be a range of the buoy location . (DBCP)

:water\_depth = **12.0** ; //........................REQUIRED - The depth in meters of the location where the buoy is deployed. (IMOS)

:water\_depth\_reference = "**The Australian Height Datum (AHD)**" ; //........................RECOMMENDED - The vertical reference datum.

:water\_depth\_source = "**chart**" ; //........................RECOMMENDED - How the water depth measurement is made. The options are: "**chart**", "**GPS**", "**echosounder**".

:water\_depth\_units = "**m**" ; //........................RECOMMENDED - The units for the depth of the location where the buoy is deployed.

:wave\_buoy\_type = "**directional**" ; //........................REQUIRED - The type of the buoy, options are either ‘**directional**’ or ‘**non-directional**’.

:wave\_motion\_sensor\_type = "**GPS**" ; //........................REQUIRED - The sensor type used to measure waves/surface displacement, options are either ‘**GPS**’ or ‘**accelerometer**’.

:wave\_sensor\_serial\_number = "**123ABC**" ;//........……............... REQUIRED - The serial number for the wave sensor. (DBCP)

}