OA metadata template (instructions)

Section	Metadata elements (Sections marked with * can be repeated as necessary.)				help ref. No	Brief Descriptions
1	Principal Investigator*	Name			1.1	Full name of the principal investigator (First Middle Last).
		Institution			1.2	Affiliated institution of the principal investigator (e.g., Woods Hole Oceanographic Institution).
		Address			1.3	Address of the affiliated institution of the principal investigator.
		Phone			1.4	Phone number of the principal investigator (xxx-xxx-xxxx).
		Email			1.5	Email address of the principal investigator.
2	Data Submitter	Name			2.1	Full name of the data submitter (First Midde Last).
		Institution			2.2	Affiliated institution of the data submitter (e.g., Woods Hole Oceanographic Institution).
		Address			2.3	Address of the affiliated institution of the data submitter.
		Phone			2.4	Phone number of the data submitter.
		Email			2.5	Email address of the data submitter.
3	Title				3	Provide a descriptive title for the data set.
4	Abstract				4	A narrative summary of the data set.
5	Purpose				5	A summary of the intentions with which the data set was developed.
6	Start date (YYYY-MM-DD)				6	Start date of the first measurement (e.g., 2001-02-25).
7	End date (YYYY-MM-DD)				7	End date of the last measurement (e.g., 2002-05-16).
8	Bounding box coordinates	West bound longitude			8.1	Westernmost longitude of the sampling (decimal degrees, negative for Western Hemisphere longitude).
		East bound longitude			8.2	Easternmost longitude of the sampling (decimal degrees, negative for Western Hemisphere longitude)
		North bound latitude			8.3	Northernmost latitude of the sampling (decimal degrees, negative for Southern Hemisphere latitude)
		South bound latitude			8.4	Southernmost latitude of the sampling (decimal degrees, negative for Southern Hemisphere latitude)
9	Spatial reference system				9	A spatial reference system or coordinate reference system defines a specific map projection, as well as transformations between different spatial reference systems. WGS 84 is the reference coordinate system used by the Global Position System.
10	Geographic names				10	Names of the geographic area where the data collection takes place, e.g., Gulf of Mexico, Baltic Sea, etc.
11	Funding Agency				11	Funding agency (and the funding number, if available) of the data collection.
12	Projects				12	Project refers to the collaborative research effort, which the data collection is part of . For example, U.S. Joint Global Ocean Flux Study (U.S. JGOFS) is a project.
13	Platform*	Platform name			13.1	Platforms are often the research vessels that carry out the research. However, platforms could be something other than a ship (e.g., glider, Argo, etc), or something that is fixed (e.g., moored buoys, towers, etc).
		Platform ID			13.2	ICES platform code (e.g., 33RO, optional). For a list of ICES ship code, please check out this link: http://vocab.ices.dk.
14	EXPOCODE				14	Expedition code consists of the four digit ICES ship code, and the date of the first day of the cruise in the format of YYYYMMDD.
15	Cruise ID				15	Cruise ID is the particular ship cruise number (e.g., MT901), or other alias for the cruise. For example, the cruise ID (e.g., A16N_2013) could consist of a Section ID (e.g., A16N), and the sampling year (e.g., 2013).
16	Section (Leg)				16	Section ID is the identification number for a research cruise section or leg. It was commonly used during the World Ocean Circulation Experiment (WOCE) studies, which often had many repeating cruises on a single section, e.g., A16N.
17	Dataset ID				17	Identification number assigned to this dataset by other data analysis centers.
18	DOI				18	Digital object identifier assigned to this data set by other data analysis centers.
19	Author list for citation				19	Please provide the list of authors in their correct order for the creation of data citation for this data set. We recommend the format of Lastname1, Firstname1, Middlename1; Lastname2, Firstname2, Middlename2; … for this field.
20	References				20	References are bibliographic citations of publications or cruise reports, etc, describing the data set.
21	Supplemental information				21	Any additional information that is critical to the understanding of the data set, but does not fit into other existing fields.

22	Dissolved Inorganic Carbon (DIC)	**Variable abbreviation in data files**			22.1	Column header name of the variable in the data files, e.g., DIC, TCO2, etc.
		Observation type			22.2	How the variable is observed, e.g., surface underway, profile, time series, model output, etc. For experimental data, this could be: laboratory experiment, pelagic mesocosm, benthic mesocosm, benthic FOCE type studies, natural pertubration site studies, etc
		In-situ observation / manipulation condition / response variable			22.3	Whether the variable belong to an in-situ observed variable, or a manipulation condition variable, or a response variable in a biological experimental study.
		Variable unit			22.4	Units of the variable (e.g., µmol/kg).
		Measured or calculated			22.5	Whether the variable is measured in-situ, or calculated from other variables.
		Sampling instrument			22.6	Instrument that is used to collect water samples, or deploy sensors, etc. For example, a Niskin bottle, pump, CTD, etc is a sampling instrument.
		Analyzing instrument			22.7	Instrument that is used to analyze the water samples collected with the 'sampling instrument', or the sensors that are mounted on the 'sampling instrument' to measure the water body continuously. For example, a coulometer, winkler titrator, spectrophotometer, pH meter, thermosalinograph, oxygen sensor, YSI Multiparameter Meter, etc is an analyzing instrument. We encourage you to document as much details (such as the make, model, resolution, precisions, etc) of the instrument as you can here.
		Detailed sampling and analyzing information			22.8	Detailed description of the sampling and analyzing procedures, including calibration procedures, model number of the instrument, etc.
		Field replicate information			22.9	Repetition of sample collection and measurement, e.g., triplicate samples.
		Standardization information	**Standardization technique description**		22.10.1	Description of the standardization procedure.
			Frequency of standardization		22.10.2	How frequent was the calibration carried out, e.g., every 6 hours, etc.
			CRM information	**CRM manufacturer**	22.10.3.1	Manufacture of the Certified Reference Material, e.g., Andrew Dickson's lab at Scripps Institute of Oceanography.
				Batch number	22.10.3.2	Batch number of the CRMs that are used to calibrate the instrument.
		Poisoning Information	**Poison used to kill the sample**		22.11.1	As described, e.g., Mercury Chloride.
			Poison volume		22.11.2	How much poison is added to each sample to kill the microbes. For example, 20 µL Mercury Chloride is added to 500 mL samples.
			Poisoning correction description		22.11.3	Please specify whether the reported variables were corrected for poison usage, and if so, how they were corrected.
		Uncertainty			22.12	Uncertainty of the results (e.g., 1%, 2 µmol/kg), or any pieces of information that are related to the quality control of the variable.
		Data quality flag description			22.13	Describe what the quality control flags stand for, e.g., 2 = good value, 3 = questionable value, 4 = bad value.
		Method reference (citation)			22.14	Citation for the dissolved inorganic carbon method.
		Researcher who measured this parameter	**Researcher Name**		22.15.1	The name of the PI, whose research team measured or derived this parameter.
			Researcher Institution		22.15.2	The institution of the PI, whose research team measured or derived this parameter.

23	Total Alkalinity (TA)	**Variable abbreviation in data files**			23.1	Column header name of the variable in the data files, e.g., TA, Alk, etc.
		Observation type			23.2	How the variable is observed, e.g., surface underway, profile, time series, model output, etc. For experimental data, this could be: laboratory experiment, pelagic mesocosm, benthic mesocosm, benthic FOCE type studies, natural pertubration site studies, etc
		In-situ observation / manipulation condition / response variable			23.3	Whether the variable belong to an in-situ observed variable, or a manipulation condition variable, or a response variable in a biological experimental study.
		Variable unit			23.4	Units of the variable (e.g., µmol/kg).
		Measured or calculated			23.5	Whether the variable is measured in-situ, or calculated from other variables.
		Sampling instrument			23.6	Instrument that is used to collect water samples, or deploy sensors, etc. For example, a Niskin bottle, pump, CTD, etc is a sampling instrument.
		Analyzing instrument			23.7	Instrument that is used to analyze the water samples collected with the 'sampling instrument', or the sensors that are mounted on the 'sampling instrument' to measure the water body continuously. For example, a coulometer, winkler titrator, spectrophotometer, pH meter, thermosalinograph, oxygen sensor, YSI Multiparameter Meter, etc is an analyzing instrument. We encourage you to document as much details (such as the make, model, resolution, precisions, etc) of the instrument as you can here.
		Type of titration			23.8	Type of the titration used to determine alkalinity.
		Cell type (open or closed)			23.9	Whether the titration cell is open or closed.
		Curve fitting method			23.10	Curve fitting method used to determine the alkalinity.
		Detailed sampling and analyzing information			23.11	Detailed description of the sampling and analyzing procedures, including calibration procedures, model number of the instrument, etc.
		Field replicate information			23.12	Repetition of sample collection and measurement, e.g., triplicate samples.
		Standardization information	**Standardization technique description**		23.13.1	Description of the standardization procedure.
			Frequency of standardization		23.13.2	How frequent was the calibration carried out, e.g., every 6 hours, etc.
			CRM information	**CRM manufacturer**	23.13.3.1	Manufacture of the Certified Reference Material, e.g., Andrew Dickson's lab at Scripps Institute of Oceanography.
				Batch Number	23.13.3.2	The batch number of the CRMs that are used to calibrate the instrument.
		Poisoning Information	**Poison used to kill the sample**		23.14.1	As described, e.g., Mercury Chloride.
			Poison volume		23.14.2	How much poison is added to each sample to kill the microbes. For example, 20 µL Mercury Chloride is added to 500 mL samples.
			Poisoning correction description		23.14.3	Please specify whether the reported variables were corrected for poison usage, and if so, how they were corrected.
		Magnitude of blank correction			23.15	Please specify whether the reported variables were corrected for blank, and if so, how they were corrected.
		Uncertainty			23.16	Uncertainty of the results (e.g., 1%, 2 µmol/kg), or any pieces of information that are related to the quality control of the variable.
		Data quality flag description			23.17	Describe what the quality control flags stand for, e.g., 2 = good value, 3 = questionable value, 4 = bad value.
		Method reference (citation)			23.23	Citation for the alkalinity method.
		Researcher who measured this parameter	**Researcher Name**		23.19.1	The name of the PI, whose research team measured or derived this parameter.
			Researcher Institution		23.19.2	The institution of the PI, whose research team measured or derived this parameter.

24	pH	**Variable abbreviation in data files**			24.1	Column header name of the variable in the data files, e.g., pH
		Observation type			24.2	How the variable is observed, e.g., surface underway, profile, time series, model output, etc. For experimental data, this could be: laboratory experiment, pelagic mesocosm, benthic mesocosm, benthic FOCE type studies, natural pertubration site studies, etc
		In-situ observation / manipulation condition / response variable			24.3	Whether the variable belong to an in-situ observed variable, or a manipulation condition variable, or a response variable in a biological experimental study.
		Measured or calculated			24.4	Whether the variable is measured in-situ, or calculated from other variables
		Sampling instrument			24.5	Instrument that is used to collect water samples, or deploy sensors, etc. For example, a Niskin bottle, pump, CTD, etc is a sampling instrument.
		Analyzing instrument			24.6	Instrument that is used to analyze the water samples collected with the 'sampling instrument', or the sensors that are mounted on the 'sampling instrument' to measure the water body continuously. For example, a coulometer, winkler titrator, spectrophotometer, pH meter, thermosalinograph, oxygen sensor, YSI Multiparameter Meter, etc is an analyzing instrument. We encourage you to document as much details (such as the make, model, resolution, precisions, etc) of the instrument as you can here.
		pH scale			24.7	The pH scale for the reported pH results, e.g., total scale, seawater scale, NBS scale, etc.
		Temperature of measurement			24.8	Temperature at which the samples were measured.
		Detailed sampling and analyzing information			24.9	Detailed description of the sampling and analyzing procedures, including calibration procedures, model number of the instrument, etc.
		Field replicate information			24.10	Repetition of sample collection and measurement, e.g., triplicate samples.
		Standardization information	**Standardization technique description**		24.11.1	Description of the pH calibration procedures.
			Frequency of standardization		24.11.2	How frequent was the calibration carried out, e.g., every 6 hours, etc.
			pH values of the standards		24.11.3	pH values of the standards, e.g., 4.0, 7.0, 10.0.
			Temperature of standardization		24.11.4	Temperature at which the calibration was done.
		Temperature correction method			24.12	How the temperature effect was corrected.
		at what temperature was pH reported			24.13	The input could be a constant temperature value, or something like, in-situ temperature, temperature of analysis, etc.
		Uncertainty			24.14	Uncertainty of the results (e.g., 1%, 2 µmol/kg), or any pieces of information that are related to the quality control of the variable.
		Data quality flag description			24.15	Describe what the quality control flags stand for, e.g., 2 = good value, 3 = questionable value, 4 = bad value.
		Method reference (citation)			24.16	Citation for the pH method.
		Researcher who measured this parameter	**Researcher Name**		24.17.1	The name of the PI, whose research team measured or derived this parameter.
			Researcher Institution		24.17.2	The institution of the PI, whose research team measured or derived this parameter.

25	pCO2/fCO2 (autonomous)	**Variable abbreviation in data files**			25.1	Column header name of the variable in the data files, e.g., pCO2, etc.
		Observation type			25.2	How the variable is observed, e.g., surface underway, profile, time series, model output, etc. For experimental data, this could be: laboratory experiment, pelagic mesocosm, benthic mesocosm, benthic FOCE type studies, natural pertubration site studies, etc
		In-situ observation / manipulation condition / response variable			25.3	Whether the variable belong to an in-situ observed variable, or a manipulation condition variable, or a response variable in a biological experimental study.
		Variable unit			25.4	Units of the variable, e.g., µatm.
		Measured or calculated			25.5	Whether the variable is measured in-situ, or calculated from other variables
		Sampling instrument			25.6	Instrument that is used to collect water samples, or deploy sensors, etc. For example, a Niskin bottle, pump, CTD, etc is a sampling instrument.
		Location of seawater intake			25.7	Whereabout of the seawater intake
		Depth of seawater intake			25.8	Water depth of the seawater intake
		Analyzing instrument			25.9	Instrument that is used to analyze the water samples collected with the 'sampling instrument', or the sensors that are mounted on the 'sampling instrument' to measure the water body continuously. For example, a coulometer, winkler titrator, spectrophotometer, pH meter, thermosalinograph, oxygen sensor, YSI Multiparameter Meter, etc is an analyzing instrument. We encourage you to document as much details (such as the make, model, resolution, precisions, etc) of the instrument as you can here.
		Detailed sampling and analyzing information			25.10	Detailed description of the sampling and analyzing procedures, including calibration procedures, model number of the instrument, etc.
		Equilibrator information	**Equilbrator type**		25.11.1	Type of the equilibrator for the CO2 measurement.
			Equilibrator volume (L)		25.11.2	The total volume of the CO2 equilibrator.
			Vented or not		25.11.3	Is the equilibrator vented or not?
			Water flow rate (L/min)		25.11.4	Flow rate of the flow through seawater.
			Headspace gas flow rate (L/min)		25.11.5	Flow rate of the gas from the equilibrator to the CO2 analyzer.
			How was temperature inside the equilibrator measured .		25.11.6	Please specify whether temperatrure inside the equilibrator is measured or not. If so, please describe how the temperature was measured.
			How was pressure inside the equilibrator measured.		25.11.7	Please specify whether pressure inside the equilibrator is measured or not. If so, please describe how the pressure was measured.
		Drying method for CO2 gas			25.12	The method used to dry the gas coming out of CO2 equilibrator, before it is pumped into the CO2 sensor.
		Gas detector information	**Manufacturer**		25.13.1	Manufacturer of the CO2 sensor.
			Model		25.13.2	Model number of the CO2 sensor.
			Resolution		25.13.3	Resolutin of the CO2 sensor.
			Uncertainty		25.13.4	Uncertainity of the CO2 sensor.
		Standardization information	**Standardization technique description**		25.14.1	Please describe the calibration procedure.
			Frequency of standardization		25.14.2	How frequent was the calibration carried out, e.g., every 6 hours, etc.
			Standard gas information	**Manufacturer of standard gas**	25.14.3.1	Manufacturer of the CO2 standard gas.
				Concentrations of standard gas	25.14.3.2	Concentrations of the CO2 standard gases that are used to calibrate the CO2 sensor, e.g., 200, 350, 510ppm.
				Uncertainties of standard gas	25.14.3.3	Uncertainties of the CO2 standard gas, e.g., 0.5%.
		Water vapor correction method			25.15	How the water vapor pressure inside the equilibrator was determined
		Temperature correction method			25.16	How the temperature effect was corrected.
		at what temperature was pCO2 reported			25.17	The input could be a constant temperature value, or something like, in-situ temperature, temperature of analysis, etc.
		Uncertainty			25.18	Uncertainty of the results (e.g., 1%, 2 µmol/kg), or any pieces of information that are related to the quality control of the variable.
		Data quality flag description			25.19	Describe what the quality control flags stand for, e.g., 2 = good value, 3 = questionable value, 4 = bad value.
		Method reference (citation)			25.20	Citation for the pCO2 method.
		Researcher who measured this parameter	**Researcher Name**		25.21.1	The name of the PI, whose research team measured or derived this parameter.
			Researcher Institution		25.21.2	The institution of the PI, whose research team measured or derived this parameter.

		Variable abbreviation in data files			26.1	Column header name of the variable in the data files, e.g., pCO2, etc.
		Observation type			26.2	How the variable is observed, e.g., surface underway, profile, time series, model output, etc. For experimental data, this could be: laboratory experiment, pelagic mesocosm, benthic mesocosm, benthic FOCE type studies, natural pertubration site studies, etc
		In-situ observation / manipulation condition / response variable			26.3	Whether the variable belong to an in-situ observed variable, or a manipulation condition variable, or a response variable in a biological experimental study.
		Variable unit			26.4	Units of the variable, e.g., µatm.
		Measured or calculated			26.5	Whether the variable is measured in-situ, or calculated from other variables
		Sampling instrument			26.6	Instrument that is used to collect water samples, or deploy sensors, etc. For example, a Niskin bottle, pump, CTD, etc is a sampling instrument.
		Analyzing instrument			26.7	Instrument that is used to analyze the water samples collected with the 'sampling instrument', or the sensors that are mounted on the 'sampling instrument' to measure the water body continuously. For example, a coulometer, winkler titrator, spectrophotometer, pH meter, thermosalinograph, oxygen sensor, YSI Multiparameter Meter, etc is an analyzing instrument. We encourage you to document as much details (such as the make, model, resolution, precisions, etc) of the instrument as you can here.
		Storage method			26.8	How the samples were stored before the measurement.
		Seawater volume (mL)			26.9	Volume of seawater in the flask.
		Headspace volume (mL)			26.10	Volume of headspace (water displaced in the flask plus volume of the tubing).
		Temperature of measurement			26.11	Temperature at which the samples were analyzed.
		Detailed sampling and analyzing information			26.12	Detailed description of the sampling and analyzing procedures, including calibration procedures, model number of the instrument, etc.
		Field replicate information			26.13	Repetition of sample collection and measurement, e.g., triplicate samples.
26	**pCO2/fCO2 (discrete)**	**Gas detector information**	**Manufacturer**		26.14.1	Manufacture of the CO2 sensor.
			Model		26.14.2	Model number of the CO2 sensor.
			Resolution		26.14.3	Resolutin of the CO2 sensor.
			Uncertainty		26.14.4	Uncertainity of the CO2 sensor.
		Standardization information	**Standardization technique description**		26.15.1	Description of the calibration procedure.
			Frequency of standardization		26.15.2	How frequent was the calibration carried out, e.g., every 6 samples, etc.
			Temperature of standardization		26.15.3	Temperature at which normalization was done.
			Standard gas information	**Manufacturer of standard gas**	26.15.4.1	Manufacturer of the CO2 standard gas.
				Concentrations of standard gas	26.15.4.2	Concentrations of the CO2 standard gases that are used to calibrate the CO2 sensor, e.g., 260, 350, 510ppm.
				Uncertainties of standard gas	26.15.4.3	Uncertainties of the CO2 standard gas, e.g., 0.5%.
		Water vapor correction method			26.16	How the water vapor pressure inside the equilibrator was determined
		Temperature correction method			26.17	How the temperature effect was corrected.
		at what temperature was pCO2 reported			26.18	The input could be a constant temperature value, or something like, in-situ temperature, temperature of analysis, etc.
		Uncertainty			26.19	Uncertainty of the results (e.g., 1%, 2 µmol/kg), or any pieces of information that are related to the quality control of the variable.
		Data quality flag description			26.20	Describe what the quality control flags stand for, e.g., 2 = good value, 3 = questionable value, 4 = bad value.
		Method reference (citation)			26.21	Citation for the pCO2 method.
		Researcher who measured this parameter	**Researcher Name**		26.22.1	The name of the PI, whose research team measured or derived this parameter.
			Researcher Institution		26.22.2	The institution of the PI, whose research team measured or derived this parameter.

27	**Other measured variable (can be repeated as many times as needed)***	**Variable abbreviation in data files**			27.1	Column header name of the variable in the data files, e.g., T, DO, etc.
		Full variable name			27.2	Here "Variable" refers to the observed property of your study, e.g., Temperature, Dissolved Oxygen, Nitrate, etc. Information such as Station ID, Bottle number, etc are not variables. Similarly, ancillary variables, such as Nitrate_stdev, Nitrate_Flag, temp_eq, press_eq, etc are not treated as "Variables" as well. In this example, only their parent variable (Nitrate, and pCO2) are treated as variables.
		Climate and Forecast standard name			27.3	Standard names from NetCDF Climate and Forecast Metadata Convention: http://cf-pcmdi.llnl.gov/documents/cf-standard-names/standard-name-table/16/
		Observation type			27.4	How the variable is observed, e.g., surface underway, profile, time series, model output, etc. For experimental data, this could be: laboratory experiment, pelagic mesocosm, benthic mesocosm, benthic FOCE type studies, natural pertubration site studies, etc
		In-situ observation / manipulation condition / response variable			27.5	Whether the variable belong to an in-situ observed variable, or a manipulation condition variable, or a response variable in a biological experimental study.
		Variable unit			27.6	Units of the variable, e.g., oC, µmol/kg.
		Measured or calculated			27.7	Whether the variable is measured in-situ, or calculated from other variables.
		Sampling instrument			27.8	Instrument that is used to collect water samples, or deploy sensors, etc. For example, a Niskin bottle, pump, CTD, etc is a sampling instrument.
		Analyzing instrument			27.9	Instrument that is used to analyze the water samples collected with the 'sampling instrument', or the sensors that are mounted on the 'sampling instrument' to measure the water body continuously. For example, a coulometer, winkler titrator, spectrophotometer, pH meter, thermosalinograph, oxygen sensor, YSI Multiparameter Meter, etc is an analyzing instrument. We encourage you to document as much details (such as the make, model, resolution, precisions, etc) of the instrument as you can here.
		Duration (for settlement/colonization methods)			27.10	The duration for settlement, colonization, or experiment studies.
		Detailed sampling and analyzing information			27.11	Detailed description of the sampling and analyzing procedures, including calibration procedures, model number of the instrument, etc.
		Field replicate information			27.12	Repetition of sample collection and measurement, e.g., triplicate samples.
		Uncertainty			27.13	Uncertainty of the results (e.g., 1%, 2 µmol/kg), or any pieces of information that are related to the quality control of the variable.
		Data quality flag description			27.14	Describe what the quality control flags stand for, e.g., 2 = good value, 3 = questionable value, 4 = bad value.
		Method reference (citation)			27.15	Citation for the method.
		Biological subject			27.16	For biological variables, please state the taxonomy (a specific species genus or a community), upon which the variable is studied. For example, if you study the growth rate of a certain type of Salmon. The "variable/parameter" is growth rate, and "Type of biological subject" is that specific type of salmon. You could group/capture organismal data in three forms: taxonomic, functional, and phylogenetic.
		Species Identification code			27.17	It is recommended to use the species reference databases from the Integrated Taxonomic Information System (or ITIS, http://www.itis.gov/), or World Register of Marine Species (or WoRMS, http://marinespecies.org/). We also recommend you to include the reference databases that are used in this field.
		Researcher who measured this parameter	**Researcher Name**		27.18.1	The name of the PI, whose research team measured or derived this parameter.
			Researcher Institution		27.18.2	The institution of the PI, whose research team measured or derived this parameter.

28	**Non-measured variable (can be repeated as many as needed)***	**Variable abbreviation in data files**			28.1	For variables that are not measured variables, such as station number, cast number, date, longitude, latitude etc. The purpose of this section is to allow you to spell out all the abbreviations that appear in your data files.
		Full variable name			28.2	

Acknowledgement: This template was based on the metadata template that was developed by the National Oceanic and Atmospheric Administration (NOAA)'s Ocean Acidification Data Stewardship (OADS) Team under the funding support from the NOAA's Ocean Acidification Program.