

Group	Parameter	Method (see also JGOFS Report 19)	Unit
CTD	Pressure	digiquartz pressure sensor	dbar
	Temperature		°C
	Dissolved Oxygen		μmol l ⁻¹
	Surface Downwelling Irradiance (PAR)	light meter: scalar (2-π), vector (flat, cosine collector), or chemical actinometry	W m ⁻² , μEinstein m ⁻² s ⁻¹
	E _{PAR} in the water column	light meter: scalar (4-π), vector (cosine collector), or chemical actinometry	W m ⁻² , μEinstein m ⁻² s ⁻¹
	Surface Downwelling Irradiance (PUR)	light meter scalar (2-π), vector (cosine collector), or chemical actinometry	W m ⁻² , μEinstein m ⁻² s ⁻¹
	Photosynthetic electron transport rate	fast repetition rate fluorometry (FRRF), see Laney 1997, Sea Technol., 38(4), 99-102	(unit to be specified)
	Photosystem II-cross section absorption	fast repetition rate fluorometry (FRRF) , see Laney 1997, Sea Technol., 38(4), 99-102	m ⁻¹
	Depth in water		m (positive)
	Salinity	electrical conductivity	(practical salinity scale 1978)
	Fluorescence		μgChl. a l ⁻¹
	Beam Attenuation Coefficient		m ⁻¹
	Other photosynthetic parameters [P.vs.E, a*, α]		m ⁻¹
Discrete	Salinity	4-electrod cell salinometer	(practical salinity scale 1978)
measurements	Dissolved Oxygen	Winkler method	μmol l ⁻¹ or μmol kg ⁻¹
when appropriate, the conversion factor for unit per “kg ⁻¹ ” or per “l ⁻¹ ” should be included for each depth, along with the calculated potential density excess (kg m ⁻³) and the measurement temperature	Nitrite	autoanalyzer, spectrophotometer (manual)	μmol l ⁻¹
	Nitrate + Nitrite	autoanalyzer, spectrophotometer (manual)	μmol l ⁻¹
	Ortho-Phosphate	autoanalyzer, spectrophotometer (manual)	μmol l ⁻¹
	Silicate	autoanalyzer, spectrophotometer (manual)	μmol l ⁻¹
	Nitrate	autoanalyzer, spectrophotometer (manual)	μmol l ⁻¹
	Ammonium	autoanalyzer, spectrophotometer (manual)	μmol l ⁻¹
	Total alkalinity (TAlk)	acidimetric titration	μmol l ⁻¹ or μmol kg ⁻¹
	Total dissolved inorganic carbon (DIC)	coulometry	μmol l ⁻¹ or μmol kg ⁻¹
	seawater pCO ₂ /fCO ₂		μatm

	pCO ₂ /fCO ₂ measurement temperature		°C
	pH	seawater scale, NBS scale, TRIS scale	(no unit)
	pH measurement temperature		°C
Pigments	Chlorophyllide b	HPLC	ng l ⁻¹
	Chlorophyllide a	HPLC	ng l ⁻¹
	Chlorophyll c3	HPLC	ng l ⁻¹
	Chlorophyll c1+c2 & Chl. Mg 3,8DVP a5	HPLC	ng l ⁻¹
	Peridinin	HPLC	ng l ⁻¹
	19' - Butanoyloxyfucoxanthin	HPLC	ng l ⁻¹
	Fucoxanthin	HPLC	ng l ⁻¹
	19' - Hexanoyloxyfucoxanthin	HPLC	ng l ⁻¹
	Prasinoxanthin	HPLC	ng l ⁻¹
	Pyropheophorbide a	HPLC	ng l ⁻¹
	Diadinoxanthin	HPLC	ng l ⁻¹
	Alloxanthin	HPLC	ng l ⁻¹
	Diatoxanthin	HPLC	ng l ⁻¹
	Lutein	HPLC	ng l ⁻¹
	Zeaxanthin	HPLC	ng l ⁻¹
	Chlorophyll b	HPLC	ng l ⁻¹
	Chlorophyll a	HPLC	ng l ⁻¹
	Phaeophytin b	HPLC	ng l ⁻¹
	Phaeophytin a	HPLC	ng l ⁻¹
	α- Carotene	HPLC	ng l ⁻¹
	β- Carotene	HPLC	ng l ⁻¹
	Divinyl-Chlorophyll a	HPLC	ng l ⁻¹
	Divinyl-Chlorophyll a	HPLC	ng l ⁻¹
	Phycoerythrin	HPLC	ng l ⁻¹
	Chlorophyll a	fluorometry	μg l ⁻¹

	Phaeopigments	fluorometry	µg l-1
Mass	Particulate Organic Carbon	CHN analyzer	µmol-C l-1
	Particulate Nitrogen	CHN analyzer	µmol-N l-1
	Dissolved Organic Carbon	HT(C)O analyzer (with direct injection technique)	µmol-C l-1
	Total Dissolved Nitrogen	UV, Persulfate, or HTC analyzer	µmol-N l-1
	Dissolved Organic Phosphorus	to be specified (UV, Thermal, or Persulphate)	nmol-P l-1
	Particulate Biogenic Silica	NaOH digestion	nmol-Si l-1
Sediment Traps	Mass Flux	dry weight	mg m-2 d-1
[Downward particulate fluxes] Deployment Environment, Temporal Resolution, Trap Preserving Solutions and Post-collection Procedures should be clearly specified	Total Carbon Flux	elemental high-temperature combustion analyzer	µmol-C m-2 d-1
	Particulate Organic Carbon Flux	elemental high-temperature combustion analyzer, following the removal of the inorganic carbon.	µmol-C m-2 d-1
	Particulate Nitrogen Flux	elemental high-temperature combustion analyzer	µmol-N m-2 d-1
	Particulate Phosphorus Flux	to be specified	µmol-P m-2 d-1
	Particulate Silicon Flux	to be specified	µmol-Si m-2 d-1
	210Pb Flux	to be specified	to be specified
	230Th Flux	to be specified	to be specified
	231Pa Flux	to be specified	to be specified
	Swimmers	Hand picking under a dissecting microscope	(unit to be specified)
Phytoplankton Production Incubation duration and conditions should be clearly specified (Net P, Gross P, Gross photosynthesis, photorespiration, (light or dark) respiration, growth, euphotic zone depth	New Production (15N uptake)	Dumas combustion method and optical emission spectrometry or mass spectrometry	nmol-N l-1 d-1
	Primary Production (phytoplankton uptake estimated by the 14C method; phytoplankton carbon fixation rates)	scintillation counter and quenching corrections	µmol-C l-1 d-1
	Primary Production (32Si uptake)	(method to be specified)	µmol-Si l-1 d-1
	Gross Production	Triple oxygen isotopes (16-17-18) or 18O-H2O	(unit to be specified)
	Dark Respiration	Light and dark O2 bottle incubations	(unit to be specified)
	Net Community Production	Light and dark O2 bottle incubations	(unit to be specified)
	Excretory Organic Carbon Production	14C-based method	µmol-C l-1 d-1
	Integrated (or areal) Primary Production	14C with scintillation counter and quenching corrections	mmol-C m-2 d-1
Bacteria	Bacteria Plankton Abundance	acridine orange or DAPI staining technique +	cells l-1

		epifluorescence microscopy	
	Bacteria Production	methyl-tritiated thymidine, or tritiated leucine	pmol l-1 h-1
Microzooplankton	biomass	inverted or fluorescence microscopy	µmol-C l-1
methodology should include specifications on size range and sampling depth	grazing rate of org. carbon phytoplankton (herbivory)	dilution technique [+POC measurement]	µmol-C l-1 d-1
	sampling depth layer range		m
Mesozooplankton	biomass	dry weight, ash-free dry weight, carbon	mg m-3
methodology should include specifications on size range and sampling depth	displacement volume		ml m-3
	wet mass		mg m-3
	sampling depth layer range		m
	Respiration rate	oxygen concentration variation	µmol-O mg-C d-1
	Nitrogen excretion rate	ammonium or total nitrogen concentration variation	µmol-N mg-C d-1
	Phosphorus excretion rate	phosphate or total phosphorus concentration variation	µmol-P mg-C d-1
	Ingestion rate	particle concentration variation	µmol-C mg-C d-1
	Rate of phytoplankton ingestion	gut fluorescence	ng-Chl mg-C d-1
CO2 system	seawater pCO2/fCO2		µatm
continuous measurements	intake or in situ temperature		°C
	intake or in situ salinity		(practical salinity scale 1978)
	pressure in equilibrator		kPa
	temperature in equilibrator		°C
	air pCO2/fCO2		µatm
	pH	seawater scale, NBS scale, TRIS scale	(no unit)
	pH measurement temperature		°C
	Total alkalinity (TAlk)	acidimetric titration	µmol l-1 or µmol kg-1
	Total dissolved inorganic carbon (DIC)	coulometry	µmol l-1 or µmol kg-1
Iron	dissolved Fe concentration	See SCOR WG 109	nmol l-1
	specific Fe uptake		pmol (µg-Chl a)-1 h-1