

CARBON UNDERWAY MEASUREMENTS: GLOBAL

International Ocean Carbon Coordination Project (www.ioccp.org)

Last updated: November 2007.

Track/Ship name	Dates of operation	Area	Brief description (ship track)	Frequency	PI	Nation
Southern Ocean						
Palmer	2000-	Pacific / Southern Ocean	Various	Random	T. Takahashi	USA
l'Astrolabe	2002-	Southern	Hobart – Terre Adelie (Antarctica.)	3/austral summer	B. Tilbrook (joint project with C; Goyet)	Australia/ France
Aurora Australis	2006-	Southern	Hobart -Mawson Base/ Hobart - Casey Base	4/year	B. Tilbrook	Australia
Polarstern	2007-	both polar oceans and Atlantic transects to/from Antarctic	autonomous pCO ₂ system (General Oceanics) should already have been completed and delivered. For installation and continuous operation at Polarstern.	Annual	M. Hoppema collaborative effort with Royal NIOZ	Germany/ Netherlands
JARE by Icebreaker Shirase	On going	Southern	Fremantle – Syowa Stn. (Lützw-Holm Bay, Antarctica) Syowa Stn. – Sydney	Annual Dec. *Feb-Mar	G. Hashida S. Nakaoka	Japan
Xuelong	Nov-Mar	Southern	Leaving from Shanghai, pass northern and southern Pacific, investigate in Prydz Bay and tracks between Zhongshan St (East Antarctica) and Changcheng St (Antarctic Peninsular).	Yearly except for modification year.	L. Chen,	China
RRS James Clark Ross	2006-2009	Southern	Variable but mainly Falklands-South Georgia-Signy-Rothera	Variable	N. Hardman-Mountford	UK
RV Umitaka Maru	Dec 2007- Feb 2008	Southern	Cape Town – Fremantle - Hobart (Off of Lützw-Holm Bay, 110°E, 140°E)		G. Hashida S. Nakaoka	Japan

RV Hakuho Maru	Feb 2008	Southern	Port Elizabeth – Fremantle (near Kerguelene, Off of Lützw-Holm Bay)		H. Y. Inoue	Japan
SA Agulhas lines	Dec 2007-	Atlantic / Southern	Cape Town – Neumayer (SANAE): Southwards: early Dec, return Feb with additional sampling between Neumayer and S.Sandwich Is. Cape Town – Marion Is.: southwards march, return April, including an extended southward leg to 55 S Cape Town – Gough Is.: Southwards in Sept, return October, additional leg to 55 S.	Dec, Feb, March, Apr, Sept, Oct (repeated annually)	P. Monteiro	South Africa
IRIZAR Project	2007-	Atlantic	Buenos Aires - Antarctica	2-4 times per year	C. Goyet (joint project with Argentina)	France
Drake Passage Time series/ LM Gould	2005-	Atlantic	Ponte Arenas - Palmer	20/year	T. Takahashi C. Sweeney	USA
Marion Dufresne / OISO	1998-	S Indian/ Southern Ocean	Reunion - Crozet - Kerguelen - Amsterdam Is	2/year	N. Metzl	France
RV Tangaora	2009 -	Pacific, Southern	SW Pacific, mainly New Zealand EEZ	Continuous	K. Currie	New Zealand
Pacific Ocean						
RV Ka'imimoana	1998-	Pacific	San Diego-Honolulu-Samoa	2/year	R. Feely	USA
Columbus Waikato/ Albert Rickmers	2005-	Pacific	Long Beach – New Zealand – Australia	6/year	R. Feely (joint project with Australia)	USA
Line P / John P Tully	1974 -	Pacific	Sidney BC – Station P	3/ year	C. S. Wong	Canada
Pyxis	2002-	Pacific	Nagoya – Portland – L.A. – Toyohashi	Monthly	Y. Nojiri	Japan
RV Tangaora	2009 -	Pacific, Southern	SW Pacific, mainly New Zealand EEZ	Continuous	K. Currie	New Zealand

M/S Transfuture 5	2005-	Western Pacific	Tokyo – Brisbane-Melbourne-Christchurch (NZ)	Monthly	Y. Nojiri	Japan
JMA's monitoring program by RV Ryofu Maru and RV Keifu Maru	On going	North and Eq Pacific	137°E, 34°N – 3°N 137°E, 34°N – 2°S*	Seasonal Jan-Feb*, April-May, June- July*, Oct-Nov	T. Midorikawa S. Minato	Japan
JMA's monitoring program by RV Ryofu Maru and RV Keifu Maru	On going	North Pacific	Tokyo – 50°N ,165°E – 28°N ,165°E	Annual June-July	T. Midorikawa S. Minato	Japan
JMA's monitoring program by RV Ryofu Maru and RV Keifu Maru	On going	North and Eq Pacific	165°E, 28°N – 5°S	Biannual Jan-Feb, June-July	T. Midorikawa S. Minato	Japan
JMA's monitoring program by RV Ryofu Maru and RV Keifu Maru	On going	Eq Pacific	142°E – 165°E, Equator	Biannual Jan-Feb, June-July	T. Midorikawa S. Minato	Japan
RV Ocean Researcher	2003-	North Pacific (South China Sea)	Underway pCO ₂ survey is conducted along the following cruise track in the northern South China Sea:from Kaoshiung (~120.3°E; 22.6°N) to the SEATS site (115.7°E; 18.3°N)	Seasonal	C.-M. Tseng	China (Taiwan)
RV Ocean Researcher	2001-	North Pacific (East China Sea)	Underway pCO ₂ survey is conducted in the area among ~123°E; 31.5°N, ~127°E; 30°N, ~120°E; 26°N, ~121.5°E; 25°N.	Annual	C.-M. Tseng	China (Taiwan)
RV Tamyang	2006-2009	East/Japan Sea	Annual Ulleung Basin Survey	1/year	T. Lee	Korea
Project with irregular tracks						
Southern Surveyor	2007-	SW Pacific / E Indian	Various research cruise East Indian Ocean/Coral Sea/Tasman Sea	8/yr	B. Tilbrook	Australia
Palmer	2000-	Pacific/ Southern Ocean	Various	Random	T. Takahashi	USA

David Starr Jordan	2006 -	N/Tropical Pacific	San Diego-San Diego	Random	R. Feely	USA
MacArthur II	2006-	NE Pacific	Seattle -San Diego	Random	R. Feely	USA
R/V Mirai	1998-	Pacific, Arctic	Depending on cruises	Irregular	A. Murata	Japan
Future plans						
JMA's monitoring program by RV Ryofu Maru and RV Keifu Maru	2010-	N Pacific	40°N, to the west of date line	Biannual	future planning	Japan
JMA's monitoring program by RV Ryofu Maru and RV Keifu Maru	2010-	N Pacific	24°N(P3) to the west of date line	Biannual	future planning	Japan
JMA's monitoring program by RV Ryofu Maru and RV Keifu Maru	2010-	N Pacific	9N° (P4), to the west of date line	Biannual	future planning	Japan
No longer current						
Skaugran VOS	1995-2005	Pacific	Vancouver, Tokyo. Surface measurements of DIC etc., some pCO ₂ surveys with Japan	~10/yr	C.S. Wong	Canada
Atlantic Ocean						
Ams-Bergen	2005-2009	North Sea	Amsterdam-Bergen; collaboration Norway-Netherlands in CarboOcean	weekly	A. M. Omar T. Johannessen	Norway
Finnpartner Finmaid	2003-	Baltic Sea	Leubeck-Helsinki	150/year	B. Schneider	Germany
Bjarni Saemundsson	2006 and 2007	Atlantic	Repeat hydrographic sections across the Iceland shelf and into open Atlantic	4/year	J. Olafsson	Iceland
Pride of Bilbao	2005-	Atlantic	Portsmouth (UK)-Spain	Twice per week except January	D. Hydes C. Barger	UK

A. Companion	2006-	Atlantic	Liverpool - Halifax	2 per 5 weeks	A. Körtzinger D. Wallace	Germany
Skogafoss	2005-	Atlantic	Charleston-Reykjavik	12/year	R. Wanninkhof Joint project France/Iceland	USA/France
Explorer of the Seas	2004-	Atlantic	Caribbean (winter) Bermuda-Newark-Caribbean (summer)	Weekly	R. Wanninkhof	USA
Santa Lucia /Santa Maria	2003-2009	Atlantic	Portsmouth (UK) - Windward Islands	35 day round trips	U. Schuster	UK
Thalassa (OVIDE)	2002-2010	Atlantic	Iberian Peninsula - Greenland	2 years	A. Rios	Spain
Oleander	2006-	NW Atlantic	Newark-Bermuda	2/week	N. Bates	USA
MN Colibri (AX20)	2006-	Atlantic	France - French Guiana	~6/ year	N. Lefèvre	France
Monte Olivia (AX11)	2007-	Atlantic	France-Brazil	~6/ year	N. Lefèvre	France
R/V Poseidon/ Merian	2007 and 2008	Mauritanian upwelling	Las Palmas-Las Palmas	1/year	A. Körtzinger	Germany
Las Palmas	2005-	Atlantic	Cartagena - Rio - Ushuaia	2/year	A. Rios	Spain
Quima VOS line	2005	Atlantic	UK - Cape Town	Monthly	M. Gonzalez	Spain
IRIZAR Project	2007-	Atlantic	Buenos Aires - Antarctica	2-4 times per year	C. Goyet (joint project with Argentina)	France
Drake Passage Time series/ LM Gould	2005-	Atlantic	Ponte Arenas - Palmer	20/year	T. Takahashi C. Sweeney	USA
Shelf/coastal lines						
Plymouth Quest	2005-2009	Atlantic (shelf)	Weekly (L4) & monthly (E1) transects in Western English Channel, other variable routes	Weekly/Monthly & other variable	N. Hardman-Mountford	UK
Prince Madog	2006-2009	Atlantic (shelf)	Regular transects between Hollyhead and Dublin, regular Liverpool Bay, other variable routes in Irish Sea	Approx. monthly & other variable	N. Hardman-Mountford	UK

ICCABA	2007	Atlantic Mediterranean	Canary Islands - Italy		M. Gonzalez	Spain
Mytilus	2006-2007	Atlantic	Coastal Zone - Gulf of Cádiz	4/year	J. Forja	Spain
RV Belgica	2001-2010	Atlantic	Continuous pCO ₂ measurements on all the cruises of the RV Belgica in the Southern Bight of the North Sea	Weekly to monthly	A. Borges	Belgium
Irregular						
RV Ron Brown	1997-	Atlantic/ E Pacific	Random	Random	R. Wanninkhof	USA
R/V Atlantic Explorer	2006-	NW Atlantic	Bermuda	Random	N. Bates	USA
CARIOCA buoys	2005-2009	Atlantic	Southern Ocean	Continuous	J. Boutin L. Merlivat	France
No longer running						
RMS St Helena	1993-95	Atlantic	UK- Cape Town	Every two months	N. Lefèvre	UK
Prince of Seas	Jun 1994- Jun 1995	Atlantic	UK - Jamaica	Once per month	A. Watson	UK
Atlantic Meridional Transect	1995, 1996 (2 x), 1998	Atlantic	UK - Falkland Islands (pCO ₂ for AMT-1, -2, -3, -7)	4 crossings	N. Lefèvre	UK
Atlantic Meridional Transect	2003-2004	Atlantic	UK - Falkland Islands (some, discrete TCO ₂ , T _{Aik} for AMT-12, -13, -14)	3 crossings	Andrew Hind	UK
Atlantic Meridional Transect	2004-2005	Atlantic	UK - South Africa (pCO ₂ for AMT-15 (part), -16, -17; AMT-15 also some discrete TCO ₂ , T _{Aik})	3 crossings	D.C.E. Bakker A. Hind	UK
Indian Ocean						
Marion Dufresne / OISO	1998-	S Indian/ Southern Ocean	Reunion - Crozet - Kerguelen - Amsterdam Is	2/year	N. Metzl	France

Arctic Ocean						
Amundsen	2004-	Arctic	ArcticNet Domain (Arctic coastal waters)	1/year	T. Papakyriakou	Canada
St Laurent / Laurier	2005-	Atlantic & Pacific	Newfoundland-Canada basin	?	C. S. Wong	Canada
Nuka Arctica	2005-2009	N Atlantic -Arctic	Aalborg Denmark - Nuuk, West Greenland	Monthly	A. Olsen T. Johannessen	Norway
Global						
Pacific Celebes	May 2007-	global	Singapore-TAO array-Panama Canal- Houston- Halifax-Suez-Jeddah-Mumbai-Singapore	Twice per year	D. Hydes	UK
Xue Long (Snow Dragon)	2007-	Arctic/ Antarctic (Pacific)	Shanghai- PR China- Antarctic and Arctic oceans	Annual	R. Wanninkhof W.-J. Cai L. Chen (3rd inst PRC) Joint project w PRC	USA
Polarstern	2007-	both polar oceans and Atlantic transects to/from Antarctic	autonomous pCO ₂ system (General Oceanics) should already have been completed and delivered. For installation and continuous operation at Polarstern.	Annual	M. Hoppema collaborative effort with Royal NIOZ	Germany/ Netherlands
Irregular						
Turmoil	2007	Global		Random	T. Takahashi	USA
RRS Discovery	2005 2006-2009	Global	One AMT route in 2005. Variable (pCO ₂ collected on all research cruises)	Variable	Nick Hardman-Mountford	UK
RRS James Cook	2007-2009	Global	Variable (pCO ₂ to be collected on all research cruises)	Variable	N. Hardman-Mountford	UK
R/V Langseth	2007	Global		Random	T. Takahashi	USA