

Description of LEG1

FICHE SYNTHETIQUE	NOM DE LA CAMPAGNE : BONUS-GOODHOPE
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Date de rédaction du dossier : 12 JANVIER 2006

Année demandée : 2007- 2008	Chefs de projet			Chef de mission
Durée des travaux (hors transits port-zone de travail) : 34 days (LEG1)				LEG1
Période (<i>si impératif</i>) : beginning 2008 (<i>eg</i> , Austral summer & synoptic cruises during IPY)	Nom Prénom :	Marie BOYE	Sabrina SPEICH	Sabrina SPEICH
Zone : the Southern Ocean south of South Africa (from Cape Town till the 0°E Meridian 57°S-LEG1)	Organisme :	CNRS	UBO	UBO
Pays dont les eaux territoriales sont concernées: South Africa	Laboratoire :	LEMAR UMR6539 CNRS/UBO	LPO UMR 6523 CNRS/IFREMER/ UBO	LPO UMR 6523 CNRS/IFREMER/ UBO
Pays dont la zone économique est concernée : South Africa	Adresse :	Technopôle Brest-Iroise Place N. Copernic 29280 Plouzané	UFR Sciences 6 av Le Gorgeu CS 93837 29238 Brest Cedex 3	id
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Travaux : Hydrological samplings (CTD/Niskin and Go-Flo casts, in situ pumping), XBT, atmospheric observations, superficial sediments coring, profiling floats, buoys & moorings deployments, ADCP, underway observations.

Navire : *Marion-Dufresne II* (LEG1)

Engin(s) sous-marin(s) : No

Gros équipements : Rosette, Winches, Seasor, Multiple corer, profiling floats, buoys & moorings (physics), ADCP, XBT, Aerosols collector, PVM5, Containers.

Traitement des données et besoins informatiques : Multi-beam and 3.5 kHz ecosounder data acquisition ; 2 UNIX station with Matlab for data analyses ; 1 workstation for email ; Connection to the ship network (for laptops). Data will be analysed and calibrated by the different teams, and will be shared among all the participants. They will be collected in Brest, at LPO and LEMAR. Once validated, they will be sent to the PROOF data centre in Villefranche and to SISMER (Ifremer, Brest), and they will be entirely open at the most two years after the cruises.

Nécessité d'une campagne pour récupération d'engins ? No

Equipes scientifiques et techniques embarquées

En France : LPO (Brest), LEMAR (Brest), LEGOS (Toulouse), CEREGE (Aix-en-Provence), LOV (Villefranche-sur-Mer), LSCE (Gif-sur-Yvette), IPGP-Univ.P7 (Paris), LOBB (Banyuls-sur-Mer), LMGM (Marseille)

A l'étranger : Univ. of Liverpool (UK), Univ. of Cape Town (SA), Rhodes Univ. (SA), Univ. Autonoma de Barcelona (Spain), AWI (GR), Univ. Federal Fluminense (Brazil), RSMAS (USA), Lamont-Doherty/Columbia Univ. (USA)

Equipes scientifiques et techniques à terre

En France : the same as here above + IRD (Brest) + LOCEAN (Paris)

A l'étranger: the same as here above + Univ. of East Anglia (UK), CSIR (SA)

Type de campagne : Recherche scientifique →

Thème de la campagne: Physics and bio-geochemistry of the Southern Ocean south of South Africa during the International Polar Year to acquire key data sets on dynamics and processes, and for better understanding of the role of the Southern Ocean in the global climate. Strong links with the International CLIVAR Southern Ocean GOODHOPE project, IPY-GEOTRACES and IPY-CASO, CLIVAR/CliC/SCAR-Southern Ocean, IMBER, and GOOS & GODAE. Strong collaboration with the IPY-“ZERO&DRAKE” project (Eol#880), for a synoptic study of the atlantic Southern Ocean during IPY.

Cette proposition s'inscrit dans un projet : OUI → Si oui quel est le nom du projet : BONUS-GOODHOPE

Cette proposition a été soumise au(x) programmes nationaux ou internationaux avec comité scientifique: OUI → (sous forme d'une lettre d'intention), **Si oui lesquels :** The PROOF committee positively evaluated the letter of intent submitted last fall 2005 for the BONUS-GOODHOPE project.

S'agit-il d'une première demande : OUI → (mais une lettre d'intention avait été envoyée l'an dernier pour l'appel d'offre 2006-2007 ; il n'y pas eu d'évaluation de cette lettre d'intention)

Sampling strategy and stations description

The LEG-1 will be with a departure from and an arrival to Cape Town.

According to differences in the sampling, its time consumption and the analytical resolution/performance for the several parameters, **three types of stations** are planned (Figure 1): HYDROGRAPHIC stations (54 in total, 4h each), LARGE stations (20 in total, 9h each) and SUPER station (6 in total, 28 h each).

- **HYDROGRAPHIC station**: one CTD/Niskin rosette-cast (0 m-bottom, 24 depths, 4 hours), deployment of XBTs between CTD casts with increasing resolution across frontal regions, and deployment of about 20 profiling floats at 20 CTD casts position. This will constitute a physical background to evaluate water mass characteristics and transport that is being calibrated via hydrology, LADCP, and profiling float data and extrapolated in time and space via the altimetry and satellite surface temperature observations (TRIMM) (eg Legeais et al. 2005). Parameters: full depth hydrology (T, S, pressure, O₂) and other parameters (fluorescence, chl-a, nutrients, DIC, TA, dissolved Ba) associated to LADCP observations. The casts will be at relatively high resolution (every **20 nautical miles**, eg WOCE resolution). This makes a total of 80 stations. Additionally two deep Current Meter Pressure Inverted Sounders will also be deployed across the Polar Frontal Zone to monitor the variability of the hydrology (heat and salt content) and water mass transport. A total of 80-20 (large)-6 (super) = **54 hydrographic stations of 4 hours** each is planned, corresponding to **9 days**.

- **LARGE station**: one CTD/ Niskin rosette cast (0 m-bottom, 24 depths, 4 h) and one Go-Flo cast (0-2000 m, 12 depths, 4 h), PVM5 deployment (0-max. 3000 m, 1 h) Parameters: CTD parameters, biological parameters (chl-a, pigments, primary production, plankton taxonomy), macro- and micro-nutrients, tracers and isotopes, particles levels, DIC, TA, pH, DOC/POC/PIC. Large stations will be achieved every **80 miles** so a total of 26 – 6 (super) = **20 large stations of 9 hours** each, ie **7.5 days**.

- **SUPER station**: one cast for in-situ pumps (0 m-bottom, 8-12 depths, pumping time = 3 h, cast time = 3 h, total of 6 h) + two CTD/Rosette casts (0 m-bottom, 24 depths, 8 h) + one cast with the multiple corer + two Go-Flo casts (0-2000 m and 2000 m-bottom, 12 depths each, 4 h + 8 h = total 12 h), PVM5 deployment (0-max. 3000 m, 1 h), large volume sampling for process studies (~40 L sampled at one sampling-depth at the chl-a maximum using Go-Flo bottles, 1 h), Parameters: CTD parameters, biological parameters (chl-a, pigments, taxonomy of phytoplankton, primary production), macro- and micro-nutrients, particles levels, tracers and isotopes, sediments & core parameters, DIC, TA, pH, POC/DOC/PIC, process studies (Fe bioavailability, zooplankton feeding, Si regeneration, N uptake). Every ~ **240-320 miles**, total of **6 super stations of 28 hours** each, ie **7 days**.

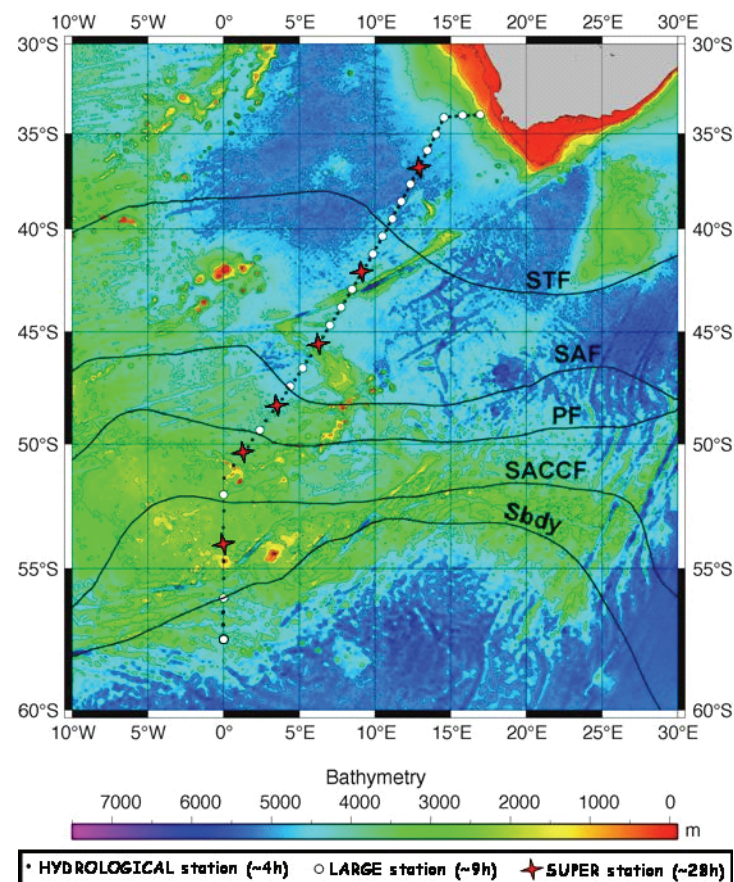


Figure 1- Sampling map of LEG-1

Underway measurements

To refine the characterisation of the fronts, a Seasor will be deployed on the transect-back while approaching the frontal positions. This will be achieved with a 4 knot ship-speed on about ¼ of the section, thus given a rise to additional 3.5 days. Along the section, underway pCO₂ (sampled using ship-underway water supply) and trace metal concentrations (sampled on the way-back using a trace-metals free towed “fish”, that is deployed next to the ship at 2-3 below the surface, its deployment depends on the weather conditions), salinity, temperature are also recorded in surface waters, as well as meteorological conditions (including wind speed, air temperature, air-masses trajectories,...). Aerosol collection is done continuously for between 1 (at the northern end of the transect) and 3 (in areas remote from land) days. Rain collection funnels will be deployed only during rain events. Remote sensing will provide near-real time satellite data support.

Ship-time for LEG-1

Type of stations	Number of station	Time per station (hours)	Time (days)
HYDROGRAPHIC	54	4	9
LARGE	20	9	7.5
SUPER	6	28	7
Total station time			23.5
Seasor survey			3,5
Total transit time ¹			14
Total shiptime for LEG-1			41

¹ Including inter-stations transit and transit on the way-back from the Polar Frontal Region to Cape Town, calculated using 10 knots ship-speed.