

Minutes of the Southern Ocean Synthesis Group (SO-SG) meeting Brest, France, 8 and 10-12 July 2000

As prepared by U. Bathmann (20 July 2000)

Agenda

- Report on the recent JGOFS-group meetings
- Issues for the Brest symposium
- Future role of SO-SG; TOR
- Data
- Modelling
- Synthesis
- Communication to other SO-programmes, homepage
- National activities
- Spin-off / follow-up programmes in the SO

The meeting of the SO-SG started on Saturday 8 July at the EUM with the local host P. Tréguer. As the time was expected to be too short to cover all items on the agenda, it was decided to meet during the symposium at various locations and times (Monday and Wednesday lunch-time, Tuesday during poster session). This strategy allowed for more discussion but made the symposium extremely busy for the members of the SO-SG, and therefore this strategy is not recommended for future meetings. At the final meeting date of the SO-SG during the symposium on Wednesday, Bathmann in the name of the entire SO-SG deeply thanked P. Tréguer and the local organisers for their effort in hosting the SO-SG meeting and the Symposium in Brest. This initiative is a major step towards synthesis of SO-JGOFS.

Attendants of the SO-SG meeting: B. Anderson, U. Bathmann (chair), B. Griffith (DMTT guest), J. Hall, P. Monfray (partially), R. Pollard, P. Pondaven (new member, modelling), W. Smith and T. Trull (partially), P. Tréguer (co-chair, host).

Report on the recent JGOFS – group meetings

Bathmann gave an update on the April JGOFS SSC meeting in Bergen and on the Bergen symposium. Special tasks for the SO-SG derived from that meeting were reflected (time-series station in the SO, contribution of the SO-SG to the scientific approach for JGOFS synthesis, time-line for the remainder of JGOFS, and the topics listed separately on the agenda).

Tréguer gave update on the PJTT meeting in Hamburg 13/14 June 2000. The SO-SG acknowledged the co-membership in both groups for Tréguer as this member of the SO-SG overseas the paleo related research in the SO. Suggestions for names of scientists working in the SO which may contribute to tasks of the PJTT are to be send to the chair of PJTT, Karin Lochte.

Issues for the Brest symposium

The Southern Ocean JGOFS symposium on, The Southern Ocean: Climate Change and the Cycle of Carbon, comprises on a series of six special sessions, each of which addresses one of the original SO-JGOFS questions. Invited speakers contribute to each of the sessions. In addition, three round table discussions were held on Tool and Instrumentation, Modelling and Process Studies, The Deviations from the Redfield-ratio and the implications for the

Biological Pump. Each chair of these groups was expected to present a summary at the Synthesis sessions on the last day afternoon. The proceedings derived from the symposium may contain papers originated from talks and posters and will be submitted as special issue of DSR II. The SO-SG serves as editorial board for the 40 ms; expected deadline for submission is 30 Sept. 2000; the issue is expected to be published in late 2001.

Future role of SO-SG; TOR

The SO-SG discussed its future role in JGOFS synthesis and the result of this discussion had impact on the modification on the new Terms of References, as listed below:

Terms of Reference for the Southern Ocean Synthesis Group as of July 2000

1) The chair of the group will be appointed by the JGOFS SSC. The chair will assemble a group of up to ten people with experience of the observational data sets and modelling activities relevant to the region. The group membership should reflect, but not be limited to, the countries that have participated in the JGOFS project in the region, and be approved by the executive committee.

2) The main tasks of the group are:

- Organise workshops (e.g. a workshop associated to the AGU/ASLO conference in 2002) and symposia (e.g. the 2000 Science Conference of Biogeochemistry of the Southern Ocean) to advance the synthesis of JGOFS.
- Facilitate the integration of results of the Southern Ocean synthesis into a global view of the ocean carbon cycle by working with other JGOFS synthesis groups; modelling efforts and IGBP programs (GLOBEC, PAGES, GAIM) and with other groups working in the SO.
- Co-ordinate data collection and synthesis activities among the Southern Ocean groups working on JGOFS-related research, including those not specifically funded by JGOFS.
- Liaise with the DMTT to encourage the submission of data to the regional/international data centres with the provision of easy access to these data via the Internet and CD-ROMs.
- Identify gaps in our understanding of carbon cycling in the Southern Ocean and provide this information to the science community through reports and presentations.
- Identify feedback mechanisms that may alter future carbon cycling in the region.
- Prepare one or more reports for the SSC that summarise the activities of the group. Report on the progress of the JGOFS science synthesis being carried out within the region.

3) Additional terms of reference can be added with JGOFS SSC approval.

Data

The data from the SO-JGOFS field studies are expected to be available eventually through the DMTT. The natural route would be from the PI to the national data centre or project centre and further to the IPO in Bergen. The IPO Bergen in co-operation with the DMTT provides Meta-data, the original data may be stored and archived on a national or project level or at any other location (e.g. BODC). The SO-SG encourages all PIs, all project co-ordinators and the national data centres to provide the necessary information to build-up a coherent data inventory and allow access to all JGOFS and JGOFS-relevant data.

Incomplete list follows:

SO-JGOFS data are nationally available in:

Australia –
Belgium –
France – Villefranche data centre
Germany – Data centre at IFM-Kiel, PANGAEA at AWI
United Kingdom – BODC
Japan –
Netherlands –
New Zealand –
South Africa –
United States – National Data Center Washington

Modelling

The modelling effort within SO-JGOFS was discussed only briefly due to the time limitation for the SO-SG meeting. The international symposia at Bergen and at Brest demonstrated clearly the efforts being undertaken and the progress achieved in modelling during the last years. It was highlighted that modelling fits best to SO-JGOFS synthesis by implementation within the different themes/topics, rather than as an individual exercise. It was therefore proposed to include modellers in the list of responsible scientists for stimulating synthesis for SO-JGOFS topics (see next item on agenda).

Synthesis

The synthesis of SO-JGOFS has effectively started in preparation for the Brest Symposium 2000. SO-SG envisages an ongoing process as outcome of this symposium. The original SO-JGOFS questions were addressed to work along answers to these questions. It is also suggested to contribute to the JGOFS synthesis specially with emphasis on the role of key organisms in biogeochemical fluxes within a given ecosystem, the functioning of the Biological Pump in various scenarios, the modes of organic matter transformation, the physical-chemical and biological interactions in the ecosystems, and the identification of “hot topics”. To fulfill these requirements, the need was mentioned various times during the symposium to compare data and hypothesis across the SO regional scale or across single project objectives relevant for SO-JGOFS field campaigns. It was also suggested to the participants of the Symposium to undertake synthesis efforts across international JGOFS activities and to contribute to JGOFS overall synthesis.

The milestones to achieve these objectives were identified by the SO-SG: The Brest 2000 symposium, a workshop associated to the AGU/ASLO 2002 conference and the JGOFS final scientific symposium (probably in 2003 or 2004 in the US).

Key scientists were identified among the SO community to stimulate all around SO-JGOFS synthesis. The tasks for these key scientists are to ensure the ongoing synthesis of a specific scientific topic by pulling in, expertise and experts from the different studies in all sectors of the SO. In addition, the groups are encouraged to draw cross-links to synthesis efforts within international JGOFS. The topics are:

- Sediment biogeochemistry, geological record (A. Kemp, A. Shemesh)
- Deep-ocean vertical flux (T. Trull)
- Si-cycle (P. Tréguer)
- Export production (M. Rutger van der Loeff, K. Buesseler, R. Schlitzer)
- Impact of food web structure dynamics on export production (R. Barber, U. Bathmann, P. Pondaven)
- Production regimes (W. Smith, C. Lancelot)

- CO₂ dynamics (N. Metzl, C. LeQuéré)
- Role of iron (P. Boyd, O. Aumont)
- Physical processes, fronts, regions (R. Pollard)
- Evidence on the role of the SO in biogeochemical processes in the past (B. Anderson, C. Heinze)
- Future role of the SO in biogeochemical cycling (P. Monfray, R. Matear)

Communication to other SO-programmes, homepage

SO-SG establishes contact to other scientific programmes active in the SO by approaching contact persons to exchange expertise, data and scientific concepts for synthesis purposes.

Programme	contact person	SO-SG contact
ARGO	N. Smith	J. Hall
EASIZ (SCAR)	A. Clarke	U. Bathmann
GODAE	?	J. Hall
LTER	D. Karl	U. Bathmann
ROVER	R. Dunbar	R. Anderson
SINOPS	L. Meyer-Reimer	P. Tréguer
SO-GLOBEC	E. Hoffmann	U. Bathmann
WOCE	J. Gould	R. Pollard

In addition, the SO-SG envisions contributions to special sessions probably organised by these programmes for the 2002 AGU/ASLO scientific conference and will initiate scientific contributions from these programmes to the sessions originating from SO-JGOFS studies.

The JGOFS home page was revisited and suggestions for alterations were provided. These suggestions will be sent to the IPO in Bergen attached as appendix to this report.

National activities and Spin-off / follow-up programmes in the SO

During a plenary discussion during the SO Brest 2000 symposium, various new national activities and potential new programmes in the SO were presented discussed. For some of the initiatives, more information is available at the JGOFS -IOP in Bergen (Roger, I will send you the drawings and schemes per surface mail).

- Australia

The Australian activities in the SO are composed of various programmes proposed until 2008. CLIVAR will repeat the SR3 line in 01, 06 and 08. For the next 6 years, the SURVOSTRAL XBT sections will be repeated. The SAZ programme is planned from 1998 to 2003. A Time-Series-Station is proposed in co-operation with international partners. A POLYNIA project is planned for 2003. In Nov. 2001, an iron input & response experiment will be performed. Amery ice shelf – ocean response will be performed 2000-2003. MARGINEX programme is proposed for 04/05. A programme near Heard Island is planned for 00/01 and 04/05. Proposals from international scientists are expected for all these programmes. A map showing the geographical areas where these programmes are planned is available at the IPO.

- EISENEX, CARUSO

In November 2000, a joint German-Netherlands-Great Britain programme will investigate the effect of iron enrichment on the production of dominant phytoplankton species and the

response within the pelagic food web. Emphasis will be given to the heterotrophic components of the pelagic systems.

- *France*

Some French scientific ocean programmes proposed for the next years can have components in the SO; none is exclusively designed for the SO however:

PROOF – Ocean processes and fluxes

OISO – Southern Ocean Indian Ocean study

POMME – Physical and biogeochemical processes in the ocean

OPALEO/SINOPS – A European research programme is currently carried out to study the global Si-fluxes and the use of proxies in ocean sciences.

- *Germany*

German SO-JGOFS will contribute to the international German JGOFS Symposium held in Bremen in September 2000. Future fieldwork will be performed during EISENEX Polarstern cruise in Nov. 2000. A Polarstern cruise in April 2001 will contribute to SO-GLOBEC. In late 2002, a oceanographic-biological-geological programme is proposed for the eastern region of the Weddell Gyre; a BIOPSIS ice drift station is proposed for 2003/04.

See also SOLAS, SO-GLOBEC

- *Great Britain*

Input from R. Pollard

See also EISENEX/CARUSO

- *Italy*

A summary report was presented to the scientific community from Italian project working in the SO including those related to or focus on SO-JGOFS. A programme to investigate flux of matter in the ice-covered areas of the Ross Sea is proposed for the next 3 years. This programme will investigate the pelago-benthic coupling for the flux of N, C and Si. Within the programme, three moorings will link pelagic production to benthic responses.

- *Japan*

Japan proposes a programme for Antarctic Ocean in Earth Science (AOES Project). The programme is composed of four parts: I) Roles of Antarctic sea-ice variation and bottom water formation in global climate system; II) Biological oceanographic processes, in aspect of climate control feedback loop; III) Role of sea-ice in material fluxes between the euphotic zone and the meso- and bathypelagic zone; IV) evolution of Antarctic Ocean basins and dynamics if continental break-up. The target areas are located south of Australia and in the Indian Ocean south of 60°S. 14 cruises are planned for the next 4 years until 2004, although always between November and March. Close co-operation with international partners (specially France, Australia, Russia, China) is suggested. An international workshop was proposed for late 2000 or early 2001.

- *New Zealand*

Input from J. Hall

- *SO-GLOBEC*

SO-GLOBEC is currently preparing its field phases, which start in April 2001. A detailed time line is available at the SO-GLOBEC home page. Briefly, in 2001 German and US research cruises will operate west off the Antarctic Peninsula, in 2002 more cruises are

planned. The AGU/ASLO 2002 conference is expected to be the venue to present the first scientific outcome of SO-GLOBEC.

- *SOLAS*

The SOLAS science programme was presented shortly; more details are available at the SOLAS web site, where the draft science plan is now available. The programme contains four parts: 1) The monitoring of CO₂ uptake by the ocean; 2) Time-series stations and new technologies; 3) Biogeochemical process studies (ecosystem perturbation studies); 4) Physical/chemical process studies related to climate change. The programme was discussed briefly and interest of participation was expressed. A list was prepared of tentatively interested scientists for a special Southern Ocean SOLAS component. This list of names is provided to the IPO and to P. Liss and D. Wallace (SOLAS steering committee).

- *US*

The AESOPS programme was very successful, one special issue in DSR II is published already, the second is under review and a third is in discussion.

In the US, the planning effort for future projects may be summarised by listing several programmes, which are under discussion at moment. Planning for the CCSP (see below) is more advanced, other programmes (OCTET, EDOC, SOLAS, SOFeX see below) are at early stage planning. LTER and SO-GLOBEC are ongoing programmes.

CCSP – Carbon Cycle Science Program
Integrates Ocean-Atmosphere-Terrestrial
Carbon Cycle Research, including:
 Natural Carbon Cycle
 Fate of Anthropogenic CO₂
 Predicting Future Responses

Programs at Early stages of Planning

- OCTET Ocean Carbon Transport, Exchanges, and Transformations
- EDOCC Ecological Determinants of the Ocean Carbon Cycle
- SOLAS Surface Ocean-Lower Atmosphere Studies
- LTER Long Term Ecological Research Antarctic Peninsula
- SOFeX Individual Research Programs

Recommendations

SO-PG recommends a continuation of the KERFIX time-series station. The SO is a large area permanently under-sampled due to its remote location with a large but mostly unknown interannual variability partially due to the Southern Ocean Oscillation. The Global Biochemical Models available to date disagree in the features associated to the SO. It is expected that climate change has a (the?) great(est) effect in the SO. KERFIX has been a real time series station in the last years and it is recommended to establish an international programme for its continuation.

SO-PG recommends a rotation of the co-chairs of the group with P. Tréguer becoming the new chair of SO-SG and U. Bathmann becoming the new vice-chair.

SO-PG recommends a synthesis workshop associated to the AGU/ASLO 2002 conference. Main aim of this workshop is a cross SO synthesis in scientific topics as outlined under SYNTHESIS in the minutes of the SO-SG meeting in Brest in July 2000. This workshop is

expected to originate SO-synthesis papers, which in turn fuel the overall JGFOS synthesis activities.

Appendix 1

Potential contributors to SO-SOLAS (alphabetic order)

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Appendix 2

Up-date on SO-JGOFS web pages as part of JGOFS home pages at Bergen:

Cruise inventory:

United States R/V Nathaniel B. Palmer (change to) 7

Total for US (change to) 11

ads.smr.uib.no/jgofs/publications/Books/index.html

Contributions to JGOFS Research

Southern Ocean

Following major publications are missing:

- DSR II from the STERNA (BOFS) expedition
- J. Mar. Systems (from Brest Symposium 1
- Marine Chemistry (from Brest Symposium 2)

ads.smr.uib.no/jgofs/inventory/Southern/Metadata/index.html

Beatrice Baliño is kindly asked to approach the DMTT to update the text of this homepage. This page seems to be outdated quite a bit. For France, Germany, US, and others the national data centres are known to the DMTT and the information should be presented here or cross-links may be established. Brian Griffith can provide more information to the DMTT in this respect.

ads.smr.uib.no/jgofs/Science/Regional/SO.html

The AIMS listed at this page are still valid. The SO-SG suggests some modifications however and for convenience, the full new text is provided here.

The new AIMS read as follows:

There are six objectives for the Southern Ocean investigation as a whole. The interpretation and emphasis of these objectives differ in the different regions of the Southern Ocean selected for study. The objectives are to answer the following questions:

- 1) What role does the Southern Ocean play in the present day global carbon flux? What is the spatial and temporal pattern of the major processes that determine the net flux in the whole Southern Ocean, and within selected subregions?
- 2) What controls the magnitude and variability of primary production and particle fate?
- 3) What are the major features of spatial and temporal variability in the physical and chemical environment, and in key biotic systems?
- 4) What is the effect of sea ice on carbon fluxes in the Southern Ocean?
- 5) How has the role of the Southern Ocean changed in the past?
- 6) How might the role of the Southern Ocean change in the future?

Time frame: 1991 to 2004

Major participating countries

Australia, France, Germany, Italy, Japan, Netherlands, New Zealand, South Africa, UK and USA

ads.smr.uib.no/jgofs/Science/Regional/SO.html

The scientific summary as provided by Priddle in July 96 is outdated. It shall be replaced by the summary of highlights derived from the Brest 2000 symposium. P. Tréguer will give a detailed scientific report on the symposium and this text or its summary may be presented here on this page.

It is recommended to publish the glossy JGOFS brochure also on the web.