JGOFS Data Management: What has been done? What has been learnt?

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Scientific Goals of the JGOFS Project

• To determine and understand, globally, the oceanic processes controlling the time-varying fluxes of carbon and associated biogenic elements and to evaluate the exchanges with the atmosphere, seafloor, continental boundaries.
• To predict globally the response of oceanic biogeochemical processes to anthropogenic perturbations, in particular those related to climate change.
Research Plan of the JGOFS Project (Strategies)

### Intensive Studies
- Long-term Time-Series Stations and Regional Process Studies Areas

### Extensive Studies
- Example: WOCE-JGOFS
- CO₂ Global Survey

- global carbon survey
- regional process studies
- long-term time-series
- data management
- synthesis & modelling

⇒ assimilate a comprehensive database built from field studies
⇒ diagnostic and prognostic models

Examples of Scientific Results (and Underlying Datasets)

⇒ Unprecedented, high spatial and temporal resolutions of ocean data

- Global composite image of surface Chlorophyll a concentration (mg m⁻³) estimated from SeaWiFS data (NASA / GFSC + ORBIMAGE)

- Global map of the average annual exchange CO₂ flux (mol-C m⁻² a⁻¹) across the sea surface. Takahashi T. et al., 1999

- Annual primary production (mol-C m⁻² a⁻¹) based on SeaWiFS data and model. P. Falkowski et al., IMCS, Rutgers University, USA.

- Global map of seafloor respiration based on benthic O₂ fluxes (mol-O m⁻² a⁻¹). Jahnke R., 1996. GBC © AGU

DMTT set-up, interactions and goals

Data Management Task Team
- consortium of national Data Management Offices (with their own agenda)
- integrated data management plan
- integrated, international cruise and data inventories
- implement data exchanges
- liaison with international programmes (WOCE, IGBP, IOC) and appropriate national and international data centres (WDC, GCMD)
- common format and metadata, in a single location (WDC system)
- International JGOFS Master Dataset

Achievements: Nationally Approved Cruise Inventories

Examples from P.R. China-Beijing, Germany, United States

Over 1000 JGOFS cruises

US JGOFS Data Categories: Only the indicated category of data by the

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## Achievements: Approved List of JGOFS Core Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Method(s)</th>
<th>JGOFS Report(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolved Fe concentration</td>
<td>nmol l⁻¹</td>
<td>19, 20</td>
</tr>
<tr>
<td>Mesozooplankton</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microzooplankton</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO₂</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sediment Traps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass Flux</td>
<td>Sediment trap m⁻² d⁻¹</td>
<td></td>
</tr>
<tr>
<td>Bacteria Plankton Abundance</td>
<td></td>
<td></td>
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<tr>
<td>Primary Production</td>
<td></td>
<td></td>
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<tr>
<td>New Production</td>
<td></td>
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<tr>
<td>Phytoplankton Mass</td>
<td></td>
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</tr>
<tr>
<td>Particulate Organic Carbon CHN</td>
<td>µmol-C l⁻¹</td>
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<tr>
<td>pCO₂ in situ</td>
<td>µatm</td>
<td></td>
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<tr>
<td>Specific Fe uptake</td>
<td>wet mass, displacement volume</td>
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</tr>
<tr>
<td>Herbivory</td>
<td>m⁻² d⁻¹</td>
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</tr>
<tr>
<td>CO₂ system</td>
<td>Full CO₂ system descriptors</td>
<td></td>
</tr>
<tr>
<td>pH seawater scale</td>
<td>NBS scale, TRIS scale</td>
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</tr>
<tr>
<td>Dissolved Organic Carbon HTCO₂</td>
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<tr>
<td>Particulate Nitrogen CHN</td>
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<tr>
<td>Bacteria Production Tritiated Leucine</td>
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<tr>
<td>Bacteria Production Methyl-tritiated Thymidine</td>
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<tr>
<td>Dissolved Inorganic Nitrogen + Dissolved Inorganic Phosphorous</td>
<td></td>
<td></td>
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<tr>
<td>Dissolved Inorganic Nitrogen</td>
<td></td>
<td></td>
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<tr>
<td>Dissolved Inorganic Phosphorous</td>
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<tr>
<td>Nitrate + Nitrite Autoanalyzer, Spectrophotometer (manual)</td>
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<tr>
<td>Nitrite Autoanalyzer, Spectrophotometer (manual)</td>
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<tr>
<td>Nitrate Spectrophotometer (manual)</td>
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<tr>
<td>Silicate Autoanalyzer, Spectrophotometer (manual)</td>
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<tr>
<td>ortho-Phosphate Autoanalyzer, Spectrophotometer (manual)</td>
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<tr>
<td>Iron, Radionuclides, Nutrient micromethods, HPLC Pigments, Zooplankton basics, full CO₂ system descriptors</td>
<td></td>
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</tbody>
</table>
Achievements: CD-ROMs (2) + DMO Websites

- JGOFS-Live Access Server
  - data and metadata interface
  - data sub-selection (selections, projections)
  - multi-variable support
  - gridded vs. in-situ data differencing
  - multiple views (property-property, depth horizon, cruise tracks)
  - multiple products (ps, gif, text)

Achievements (example): J-LAS package (US-DMO)

- select dataset and variables

(Extracted from http://us.jgofs.whoi.edu/las/jglas.html)
Achievements (example): nationally compiled publications

Over 2000 JGOFS publications

JGOFS Reports, #18, 24, 30
New update scheduled for May 2003

Additional Tools (example): Ocean Data View package

Thanks to Reiner Schlitzer, AWI (rschlitzer@awi-bremerhaven.de)

(extracted from http://www.awi-bremerhaven.de/GEO/Flux/model.html)
Lessons learned from JGOFS:
Recommendations for proper Data Management (DM)

- Set up a coherent, suitable DM framework for the programme
  (DM objectives, activities, timeline in the implementation plan)
- Support (logistics and finances) an efficient, end-to-end DM plan
  (small part of the total programme budget and resources)
- Establish & support experienced, full-time national data managers
  • collaborate with scientists associated to the national contributions
  • ensure data and metadata are complete and in common file and coherent format
- Establish & support an International Programme Data Centre
  • responsible for timely data acquisition from national contributors
  • data dissemination, long-term preservation, full accessibility in WDC system
- Set a mandatory time limit for data submission
  at the national and international levels
- Establish a coherent set of data delivery and exchange standards
  for reporting / exchanging data and metadata
Recommendations for proper data management (2)

→ Facilitate exchange of knowledge and expertise among data managers and all agencies / bodies

→ Develop various pro-active, ”bottom-up” strategies:
  • promote data & metadata publications
  • encourage full use of data management tools
  • support ”capacity building” and knowledge transfer initiatives
  • encourage and support data rescue or archeology initiatives where required
  • encourage added-value data mining and cross-disciplinary research

→ Collaborate with national funding agencies
  • insure compliance with programme data policies
  • establish and enforce a fair, efficient ”top-down” strategy

→ Collaborate with ”parent bodies” and related bodies
  • benefit from other integration activities and DM standardization efforts
  • achieve a better synthesis and modelling phase
  • increase interactions between ”naturalist” and ”human” sciences

→ Need better integration, among many possible partners: CEOS, CODATA, DBCP, DNAs, DODS, FAO, GCMD, GCOS, GCP, GODAE, GODAR, GOOS, ICES, ICSTI, ICSU, IGAC, IGBP, IGPA, IGOS, IHDP, IMAGES, IOC, IOCCG, IODE, JCOMM, NODC, PAGES, PICES, POGO, SCAR, SCOR, SICAP, SOOP, START, TWAS, WCRP, WDC, ...

Thanks!

Please, feel free to contact us:
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Come to and participate in the
Final JGOFS Open Science Conference

www.uib.no/jgofs/osc2003.html
or usjgofs.whoi.edu/osc2003.html

www.igbp.kva.se/obe/
www.globalcarbonproject.org/