

# Station locations and descriptions from JPT\_2002-16, KY0202-02, and SERIES\_EIPuma in the NE Pacific, north of station P26 (Ocean Station Papa), and on line P in 2002 (SERIES project)

Website: <https://www.bco-dmo.org/dataset/3346>

Version: 29April2010

Version Date: 2010-04-29

## Project

» [Sub-Arctic Ecosystem Response to Iron Enrichment Study](#) (SERIES)

## Program

» [Iron Synthesis](#) (FeSynth)

Contributors	Affiliation	Role
<a href="#">Levasseur, Maurice</a>	Laval University	Principal Investigator
<a href="#">Robert, Marie</a>	Fisheries and Oceans Canada, Pacific Region (DFO MPO)	Principal Investigator
<a href="#">Tsuda, Atsushi</a>	Ocean Research Institute - University of Tokyo (ORI)	Principal Investigator
<a href="#">Boyd, Philip W.</a>	University of Otago	Co-Principal Investigator
<a href="#">Gegg, Stephen R.</a>	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

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## Dataset Description

Station Locations and Descriptions

## Methods & Sampling

Generated aboard the individual SERIES cruises

## Data Processing Description

### BCO-DMO Processing Notes

Generated from original spreadsheet C-SOLAS\_SERIES\_Stations.xls

### BCO-DMO Edits

- Station files for all three SERIES cruises standardized with common information/headers
- Cruise, Project, Station\_Log\_Name and Station\_Secondary\_Name added
- lon/lat converted from degs min.decimal min to decimal degrees
- lon signed negative for West
- date reformatted to YYYYMMDD
- time reformatted to HHMMSS
- parameter names modified to conform to BCO-DMO convention

## Parameters

Parameter	Description	Units
Cruise	SERIES Cruise Id	text
Project	Project Description	text
Station_Log_Name	Station Log Name	text
Station_Secondary_Name	Station Secondary Name	text
Event	Event Number/Id	text
Patch	Patch Status (In/Out/Pre)	text
Cast	Cast Number/Id	text
date	Date (UTC)	YYYYMMDD
time	Time (UTC)	HHMMSS
lon	Station longitude (West is negative)	decimal degrees
lat	Station latitude (South is negative)	decimal degrees

## Deployments

**JPT\_2002-16**

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/57831">https://www.bco-dmo.org/deployment/57831</a>
<b>Platform</b>	CCGS John P. Tully
<b>Report</b>	<a href="http://bcodata.whoi.edu/Fe_Synthesis/SERIES/CruiseReport-SERIES-Tully.pdf">http://bcodata.whoi.edu/Fe_Synthesis/SERIES/CruiseReport-SERIES-Tully.pdf</a>
<b>Start Date</b>	2002-06-27
<b>End Date</b>	2002-07-28
<b>Description</b>	CRUISE OBJECTIVE/OBJECTIVES: Survey water properties along Line P, enrich a patch of ocean with iron near Station Papa (50N, 145W) and observe biological changes for a period of 18 days. Conduct a mesoscale iron enrichment experiment at a site to the NE of P26 (Ocean Station Papa). The rationale for this experiment was to follow the changes in phytoplankton growth rate and related biogeochemical properties of the iron-limited resident cells.

#### KY0202-02

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/57832">https://www.bco-dmo.org/deployment/57832</a>
<b>Platform</b>	R/V Kaiyo-Maru
<b>Start Date</b>	2002-07-17
<b>End Date</b>	2002-08-07

#### SERIES\_EIPuma

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/57833">https://www.bco-dmo.org/deployment/57833</a>
<b>Platform</b>	R/V El Puma
<b>Report</b>	<a href="http://bcodata.whoi.edu/Fe_Synthesis/SERIES/CruiseReport-SERIES-EIPuma.pdf">http://bcodata.whoi.edu/Fe_Synthesis/SERIES/CruiseReport-SERIES-EIPuma.pdf</a>
<b>Start Date</b>	2002-07-03
<b>End Date</b>	2002-08-03
<b>Description</b>	CRUISE OBJECTIVES: The productivity of large parts of the North Pacific Ocean is limited by iron. In this system, iron is naturally supplied by atmospheric deposition. Such natural iron fertilization is presumed to enhance plankton productivity. Given the episodic nature of these natural iron delivery events, it is impossible to plan in advance a cruise to study their impact on the ocean productivity. The goal of this project is to artificially reproduce and study the impact of such an event by releasing a small amount of iron in a ca. 64 km <sup>2</sup> area of the subarctic Northeastern Pacific. An inert gas (SF <sub>6</sub> ) will be added with the iron and serve as a tracer of the patch. Previous iron enrichment experiments conducted in other parts of the global ocean resulted in important increases in phytoplankton biomass. The iron-induced increase in plankton productivity may also change the capacity of the ocean to absorb or produce climatically relevant gases such as CO <sub>2</sub> and dimethylsulfide (DMS). Therefore, an important part of our project is to quantify the influence of iron on the dynamics of these gases, and on their concentrations in the atmosphere. In contrast with previous iron enrichment studies, oceanographic measurements will be complemented by a series of atmospheric measurements during SERIES.

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## Project Information

### Sub-Arctic Ecosystem Response to Iron Enrichment Study (SERIES)

**Coverage:** NE Pacific, north of station P26 (Ocean Station Papa) on line P at 50°N 144°45E

## Iron fertilization in the NE subarctic Pacific

**Objective:** To determine the influence of iron on the production of the trace gases and their impact on the atmospheric chemical and physical properties and on climate flux of climatically active gases.

**Experiment:** The iron fertilization expedition involved three ships that sampled both the surrounding and the iron-enriched waters. The addition of iron prompted an explosive growth of phytoplankton that turned blue waters of the NE Pacific green. The bloom was recorded by a NASA satellite as it spread into a 500 km<sup>2</sup> patch.

In July, 2002 the SERIES was carried out in the NE Pacific near Ocean Station Papa (50N, 145W). Three ships, the CCGS John P. Tully, the M/V El Puma (Mexico) and M/V Kaiyo Maru from Japan, along with 45 researchers from 20 institutions across Canada as well as international collaborators participated in the experiment. The objectives were to study the response of phytoplankton, bacteria and zooplankton to the addition of Fe, the effect on carbon flux to the deep ocean, the influence of Fe on the production and cycling of climatically active trace gases and its influence on the atmospheric sulfur budget, sulfate aerosols and cloud microphysics. The decline and fate of the iron stimulated diatom bloom as been reported (Boyd et al. (2004) Nature, doi:10.1038).

These data report on the decline and fate of an iron-stimulated diatom bloom in the Gulf of Alaska. The bloom terminated on day 18, following the depletion of iron and then silicic acid, after which mixed-layer particulate organic carbon (POC) concentrations declined over six days. Increased particulate silica export via sinking diatoms was recorded in sediment traps at depths between 50 and 125 m from day 21, yet increased POC export was not evident until day 24. Only a small proportion of the mixed-layer POC was intercepted by the traps, with more than half of the mixed-layer POC deficit attributable to bacterial remineralization and mesozooplankton grazing. The depletion of silicic acid and the inefficient transfer of iron-increased POC below the permanent thermocline have major implications both for the biogeochemical interpretation of times of greater iron supply in the geological past, and also for proposed geo-engineering schemes to increase oceanic carbon sequestration.

Prior to commencing the joint iron and SF<sub>6</sub> addition, 48-h oceanographic survey (7-8 July 2002) was conducted in the vicinity of Ocean Station Papa (OSP, 50N, 145W) to identify an appropriate site with HNLC characteristics typical of this region (LaRoche et al. 1996; Nishioka et al. 2001). A suitable site was located 50 km northeast of OSP, and the surface waters were enriched on 10 July 2002 (denoted as day 0 of SERIES) with dissolved iron to .1 nmol L<sup>-1</sup>, along with the concurrent addition of the tracer SF<sub>6</sub> (>400 fmol L<sup>-1</sup>) following procedures reported in Law et al. (1998). Throughout SERIES, mixed-layer SF<sub>6</sub> concentrations were always significantly higher than background levels, and thus we did not add any more SF<sub>6</sub> to the patch. However, on day 6, a second iron infusion was required that raised dissolved iron by around 0.6 nmol L<sup>-1</sup>.

## Related files

[SERIES Report](#)

[SERIES El Puma Cruise Report](#)

[SERIES Tully Cruise Report](#)

[SERIES Stations Sampling Timeline](#)

[SERIES Project Data Report by Doug Mackie](#)

[SeaWiFS Image of the SERIES Bloom](#)

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## Program Information

### Iron Synthesis (FeSynth)

**Coverage:** Global

The two main objectives of the Iron Synthesis program (SCOR Working Group proposal, 2005), are:

1. Data compilation: assembling a common open-access database of the *in situ* iron experiments, beginning

with the first period (1993-2002; Ironex-1, Ironex-2, SOIREE, EisenEx, SEEDS-1; SOFeX, SERIES) where primary articles have already been published, to be followed by the 2004 experiments where primary articles are now in progress (EIFEX, SEEDS-2; SAGE, FeeP); similarly for the natural fertilizations S.O.JGOFS (1992), CROZEX (2004/2005) and KEOPS (2005).

2. Modeling and data synthesis of specific aspects of two or more such experiments for various topics such as physical mixing, phytoplankton productivity, overall ecosystem functioning, iron chemistry, CO<sub>2</sub> budgeting, nutrient uptake ratios, DMS(P) processes, and combinations of these variables and processes.

SCOR Working Group proposal, 2005. "The Legacy of *in situ* Iron Enrichments: Data Compilation and Modeling".

[http://www.scor-int.org/Working\\_Groups/wg131.htm](http://www.scor-int.org/Working_Groups/wg131.htm)

See also: SCOR Proceedings Vol. 42 Concepcion, Chile October 2006, pgs: 13-16 2.3.3 Working Group on The Legacy of *in situ* Iron Enrichments: Data Compilation and Modeling.

The first objective of the Iron Synthesis program involves a data recovery effort aimed at assembling a common, open-access database of data and metadata from a series of *in-situ* ocean iron fertilization experiments conducted between 1993 and 2005. Initially, funding for this effort is being provided by the Scientific Committee on Oceanic Research (SCOR) and the U.S. National Science Foundation (NSF).

Through the combined efforts of the principal investigators of the individual projects and the staff of Biological and Chemical Oceanography Data Management Office (BCO-DMO), data currently available primarily through individuals, disparate reports and data agencies, and in multiple formats, are being collected and prepared for addition to the BCO-DMO database from which they will be freely available to the community.

As data are contributed to the BCO-DMO office, they are organized into four overlapping categories:

1. Level 1, basic metadata  
(e.g., description of project/study, general location, PI(s), participants);
2. Level 2, detailed metadata and basic shipboard data and routine ship's operations  
(e.g., CTDs, underway measurements, sampling event logs);
3. Level 3, detailed metadata and data from specialized observations  
(e.g., discrete observations, experimental results, rate measurements) and
4. Level 4, remaining datasets  
(e.g., highest level of detailed data available from each study).

Collaboration with BCO-DMO staff began in March of 2008 and initial efforts have been directed toward basic project descriptions, levels 1 and 2 metadata and basic data, with detailed and more detailed data files being incorporated as they become available and are processed.

## Related file

[Program Documentation](#)

The Iron Synthesis Program is funded jointly by the Scientific Committee on Oceanic Research (SCOR) and the U.S. National Science Foundation (NSF).



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