

Development of SIBEX-Phase I, Chile Project

PATRICIO EBERHARD¹

INTRODUCTION

The performance of FIBEX (BIOMASS) Project was the initiation point of the Antarctic Ecosystems Investigation on which 11 countries were participating during the Antarctic season 1980-81. Their results have been presented and discussed in more than 20 International Meetings and published in a hundred of scientific journals in all around the world.

The valuable contribution of the participating countries, reaffirmed the International Scientific Community decision to carry on the BIOMASS Program Investigations, named Second International BIOMASS Experiment, widely known as SIBEX, which first phase was performed during the Antarctic Summer 1983-1984.

The planning of this phase was prepared during several meetings. The most outstanding ones are the following:

- a) BIOMASS Scientific Advisory Group for SIBEX-I, Cambridge, April 1982.
- b) Meeting of the Group of Specialists on Southern Ocean Ecosystems and their living resources, Nikko, Japan, June 1982.
- c) Technical Group on Programme Implementation and Coordination, Bremerhaven, September 1982.
- d) SIBEX Chief Scientists Meeting, Wilderness, South Africa, September 1983.

The Government of Chile, taking into account the importance of the Antarctic Ecological Studies, especially the results and recommendations of the FIBEX Project, decided to continue with its active participation in this new phase, named SIBEX, inviting all the research centers of the country to present specific research projects in 1983.

¹Subdirección Científica, Instituto Antártico Chileno. Luis Thayer Ojeda 814, Santiago, Chile.

SIBEX Objectives

As krill is an important or key organism of the Southern Ocean, the investigation of its Biology in relation to biotic and abiotic compounds of the Antarctic environment must be maintained as a main objective in fundamental aspects as: krill growth and mortality in different areas, oviposition success and recruiting mechanisms, stock separations and migration patterns; trophic relations and krill survival in winter below ice.

As FIBEX brought a synoptic view of krill distribution, SIBEX aims to obtain information about krill abundance, oviposition areas and recruiting in relation to biotic and abiotic factors.

At the same time, it aims to perform studies about trophic relations in which krill is involved, as a consumer organism or prey organism.

SIBEX Planning

The International Community established the following general criterion: (BIOMASS TG, 1982).

- a) SIBEX should be based on FIBEX results.
- b) Require the coordinating effort of SIBEX vessels.
- c) Depend on the integrated analyses of data from different vessels and disciplines.
- d) Address question within the BIOMASS objectives, but keeping in mind their relevance to the needs of the Scientific Committee of CCAMLR.
- e) Include some questions which should be resolved by SIBEX, even in a partial way.
- f) Prefer benefits by comparting the results obtained from the different study areas.
- g) Establish guide-lines for future research.

Upon the basis of these criteria the following specific SIBEX objectives were defined:

1. Krill abundance and distribution (by aged group, size and maturity stages) in relation to:
 - 1.1 Physical and Chemical Oceanography
 - 1.2 Ice edge
 - 1.3 Zooplankton communities
 - 1.4 Predators
 - 1.5 Phytoplankton composition and abundance.
2. Annual and seasonal krill production by areas, including:
 - 2.1 Growth
 - 2.2 Predation
 - 2.3 Decomposition
3. Krill stock
 - 3.1 Identity
 - 3.2 Conservation
4. Krill reproduction, annual and seasonal by areas:

5. Fish recruitment in relation to krill fisheries.
6. Demersal fish ecology in SIBEX areas.
7. Predator stocks and trophodynamics (including aerial and shore based studies).

In relation to the above mentioned parameters and objectives, Chile decided to perform the following field stages:

SIBEX-PHASE I: 1983-1984: 1.1; 1.3; 1.5.

SIBEX-PHASE II: 1984-1985: 1; 1.1; 1.3; 1.5; 4; 5; 7.

That is, our country decided to perform in the first phase a cruise fundamentally oriented to physical and chemical oceanography, phytoplankton and zooplankton.

In relation to the investigation area, Chile agreed to study the Bransfield Strait A area (Fig. 1), between the following coordinates:

59,5° S.	;	52,5° W.
62,5° S.	;	52,5° W.
62,0° S.	;	64,0° W.
65,0° S.	;	64,0° W.

Transects and oceanographic stations were determined in the Wilderness Meeting in 1983.

Developed Projects

According to the above mentioned planification, the following specific research projects were developed during SIBEX-Phase I:

- a) Thermic structure description of the Bransfield Strait based on XBT observations:
 Institution: Instituto Hidrográfico de la Armada (IHA)
 Specific Objectives:
 — To characterize the thermic structure of the area in study through a high density of XBT sampling.
 — To try to identify the presence of frontal zones in the study area.
- b) Physical Oceanography of the Bransfield Strait
 Institution: Instituto de Fomento Pesquero (IFOP)
 Specific Objectives:
 — To determine temperature, salinity and dissolved oxygen distribution in the study zone.
 — To characterize masses and water types observed in the study zone.
 — To study stability behaviour of water column in the study zone.
 — To determine the existence of frontal areas in the study zone.
 — To deduce circulation characteristics.
- c) Chemical Oceanography of the Bransfield Strait: Micronutrients compounds and their relation with water masses.
 Institution: Universidad Católica de Valparaíso (UCV)

Specific Objectives:

- To determine micronutrients compounds distribution and content of the Bransfield Strait.
- To characterize water masses of the Bransfield Strait by their micronutrient contents.

d) Phytoplankton distribution and abundance in relation to water masses of the Weddell and Bellingshausen seas.

Institution: Universidad del Norte (U. del N.)

Specific Objectives:

- To know the phytoplankton specific composition at picoplankton, nanoplankton and microplankton levels.
- To study the vertical and horizontal distribution of main phytoplanktonic species in relation to water masses of the zone.
- To study the possible influence of Weddell Sea advanced water on phytoplankton specific composition of the Bransfield Strait.
- To look for water masses characteristic species observed in the study zone.

e) Zooplanktonic Antarctic Ecology.

Institution: IFOP

Specific Objectives:

- To determine zooplanktonic biomass in the study zone as indicator of secondary productivity.
- To determine abundance, horizontal and vertical distribution of *Euphausia superba* larvae at different development stages and type-protein (density) composition as indicator of bathymetric distribution.
- To determine specific composition, relative abundance and fish larvae horizontal and vertical distribution and their size composition.
- To determine zooplankton faunistic composition community parameters and its relation with environment and biotic factors which rule it.

Cruise Performance

The cruise was performed on board of M/N Capitán Alcázar, corresponding to SIBEX cruise of the XX Scientific Expedition of the Instituto Antártico Chileno.

Participating Personnel:

Patricio Eberhard B.	INACH	Scientific Chief
José L. Blanco	IFOP	Physical Oceanography
Noé Cáceres	UCV	Chemical Oceanography
Enrique Camus	IHA	XBT
Sergio Contreras	IFOP	Physical Oceanography
Maida Díaz	IFOP	Physical Oceanography
Sergio Fuentes	U. del N.	Phytoplankton
Ricardo Rojas	IHA	XBT
Nelson Silva	UCV	Chemical Oceanography
Eduardo Uribe	U. del N.	Phytoplankton

Period

The cruise was realized from January 27 to February 12, 1984.

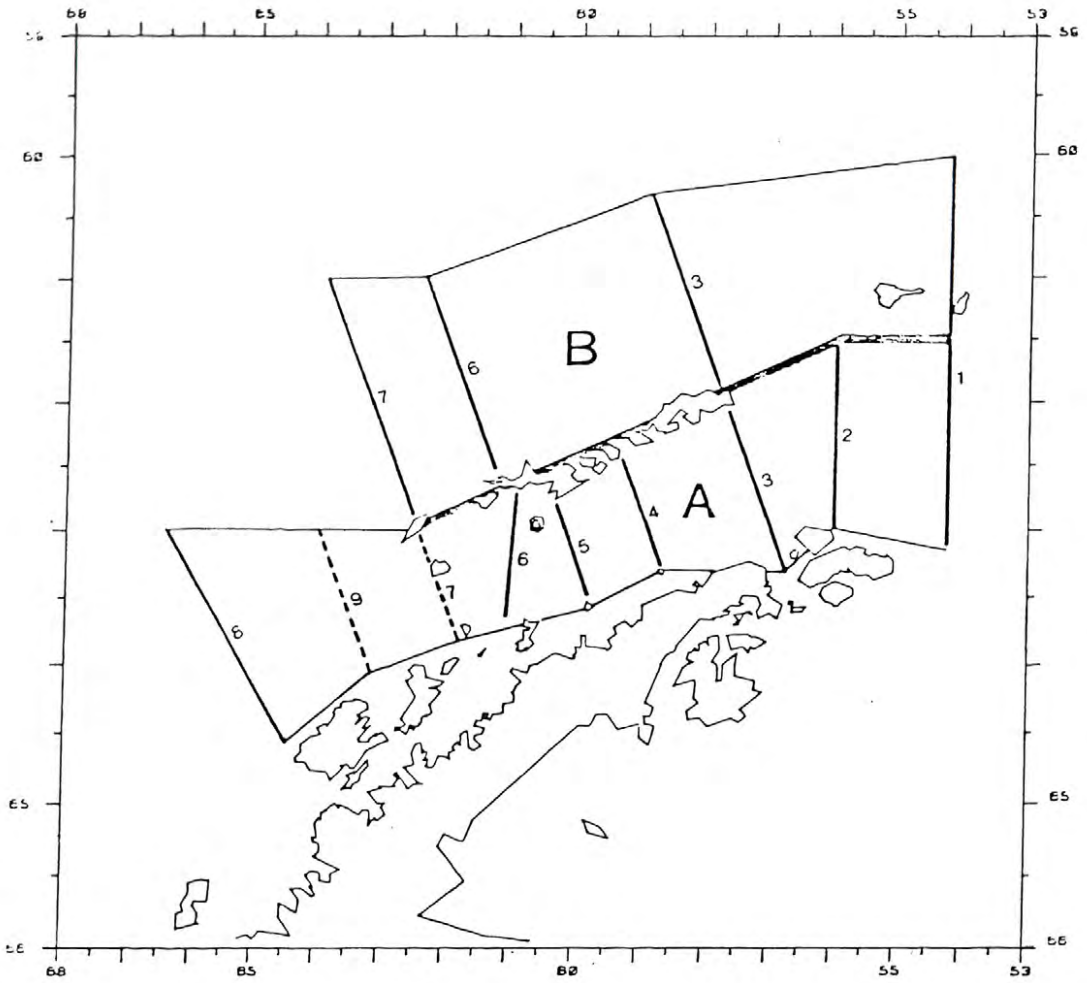
Stations

The number of stations, geographic position, date, time (GMT) and depth are shown in Table 1.

The station Nr. 502 was realized in cooperation with the brasilian R/V "Professor Besnard", with the purpose to realize an intercalibration of the respective oceanographic equipment.

REFERENCE

BIOMASS 1982. Technical Group on Programme Implementation and Coordination. Third Meeting. Bremerhaven, FRG. 27 September 1st October 1982. BIOMASS Rep. Ser. 29.



MERCATOR - PROJECTION / SCALING: .5 DEGR.
 SCALE 1: 2500000 (AT 67 DEGR.)
 SIBEX TRANSECTS

Table 1
OCEANOGRAPHIC STATIONS OF SIBEX-PHASE I-CHILE

N° Station SIBEX	N° Station Chile	Date	Time (GMT)	Latitude S	Longitude W	Depth (m)			
09	38	801	27.01.84	13.9	64	30.0	64	45.0	200
09	37	802	27.01.84	19.6	64	07.0	65	16.0	600
09	36	803	27.01.84	23.8	63	45.0	65	40.0	400
08	30	901	28.01.84	1.9	64	08.0	63	05.0	500
09	35	804	28.01.84	4.2	63	20.0	66	10.0	700
08	33	904	28.01.84	14.6	63	00.0	63	58.0	700
08	32	903	28.01.84	17.7	63	18.0	63	43.0	200
08	31	902	28.01.84	21.8	63	38.0	63	29.0	300
		900	30.01.84	09.2	64	30.9	62	15.0	600
		700	30.01.84	16.8	64	10.1	61	23.0	300
07	29	702	30.01.84	20.4	63	51.0	61	50.0	100
		701	31.01.84	0.3	63	55.5	61	39.5	500
07	28	703	31.01.84	12.3	63	39.5	62	03.0	200
07	27	704	31.01.84	17.3	63	10.0	62	12.5	100
07	26	705	31.01.84	17.5	63	12.0	62	33.0	200
		706	31.01.84	22.1	62	45.0	63	26.0	1,100
06	22	601	01.02.84	11.7	63	44.0	61	13.5	200
06	23	602	01.02.84	16.1	63	24.7	61	06.5	400
06	24	603	01.02.84	19.5	63	06.5	61	00.7	700
06	25	604	01.02.84	23.3	62	42.5	60	54.0	100
05	18	504	02.02.84	1.6	62	50.0	60	19.5	100
05	19	502	02.02.84	18.8	63	10.3	60	06.1	500
05	20	503	03.02.84	12.6	63	00.0	60	12.0	500
05	21	501	03.02.84	17.3	63	25.0	59	54.4	100
		500	03.02.84	20.4	63	41.4	59	43.0	500
		400	04.02.84	0.8	63	24.0	58	47.0	100
04	14	401	04.02.84	11.5	63	11.5	58	47.0	100
04	15	402	04.02.84	15.6	62	57.4	58	56.0	500
04	16	403	04.02.84	19.6	62	44.0	59	07.0	700
04	17	404	04.02.84	22.5	62	31.0	59	18.0	700
		004	05.02.84	23.2	62	20.0	58	27.0	500
		003	06.02.84	19.6	62	34.8	58	17.0	700
		002	06.02.84	23.0	62	49.0	58	07.0	500
		001	07.02.84	12.9	63	05.9	57	54.3	—
03	13	301	07.02.84	17.3	63	16.0	56	55.0	100
03	10	304	08.02.84	19.2	62	05.7	57	39.8	100
03	11	303	08.02.84	21.5	62	15.0	57	33.0	700
03	12	302	09.02.84	17.4	62	40.5	57	17.5	600
02	06	201	09.02.84	22.9	62	55.0	56	00.0	100
02	07	202	10.02.84	2.4	62	30.0	56	00.0	200
02	08	203	10.02.84	11.7	62	00.0	56	00.0	700
02	09	204	10.02.84	17.1	61	30.0	56	00.0	300
01	01	105	10.02.84	23.9	61	30.0	54	00.0	400
01	02	104	11.02.84	4.6	62	00.0	54	00.0	500
01	03	103	11.02.84	12.2	62	30.0	54	00.0	200
01	04	102	11.02.84	17.1	63	00.0	54	00.0	200
01	05	101	11.02.84	18.0	63	16.0	54	02.5	200