

国際協力事業団

NO. 2

ヴェトナム国
水産省

ヴェトナム国水産資源調査

資料編

平成 10 年 2 月

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芙蓉海洋開発株式会社

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1

調査団の構成

調査団の構成

1. 日本側

高木 健治	総括／資源管理 芙蓉海洋開発株式会社 取締役
新井 一男	資源調査／解析 芙蓉海洋開発株式会社
平松 亘	生物調査 芙蓉海洋開発株式会社
渡邊 真砂夫	海洋観測 芙蓉海洋開発株式会社
松本 昌弘	漁撈（第1回～2回海上調査） 耕洋海事株式会社
鈴木 勝雄	漁撈（第3回～4回海上調査） 芙蓉海洋開発株式会社
RUDDLE, Kenneth	漁村社会 IC Net Limited
米坂 浩昭	水産経済 IC Net Limited
萩原 規寿	調査船改修監督 日本鋼管株式会社
小川 健一	調査船改修監督 日本鋼管株式会社
藤澤 和二郎	業務調整 芙蓉海洋開発株式会社

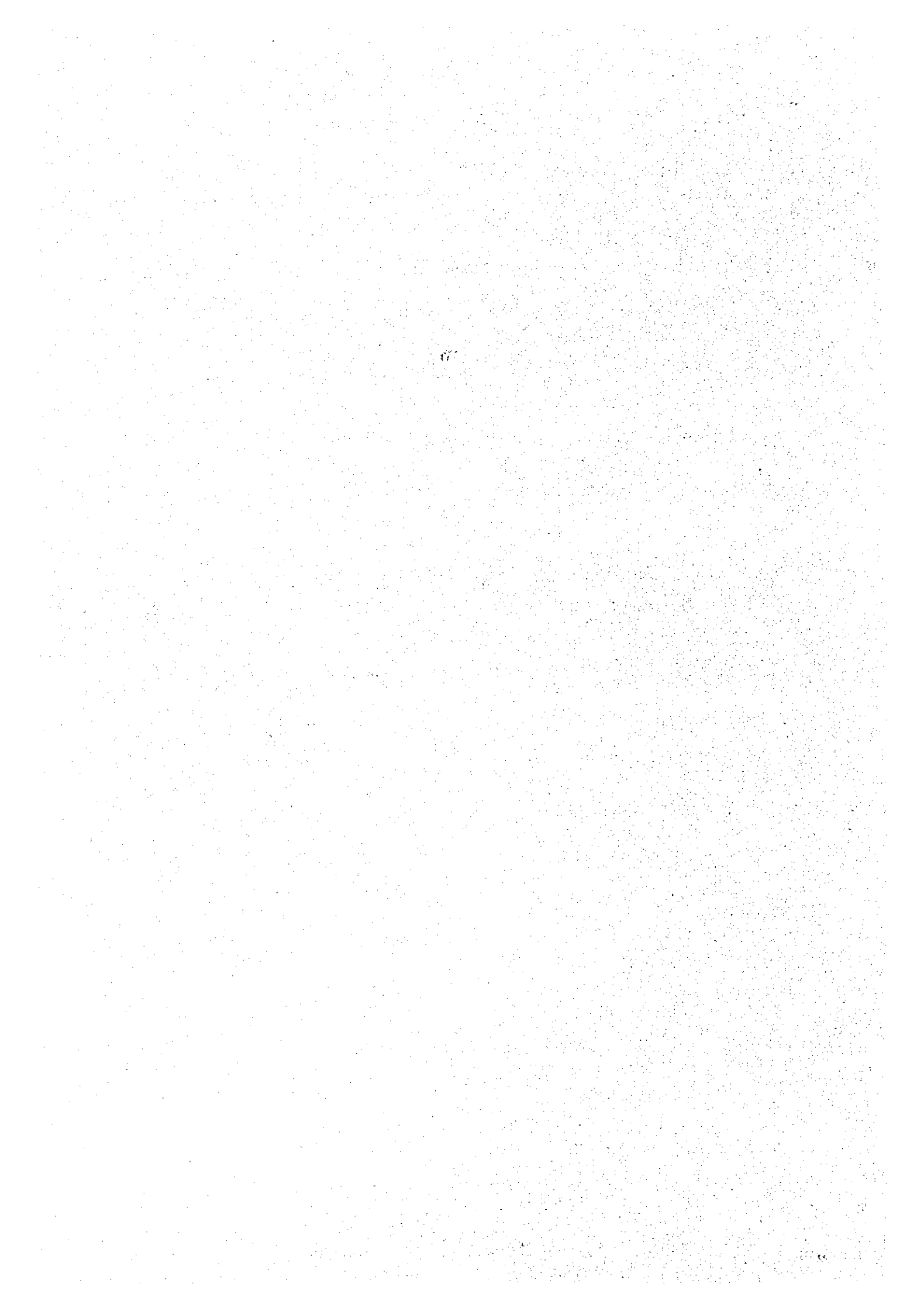
2. ヴィエトナム側

Bui Dinh Chung	総括／資源管理 海産物研究所 所長
Chu Tien Vinh	資源調査／解析／業務調整 海産物研究所
Nguyen Duong Thao	海洋生物（第1回、3回、4回海上調査） 海産物研究所
Pham Ngoc Tuyen	海洋生物（第1回～2回海上調査） 海産物研究所
Doan Van DU	海洋生物（第2回海上調査） 海産物研究所
Dao Trong Hong	海洋生物（第3回～4回海上調査） 海産物研究所
Le Hong Cau	海洋物理（第1回～2回海上調査） 海産物研究所
Tran Luu Khanh	海洋物理（第3回～4回海上調査） 海産物研究所
Nguyen Dinh Nhan	漁 撈 海産物研究所
Nguyen Long	漁村社会／水産経済 海産物研究所
Nguyen Quoc Lap	調査船改修監督 海産物研究所
調査船 BIEN DONG	海産物研究所 所属 船長 Nguyen Trong Hiep 以下乗組員 24～26名

2

業務実施細目（S/W）

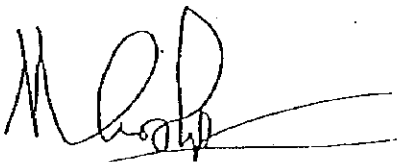
並びに議事録



SCOPE OF WORK
FOR
THE MARINE RESOURCES STUDY
IN VIET NAM

AGREED UPON BETWEEN
MINISTRY OF FISHERY
AND
THE JAPAN INTERNATIONAL COOPERATION AGENCY

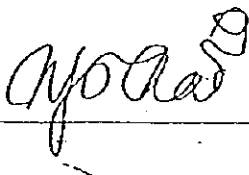
HANOI, 21 SEPTEMBER, 1994



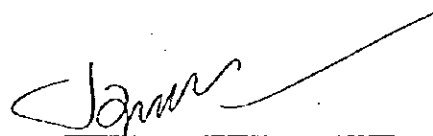
MR. HO VAN HOANH
DIRECTOR,
INTERNATIONAL COOPERATION
DEPARTMENT,
MINISTRY OF FISHERIES
SOCIALIST REPUBLIC OF VIET NAM



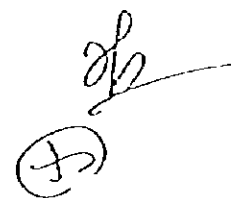
MR. AKIMITSU KOGANEZAWA
LEADER,
PREPARATORY STUDY TEAM
JAPAN INTERNATIONAL
COOPERATION AGENCY



MR. NGUYEN XUAN THAO
DIRECTOR
DEPARTMENT OF AGRICULTURE,
FORESTRY, FISHERY
STATE PLANNING COMMITTEE,
SOCIALIST REPUBLIC OF VIET NAM



MR. BUI DINH CHUNG
DIRECTOR,
RESEARCH INSTITUTE OF
MARINE PRODUCTS
MINISTRY OF FISHERIES
SOCIALIST REPUBLIC OF VIET NAM



1. INTRODUCTION

In response to the request of the Government of Socialist Republic of Viet Nam (hereinafter referred to as "the Government of Viet Nam"), the Government of Japan has decided to conduct the Marine Resources Study in Viet Nam (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of the Government of Viet Nam.

The present document sets forth the scope of work with regard to the Study.

2. OBJECTIVES OF THE STUDY

The objectives of the Study are :

- (1) to investigate relative stock abundance of pelagic fishery resources in the Viet Nam Exclusive Economic Zone,
- (2) to clarify coastal fishery conditions through landing site survey at selected major fish landing sites,
- (3) to prepare guide-lines for a marine resources management plan which would include the proper fishing methods,
- (4) to carry out technology transfer and training in the course of the Study to the counterpart personnel of the Government of Viet Nam, and thus contribute to sustainable utilization of marine resources in Viet Nam.

3. STUDY AREA

- (1) The sea-borne survey

The sea-borne survey area is defined as the offshore area of Viet Nam shown in APPENDIX 1 within the Viet Nam Exclusive Economic Zone.

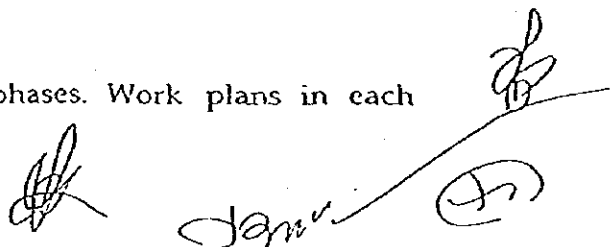
- (2) The landing site survey

The landing site survey will be carried out at the following fish landing sites in Viet Nam.

- a. Da Nang
- b. Qui Nhon
- c. Nha Trang
- d. Phan Thiet
- e. Vung Tau

4. OUTLINE OF THE STUDY

The Study will consist of the following two phases. Work plans in each phase are as follows.



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4-1 Work in Phase 1

(1) Collection of data and information on,

- a. Natural conditions
- b. Socio-economic conditions
- c. Fisheries conditions

(2) Sea-borne survey (Stage 1)

In order to conduct relative stock abundance, the sea-borne survey will be carried out twice a year considering the direction of the current. The sea-borne survey will include following items.

- a. Drifting gillnet survey
- b. Acoustic survey
- c. Oceanographic observation
- d. Biological survey
- e. Analysis of collected data
- f. others

(3) Land site survey

In order to grasp conditions of coastal fishery, the land site survey will be carried out on the following items.

- a. Collection of data and information.
- b. Interview
- d. Sampling
- c. others

4-2 Work in phase 2

(1) Sea-borne survey (Stage 2)

In order to supplement Stage 1 survey and to recommend the proper fishing methods, the sea-borne survey will be continued to Stage 1 survey. The sea-borne survey will include the following items.

- a. Test fishing survey
- b. Acoustic survey
- c. Oceanographic observation
- d. Biological survey
- e. Analysis of collected data
- f. others

(2) Formulation of guide-lines for a marine resources management plan

5 Work schedule

The Study shall be carried out in accordance with the attached tentative work schedule. (APPENDIX -2)

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6. Reports

JICA shall prepare the following reports in English for the Government of Viet Nam. (APPENDIX -2)

(1) Inception Report :

Twenty (20) copies at the beginning of phase 1 field work.

(2) Interim Report :

Twenty (20) copies at the end of phase 1 study.

(3) Draft Final Report :

Twenty (20) copies at the end of phase 2 study. The Government of Viet Nam will provide JICA with its comments on the Draft Final Report within one (1) month after receipt of the Draft Final Report.

(4) Final Report :

Fifty (50) copies within two (2) months after receipt of the comments from the Government of Viet Nam on the Draft Final Report.

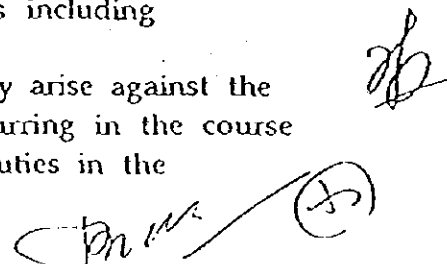
7. UNDERTAKING OF THE GOVERNMENT OF VIET NAM

(according to Japanese relevant laws and regulations)

(1) To facilitate the smooth conduct of the Study, the Government of Viet Nam shall take necessary measures ;

- a. to secure the safety of the Japanese study team,
- b. to permit the members of the Japanese study team to enter, leave and sojourn in Viet Nam for the duration of the their assignment therein, and exempt them from foreign registration requirements and fees,
- c. to exempt the members of the Japanese study team from taxes, duties and other charges on equipment, machinery and other materials brought into Viet Nam for the conduct of the Study,
- d. to exempt the members of the Japanese study team from income tax and charges of any kind imposed on or in connection with any emoluments or allowance paid to the members of the Japanese study team for their services in connection with the implementation of the Study.
- e. to provide necessary facilities to the Japanese study team for the remittance as well as utilization of the funds introduced into Viet Nam from Japan in connection with the implementation of the Study,
- f. to secure permission for entry into all areas concerned for the implementation of the Study.
- g. to secure permission for the Japanese study team to take all data and documents (including maps, photographs) related to the Study out of Viet Nam to Japan,
- h. to provide medical services as needed. whose expenses will be charged on members of the Japanese study team.
- i. to secure clearance for the use of communication facilities including transceivers,

(2) The Government of Viet Nam shall bear claims, if any arise against the members of the Japanese study team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the



implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Japanese study team.

- (3) The Ministry of Fishery shall act as a counterpart agency to the Japanese study team and also as the coordinating body in relations with other governmental and non-governmental organizations concerned with the smooth implementation of the Study.
- (4) The Ministry of Fishery shall, at its own expense, provide the Japanese study team with the following, in cooperation with other organizations concerned:
 - a. available data, maps and information related to the Study,
 - b. counterpart personnel,
 - c. research vessel for the sea-borne survey
 - d. suitable office space with necessary equipment,
 - e. credentials or identification cards,

8. UNDERTAKING OF JICA

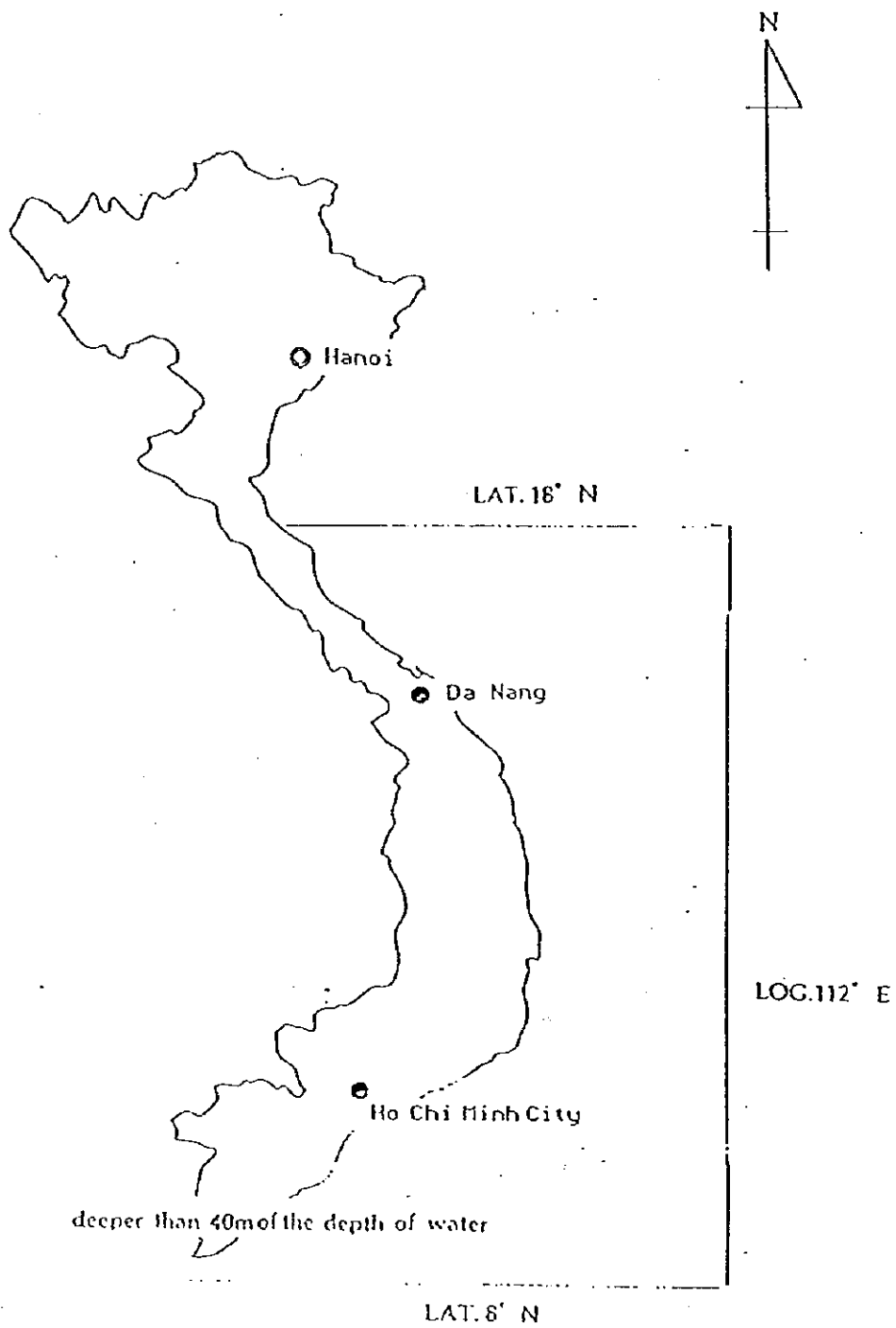
For the implementation of the Study, JICA shall take the following measures:

- (1) To dispatch, at its own expense, the study team to the Viet Nam,
- (2) To pursue technology transfer and training to the Viet Nam counterpart personnel in the course of the Study.
- (3) To offer all data collected in the course of the Study to the Vietnamese side.

9. OTHERS

- (1) JICA and the Ministry of Fishery shall consult with each other on any matter that may arise from or in connection with the Study.

APPENDIX 1



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APPENDIX 2

TENTATIVE WORK SCHEDULE OF THE STUDY

	5	10	15	20	25 (MONTH)
The Study in Japan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The Study in Viet Nam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Submission of Reports	<input type="checkbox"/> IC/R		<input type="checkbox"/> IT/R		<input type="checkbox"/> DFR <input type="checkbox"/> F/R
Phase	Phase 1		Phase 2		

Note: IC/R: Inception Report IT/R: Interim Report DFR: Draft Final Report F/R: Final Report

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MINUTES OF MEETING
OF
SCOPE OF WORK
FOR
THE MARINE RESOURCES STUDY
IN VIET NAM

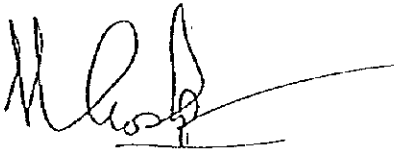
The preparatory study team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA"), and headed by Mr. AKIMITSU KOGANEZAWA, visited Viet Nam from September 13, 1994 to September 23 for the purpose of discussing and confirming the Scope of Work for The Marine Resources Study in Viet Nam (hereinafter referred to as "the Study").

The Team had a series of discussions with the officials concerned of the Ministry of Fishery (hereinafter referred to as "MOF") on the Scope of Work for the Study. The list of participants in a series of meetings is attached in the ANNEX-2.

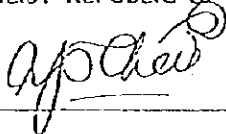
As the result of discussions, MOF and the Team agreed on the Scope of Work for the Study.

The main issues discussed and agreed upon by both sides in relation to Scope of Work for the Study are shown in the ANNEX-1 as attached hereto.

Hanoi, September 21, 1994



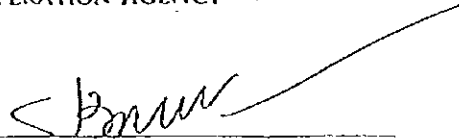
MR. HO VAN HOANH
DIRECTOR,
INTERNATIONAL COOPERATION
DEPARTMENT,
MINISTRY OF FISHERIES
SOCIALIST-REPUBLIC OF VIET NAM



MR. NGUYEN XUAN THAO
DIRECTOR,
DEPARTMENT OF AGRICULTURE,
FORESTRY, FISHERY
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SOCIALIST REPUBLIC OF VIET NAM



MR. AKIMITSU KOGANEZAWA
LEADER,
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MINISTRY OF FISHERIES
SOCIALIST REPUBLIC OF VIET NAM



ANNEX-1

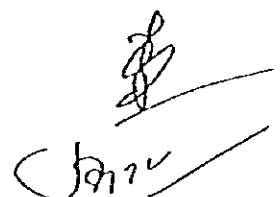
The following are the main issues discussed and agreed upon by both sides in relation to the Scope of Work for the Study.

1. MOF will be responsible for the implementation of the Study. The Research Institute of Marine Products (hereinafter referred to as "RIMP") will be directory responsible for the implementation of the Study, and will act as the counterpart organization to the Japanese study team and as the coordinating body in relation to other relevant authorities concerned to the smooth implementation of the Study.
2. MOF promised to cooperate with the Japanese study team for the implementation of the Study, and provide with the staff of MOF for the implementation of the land site survey, and also provide with the following staff of RIMP for the implementation of the sea-borne survey.
 - a) Captain
 - b) Crew
 - c) Researchers
3. MOF requested that the following necessary equipments for the Study be procured by JICA and be donated to RIMP after the termination of the Study.

The Team promised to convey its request to the Government of Japan.

 - a) Drift net
 - b) Net hauler
 - c) Scanning sonar
 - d) Echo sounder
 - e) Doppler current meter
 - f) Electric thermometer
 - g) Plankton net (Zooplankton net, Phytoplankton net)
 - h) G.P.S
 - i) Radar
 - j) Personal computer(s)
 - k) Four-wheel drive vehicle
 - l) Other necessary equipments
4. The research vessel which will be used for the sea-borne survey will be offered by RIMP without compensation. If the improvement of the research vessel would be needed for the implementation of the sea-borne survey, its expenses would be paid by the Japanese study team. The operation cost for the sea-borne survey will be also paid by the Japanese study team.

5. MOF requested JICA to open a seminar on the result of the Study at the end of the Study period.
6. MOF requested the training of counterpart personnel in Japan for effective transfer of technology in connection with the Study. The Team promised to convey its request to the Government of Japan.
7. MOF promised to offer suitable office space with necessary equipment for the Japanese study team at RIMP in Haiphong.
8. If fisheries regulations demand that the license would be required for the implementation of the Study, MOF will take necessary measures for granting or obtaining the license before the commencement of the Study.
9. Both sides confirmed that the sea-borne survey will not be carried out in the areas of the international dispute.
10. MOF will be responsible to the disposal of all fish caught in the course of the sea-borne survey, except those needed for studies.



ANNEX-2

LIST OF PARTICIPANTS

Subject : Discussion of Scope of Work
Date : From September 13 to September 21, 1994
Place : Ministry of Fisheries, Research Institute of
Marine Products

Vietnamese Side

Name	Position
Mr. Vo Van Trac	Vice Minister, MOF
Mr. Ho Van Hoanh	Director, International Cooperation Department, MOF
Mr. Dinh Trong Thai	Deputy Director, Science and Technology Management Department, MOF
Mr. Tran Duc Try	Representative, International Cooperation Department, MOF
Mr. Pham Van Thanh	Planning and Investment, MOF
Mr. Bui Dinh Chung	Director, RIMP
Mr. Pham Thuoc	Deputy Director, RIMP
Mr. Nguyen Van Ngoan	Deputy Director, RIMP
Mr. Chu Tien Vinh	Assistant Director, RIMP
Mr. Dao Manh Muon	Head of Fishery Oceanography Research Dep., RIMP
Mr. Nguyen Cong Ruong	Deputy Head of Fishery Oceanography Research Dep., RIMP
Mr. Nguyen Long	Head of Fishing Technology Research Dep., RIMP
Mr. Tran Khen	Agriculture, Forestry, Fisheries Dep., SPC

Japanese Side

Name	Position
Mr. Akimitsu Koganezawa	Leader of Mission, JICA Preparatory Study Team
Mr. Noritaka Asakawa	Member, JICA Preparatory Study Team
Mr. Masanori Takahashi	Member, JICA Preparatory Study Team
Mr. Shirou Yuge	Member, JICA Preparatory Study Team
Mr. Terutada Okamoto	Member, JICA Preparatory Study Team
Mr. Tatuya Yamada	Member, JICA Preparatory Study Team
Mr. Takahiro Sasaki	Second Secretary, Embassy of Japan

新たに分布が確認された魚種
に関する記載

1) *Pseudocarcharis kamoharai* (Matsubara) ミズワニ

体は小さく糸巻き状の細長い形である。眼は大きく、瞬膜はない。鰓裂は大きく、頭部背面にのびる。背鰭は2鰭、背鰭棘はない。第2背鰭は臀鰭前方にあり、対鰭しない。臀鰭基底は狭い。尾柄部の背面と腹面に欠刻と側面に隆起がある。体色は一様に暗灰色である。

参考文献：2、6

2) *Prionance glauca* Linnaeus ヨシキリザメ

体は細長く、典型的なサメ型を呈し、尾柄隆起がある。噴水孔はない。第1背鰭は胸鰭のはるか後方にある。背面が鮮やかな青色、腹面は白い。

参考文献：3、6

3) *Carcharhinus brevipinna* (Muller et Henle) ハナザメ

背中線隆起はない。吻端はかなり尖る。上顎歯は幅の狭い三角形で、縁辺は鋸歯状となる。下顎歯には鋸歯はない。胸鰭、第2背鰭、臀鰭、尾鰭下葉の各先端は黒い。

参考文献：3、4

4) *Isistius brasiliensis* (Quoy et Gaimard) ダルマザメ

体は小さく、円筒形を呈する。棘のない小さな背鰭が2鰭あり、尾柄部付近に位置する。臀鰭はない。下顎歯は大きな三角形の主尖頭をもち、歯数は25～31個である。吻端はかなり短く、上唇の縁辺より頬部へ延びる膜上部よく発達し、上唇溝と口角部後方の溝を完全に覆い、吸盤状の口唇を形成する。尾鰭はほぼ左右対称形を呈する。

参考文献：2、6

5) *Manta birostris* (Donndorff) オニイトマキエイ

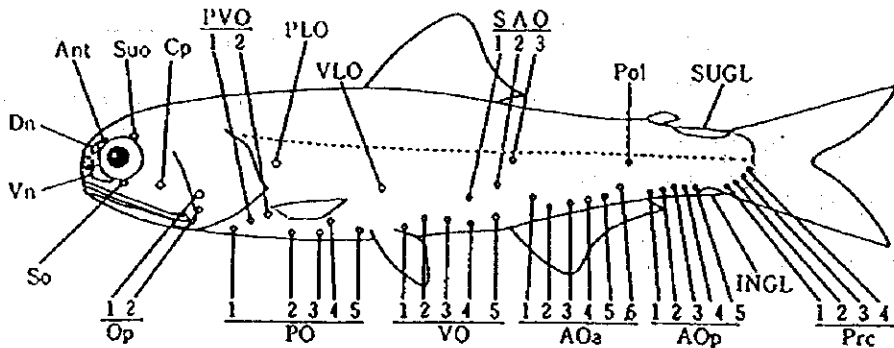
体は円盤状とで、目と噴水孔は頭部側面に開く。口は頭部前端に開き、鰓孔は腹面に開く。胸鰭の一部は頭部前端に突出して頭鰭となり、左右のものが互いに分離した耳状の鰭となる。尾柄部はムチ状で体盤より長く、棘はない。

参考文献：6、8

6) *Mobula japonica* (Muller et Henle) イトマキエイ

頭部は突出し、左右のものが互いに分離した耳状の頭鰭となる。口は腹面に開く。尾鰭はなく、尾柄部は長いムチ状となる。尾棘がある。

参考文献：6、8



ハダカイワシ科の発光器の配列

7) *Diaphus watasei* Jordan et Starks ハダカイワシ

発光器が腹部と頭部にある。Prcは2個以上である。Pol, Pvo1, Pvo2を結ぶラインは胸鰭起部に向かい直線となる。Vo1, Vo2, Vo3を結ぶラインも上向きの直線となる。DnとVnは頭部にある。尾柄上部と下部に発光器がない。Soがない。Vnは眼の前縁沿いに鼻孔まで広がる。Antがある。Dnは鼻孔より小さい。Ploは側線より胸鰭起部に近い。Sao3とPloは側線よりかなり下に位置する。

参考文献：6、8

8) *Diaphus gigas* Gilbert スイトウハダカ

発光器が腹部と頭部にある。Prcが2個以上ある。Pol, Pvo1, Pvo2を結ぶラインは胸鰭に向かい直線になる。Vo1, Vo2, Vo3を結ぶラインは上向きの直線となる。Dn, Vnは頭部にある。尾柄部の下部と上部に発光器がない。Suoはない。Vnは吻端部全体に広がる。Antがある。Ploは側線と胸鰭起部のほぼ中央にある。Sao3とPolは側線より発光器約1個分下にある。

参考文献：6、8

9) *Cypselurus cyanopterus* (Valenciennes) カラストビウオ

胸鰭は長くその先端は臀鰭後端に達する。腹鰭は長く、その先端は臀鰭起部を越える。腹鰭は尾鰭下葉起部より鰓蓋後端に近い。側線は胸部で分枝しない。臀鰭起部は背鰭第3軟条の下方もしくはその後方である。背鰭軟条は臀鰭軟条より2~4本多い。胸鰭の第1と第2軟条は不分枝である。

背鰭に黒色域がある。胸鰭鰭膜は一様に黒色であり、透明の斜走帯がない。尾鰭上葉は暗色である。

参考文献：6

10) *Cypselurus spilonotus* (Bleeker) チャバネトビウオ

胸鰭は長くその先端は臀鰭後端に達する。腹鰭は長く、その先端は臀鰭起部を越える。腹鰭は尾鰭下葉起部と鰓蓋後端の中央にある。側線は胸部で分枝しない。臀鰭起部は背鰭第3軟条の下方もしくはその後方である。背鰭軟条は臀鰭軟条より2~4本多い。胸鰭の第1と第2軟条は不分枝である。

背鰭に黒色域がある。胸鰭の紫褐色である。

参考文献：6

11) *Cypselurus unicolor* (Valenciennes) オオメナツトビ

側線は胸部で分枝しない。側線鱗数は57枚以下、背鰭前方鱗数は38枚以下である。胸鰭は長く、その先端は臀鰭後端に達する。胸鰭の第1軟条は不分枝である。背鰭軟条数は臀鰭軟条数より2~4本多い。腹鰭は長く、その先端は臀鰭起部を越える。臀鰭起部は背鰭第3軟条の下方か後方である。胸鰭鰭膜は透明で無紋である。背鰭に黒色域がない。

参考文献：6

12) *Cypselurus naresii* (Gunther) ウチダトビウオ

体は細長く、円筒形である。側線は腹縁に近い体側に走る。側線鱗数は45~48、背鰭前方鱗数は28~32である。下顎は短く突出しない。頭は背鰭基底長より長い。胸鰭は体側の上方にあり、その末端は臀鰭起部を越える。胸鰭は第一軟条のみが分枝し、他の軟条は不分枝である。背鰭軟条数は10~12である。尾鰭は2叉形を呈し、尾鰭下葉が上葉より長い。胸鰭の鰭膜は大部分が暗色であり、透明の斜走帯がない。背鰭の鰭膜は透明である。

参考文献：6

13) *Ablennes hians* (Valenciennes) ハマダツ

頭部と体は側扁し、細長い。吻端は長くのびる。鰓耙はない。背鰭軟条数は21~24、胸鰭軟条数は13~15、臀鰭は25~27である。側線は胸鰭起部で分枝する。体側に黒い斑紋がある。尾柄部に隆起線がない。

参考文献：6

14) *Tylosurus acus melanotus* (Bleeker) テンジクダツ

体と頭部は著しく側扁し、細長い。上顎と下顎はともに長く伸びる。上顎の犬

歯は垂直に生える。第一鰓弓に鰓耙がない。背鰭と臀鰭は対鰭する。背鰭の軟条数は24~27本である。尾柄部は側扁する。鰓蓋骨前部に暗青色の横帯がない。

参考文献：6

15) *Parastromateus niger* (Bloch) クロアジモドキ

腹鰭がない。ただし、幼魚にはある。背鰭棘部は皮膚に埋没する。体は側扁し、体高は高い。

参考文献：5、6

16) *Scomberoides commesonianus* Lacepede オオクチケカツオ

体は細長く、側扁する。側線上に稜鱗はない。第一鰓弓下枝の鰓耙数は15以下である。上顎の後端は眼の後縁下をはるかに越える。体側には親指で押したような斑紋がいくつか側線上に並ぶ。

参考文献：5、6

17) *Seliola rivoliana* Valenciennes ヒレナガカンパチ

体は細長く、側扁する。吻はまるい。側線には稜鱗はない。第1鰓弓下枝の鰓耙数は17~20である。第2背鰭の前部の形状は鎌状である。尾柄部に小離鰭がない。体側後半部に暗色縦帯がない。眼を通る暗色縦走帯がある。尾鰭下葉の先端は白くない。

参考文献：5、6

18) *Trachinotus bailloini* (Lacepede) コバンアジ

体は側扁し、体高は高く、頭長より大きい。吻端はやや尖る。眼には脂脰がある。側線には稜鱗がない。胸鰭は短く鎌状にのびない。背鰭棘は痕跡的で棘間に鰭膜がない。背鰭と臀鰭の軟条は長く鎌状を呈する。背鰭軟条数は21~25、臀鰭軟条数は20~24である。体色は背面部は灰緑色、腹面部は銀白色であり、体側に3~5個の黒色斑がある。

参考文献：6

19) *Megalaspis cordyla* (Linnaeus) オニアジ

体は細長く、側扁する。稜鱗は側線の直線部にあり、一枚の稜鱗の幅は上下に広い。脂脰はよく発達する。上顎歯は2列であり、外側の歯が大きく、円錐歯となる。第1背鰭の高さは第2背鰭より低い。第2背鰭と臀鰭の形状は鎌形を呈し、各鰭の末端にいくつかの小離鰭がある。

参考文献：5、6

20) *Decapterus akaadsi* Abe アカアジ

脂脰はよく発達する。背鰭前方鱗は両眼を結ぶラインを越え、吻端側に伸びる。稜鱗は側線直線部にある。鰓膜は滑らかである。鰓耙数は29~32である。第一背鰭は第二背鰭より高い。胸鰭は長く、第二背鰭起部を越え、後方に達し、頭長とほぼ等しい。小離鰭が第二背鰭と臀鰭の末端にある。

参考文献：5、6

21) *Carangoides orthogrammus* (Jordan et Gilbert) ナンヨウカイワリ

脂脰は未発達である。吻は尖り、その長さは眼径より長い。両顎歯は前方で歯帯を形成する。稜鱗は側線直走部の後半のみを覆う。胸部無鱗域は胸鰭起部にまでひろがる。背鰭棘は長く、棘間は鱗膜でつながる。腹鰭は短く、淡色である。体側には暗色横帯がなく、黄色点が散在する。

参考文献：5、6

22) *Coryphaena equiselis* Linnaeus エビスシイラ

体高は体長の25%以上である。舌にある歯帯の形状は四角形である。背鰭起部は頭部にあり、軟条数は52~59である。胸鰭の長さは頭長の約1/2である。背鰭と臀鰭に棘はない。尾鰭はその後縁が深く湾入する二叉形である。

参考文献：6、8

23) *Brama orcini* Cuvier マルバラシマガツオ

体は著しく側扁し、体高は高い。側線鱗数は48~55である。臀鰭には棘がない。尾鰭は二叉形の形状である。

参考文献：6、7、8

24) *Lobotes surinamensis* (Bloch) マツダイ

体は細長い楕円形で側扁する。背鰭には強固な棘が11~12本ある。体側鱗はやや大きめの櫛鱗で、体のほぼ全域を覆う。体色は暗茶色か緑っぽい黄色である。

参考文献：6、8

25) *Lepidocybium flavobrunneum* (Smith) アブラソコムツ

体は長円形で側扁する。歯は長く大きい。側線は1本で、体側を波を打つように上下する。背鰭軟条数は28~35本である。背鰭と臀鰭の後方に小離鰭がある。尾柄部には顕著な隆起線とその上下に小さな隆起線がある。

参考文献：6、8

26) *Ruvettus pretiosus* Cocco バラムツ

体は長円形で側扁する。体表はヤスリ状で、体側鱗は骨性の棘となる。腹部正中線に骨質隆起線がある。歯は長く大きい。側線は体側で波を打つように上下しない。背鰭棘数は12本以上である。尾柄部に隆起線がない。

参考文献：6、8

27) *Gempylus serpens* Cuvier クロタチカマス

体は細長く滑らかである。鱗は小さく、円鱗である。側線は2本である。腹部正中線上に隆起線がない。背鰭棘数は26~32本である。臀鰭軟条部の前方は退化的でない。背面と腹面の小離鰭の数は5~7本である。

参考文献：6、7、8

28) *Scomber austrasicus* Cuvier ゴマサバ

体は紡錘形で長い。全身は小さな鱗で覆われる。第一背鰭と第2背鰭の間はかなり離れる。小離鰭は5個である。脂鱗は眼の前部と後部を覆う。鰓耙は短く、口を開いても見えない。第一背鰭棘は10~13本である。腹面に小さな斑点が散在する。

参考文献：1、6、8

29) *Tetrapturus audax* Philippi マカジキ

腹鰭はある。吻端は長く、その断面は丸い。第一背鰭の高さは体側中央部の体高より低い。背鰭の先端は尖り、形は帆状でない。鰭の高さは後方に行くに従い低くなる。胸鰭、臀鰭の先端は尖る。

参考文献：1、6

30) *Psenes arafurensis* Gunther クラゲウオ

吻端は短い。鋤骨と口蓋骨に歯がある。背鰭と臀鰭の軟条数は15本以上である。背鰭起部は胸鰭起部の前か直上である。有孔側線鱗数は44~48である。側線鱗数は55~62である。

参考文献：6、8

31) *Psenes maculatus* Lutken シマハナピラウオ

吻端はやや長い。鋤骨と口蓋骨に歯がある。背鰭と臀鰭の軟条数は15本以上である。背鰭起部は胸鰭起部の前か直上である。有効側線鱗数は52、側線鱗数は

77~85である。

参考文献：6、8

32) *Psenes cyanophrys* Valenciennes スジハナピラウオ

体は楕円形を呈し、眼の後方の頭部に鱗がある。下顎歯と上顎歯同じ形状を呈し、鋭い。鋤骨と口蓋骨に歯がある。第一背鰭は9~11棘、第二背鰭は1棘 23~28軟条である。臀鰭は3棘 23~28軟条である。体側には数本の縦帯がある。

参考文献：6、8

33) *Cubiceps baxteri* McCulloch オキメダイ

体は細長い。鋤骨と口蓋骨に小さな歯がある。口蓋骨歯と舌の歯は1列である。頬部の鱗域は吻端付近に達する。胸鰭の幅は広く、長い。通常、頭長より長い。体色は暗い茶色である。

参考文献：6、8

34) *Nomeus gronovii* (Gmelin) エボシダイ

体は細長く、伸張する。涙骨は主上顎骨に大部分が被われる。体表は円鱗で被われる。側線有孔鱗数は44~65である。頭部背面域には無鱗域がなく、両眼間域に達するかまたそれを越えて前方に広がる。胸鰭は長く、その先端は臀鰭起部をこえて後方へ伸びる。胸鰭の鰭膜は一様に黒く、下葉付近は白い。背鰭軟条数は23~27、臀鰭軟条数は21~23である。

参考文献：6

35) *Ariomma indica* (Day) マルイボダイ

体は側扁し、卵形であり、体高は高い。体表は小さな円鱗で被われ、剥がれやすい。側線は背縁とほぼ並行して走り、その末端は尾柄部に達しない。涙骨は主上顎骨に被われる。歯は両顎上で歯帯を形成するが、鋤骨、口蓋骨、舌には歯がない。鰓耙は長く、鰓耙数は23である。臀鰭は普通3棘 15軟条であり、起部は第2背鰭のやや後方である。体色は銀白色であり、背面部はやや紫色を帯びる。腹鰭は白っぽく、他の鰭にはすべて黒点がある。

参考文献：6

36) *Cubiceps pauciradiatus* Gunther ホソオキメダイ

体は細長い。鋤骨と口蓋骨にはこぶ状の歯帯がある。舌の表面に楕円形の歯帯がある。頭部の鱗は吻端近くに達する。第一背鰭は10~11棘、第二背鰭は1棘

15~17 軟条である。臀鰭は 2 棘 14~16 軟条である。細い骨質隆起線が胸部にある。

参考文献：6、8

37) *Cubiceps sqamiceps* (Lloyd) ボウズコンニャク

体高はやや高く、体長 30%以上である。鋤骨と口蓋骨に小さな歯がある。頬部の鱗は眼の前縁近くに達する。背鰭軟条数と臀鰭軟条数はともに 18~21 である。

参考文献：6、8

38) *Remorina albescens* (Temminck et Schlegel) シロコバン

頭頂は平たく、薄片状の吸盤がある。吸盤の板状体の数は 12~14 個である。体は太短く、体高は体長の 1/5~1/8 である。背鰭と臀鰭の基底は頭長の 2 倍より小さい。背鰭の軟条数は 17~22 である。体色は灰白色ないし白である。

参考文献：6、8

39) *Remora remora* (Linnaeus) ナガコバン

頭頂は平たく、薄片状の吸盤があり、吸盤の板状体の数は 14~27 個である。体は太短い。背鰭軟条数は 22~26 本である。

参考文献：6、8

40) *Melichthys vidua* (Solander) クロモンガラ

体は硬く、板状の骨質の鱗で覆われる。眼前に 1 縦溝がある。前歯は白く、突出しない大きさのほぼ同じの門歯状である。第 2 背鰭と臀鰭は白い。背鰭第 3 棘はきわめて小さい。尾柄部は側扁する。尾鰭は下葉上葉ともに延長しない截形である。

参考文献：6、8

41) *Lagocephalus lagocephalus oceanicus* Jordan et Fowler クマサカフグ

体表の背面と腹面に小棘が分布する。側線がある。鰓孔は黒い。胸鰭は上半分が黒い。尾鰭は 2 重湾入形を呈し、下葉先端は上葉より長い。

参考文献：6、8

42) *Diodon eydouxi* Brissout et Barreille ヤセハリセンボン

体は丸く、棘が全身に生える。棘は眼径より長く可動性である。上下顎の歯は融合し、くちばし状となる。尾柄背面は全く棘で覆われる。背鰭と臀鰭の先端は尖る。背鰭と尾鰭に黒点が散在する。

41) *Lagocephalus lagocephalus oceanicus* Jordan et Fowler クマサカフグ

体表の背面と腹面に小棘が分布する。側線がある。鰓孔は黒い。胸鰭は上半分が黒い。尾鰭は2重湾入形を呈し、下葉先端は上葉より長い。

参考文献：6、8

42) *Diodon eydouxii* Brissout et Barreille ヤセハリセンボン

体は丸く、棘が全身に生える。棘は眼径より長く可動性である。上下顎の歯は融合し、くちばし状となる。尾柄背面は全く棘で覆われる。背鰭と臀鰭の先端は尖る。背鰭と尾鰭に黒点が散在する。

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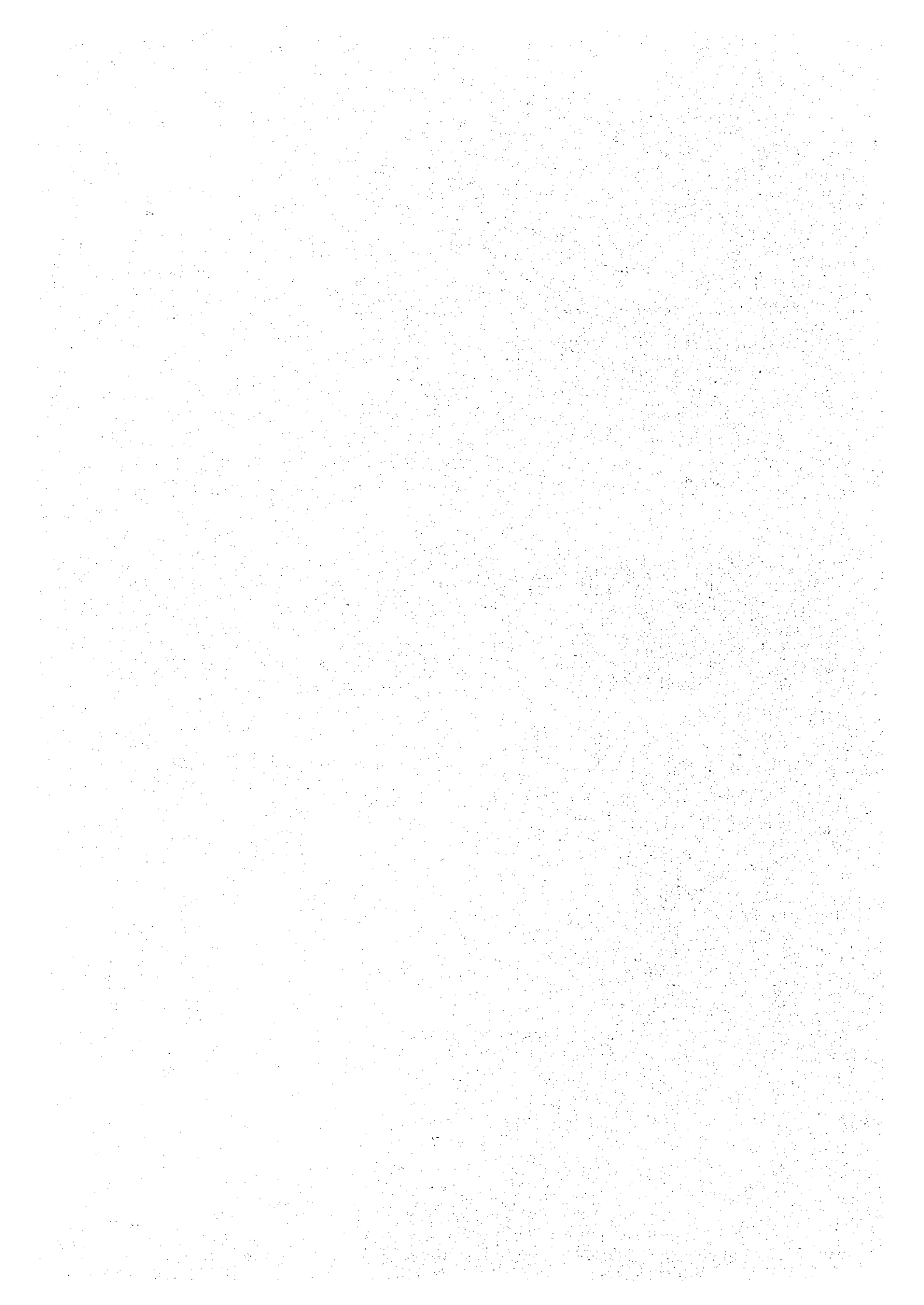
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4

陸上調査資料収集方法と

その解析方法



Manual for Field Enumerators

PROJECT FOR FISHERY RESOURCE SURVEY IN VIETNAM (Fisheries Production and Economics)

CONTENTS

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IC Net Limited

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1. The Objective of Survey

It is well known that, like agriculture, fisheries are one of the most important industries in Vietnam. The output of fisheries has increased rapidly. Especially, its export shows a remarkable increase. The fishery sector not merely contributes to provide people with food but also to a large part of the Vietnamese export.

For the sustainable development of fisheries, we ought to consider several things. For instance, constructing and keeping fishing ports and other infrastructure in good conditions are necessary. It is also necessary to understand what sort of fish are sold well, and where and when. Moreover, the nationwide road network and trucks with refrigerator may be needed to transport fresh fish to many cities. Fishing boats to catch more fish are, of course, vital to further expansion of fisheries.

Upon taking these things into considerations, we have to realize the most basic point that catching too much fish now would lead no fish in the future. Once fish resources are scarce, it is very difficult to recover them. This is not an unusual case; it actually happened in many parts of the world. Fortunately, Vietnamese marine resources have not deteriorated that far. Fish as our future's precious food and export merchandise have to be preserved.

Then, how can marine resources be preserved? First of all, one should know what kind of resources and how much exist in the Vietnamese sea and how Vietnamese fishermen are exploiting them. This survey is organized for this purpose. The survey is roughly divided into two parts. One is to research fishery resources in the sea. The other is to conduct a series of socio-economic surveys on fish production, fishing gear and boats, fishermen and their communities at five major fishing ports. To obtain an accurate picture about fishery resources and the present situation of fisheries, a lot of information have to be collected. Although we might sometimes disturb business of fishermen and other people when we ask questions, let us make our best efforts to secure their cooperation.

Information gathered through this survey will be widely utilized. Precise and sufficient knowledge on the present status of fisheries will help us identify what are needed for future fisheries development, and where and to what extent. Information and knowledge will be very useful for the national and local governments when formulating fisheries development plans. At the same time, the information and knowledge will facilitate international donors and private investors to make correct judgments on how to involve themselves in fisheries development in Vietnam. As the Vietnamese fishery resources now attract a great deal of international attention, it is quite important for the governments, both central and local, to be able to provide up-to-date and reliable information to potential investors.

As fisheries grow, various other businesses such as fish processing, export business, refrigerator manufacturing and shipbuilding will also be stimulated. Above all, it is most important and useful for fishermen themselves to know their own industry and resources they depend on. The survey will require our sincere efforts and even patience to collect as precise data as possible, with the method the following section explains.

2. Survey Items

In order to grasp the accurate situation of the Vietnamese fisheries sector, in the most strict sense, all Vietnamese fishing ports and villages have to be surveyed. However, that is unrealistic since such a nation-wide project demands too much money and time. Under this project, therefore, survey will be conducted only at five major fishing ports, and if necessary make estimations on the national fisheries sector as a whole. These five fishing ports are as follows;

- Dong Hoi Port
- Da Nang Port
- Nha Trang Port
- Phan Thiet Port
- Bung Tau Port

The eight important aspects which we envisage to investigate through this project are listed below. They are critical elements to better understand the fishing sector.

- (1) Catches in Quantity and Value and Their Seasonal Changes
- (2) Fish Species Composition and Fish Prices
- (3) Ratio of Trash Fish to Total Catch
- (4) Freshness and Post-Harvest Loss
- (5) Fishing Grounds
- (6) Fishing Boats and Gear
- (7) Fishing Productivity
(catch in quantity per boat by type of fishery, catch in quantity per fisherman)
- (8) Fishery Infrastructure

Now, for understanding these aspects, we will carry out a series of investigation, with various survey items. These items can be divided into two categories. One is concerned largely with "quantity", the other is concerned more with "feature" than "quantity" or numbers.

Let us elaborate on "quantity-type" items, first.

1. The Number of Fishing Boats: to survey of how many boats are engaging in fisheries.
2. The Number of Fishing Units: to survey groups of fishing boats catching fish together.
3. Catch in Quantity: to survey how much is caught and landed by species at each fishing port.
4. Catch in Value: to survey of how much income is generated by fishermen selling fish.

Next, as to the "feature-type" items, it is to investigate of how and what kind of fishing boats catch fish, with what kind of fishing gear.

5. Fishing Boats: to survey the type, size and capacity of fishing boats and their engines.
6. Fishing Operations: to survey of how many fishermen are on boats, how many boats are working together, what type of fishing gear is used, and where fishermen go to fish.
7. Fisheries Infrastructure: to survey of how many and on what scale fisheries-related facilities are located in the five fishing ports, including pier, market, water supply, electricity, cold storage and ice plant.

3 The Method of Survey

3.1. Preparation Before Survey

(Selection and Determination of a Sampling Ledger)

In this section, we discuss how to conduct this survey. After procedures required for preparing the survey is explained, the items described above are examined one by one.

The first thing to do is to determine the sampling ledger. It is very difficult to investigate all fishing boats in the five fishing ports. If we could survey all boats there, of course, the most accurate and detailed information would be available. However, in reality, it takes many years and needs much more manpower. Like many other social surveys, this project will therefore conduct the survey by extracting samples, and for this purpose a sampling ledger is needed. When we do not select samples in a right way, even if the method of survey itself is correct afterward, survey results will not be reliable. Therefore, first of all, one has to be careful in determining the sampling ledger, and there are four important points for this.

1. The sampling ledger should be appropriate to the objective of the survey. It is naturally essential that the selected sampling ledger must contain sufficient information

of the targeted population.

2. There should not be large bias and skewness in data of the sampling ledger.
3. If a part of the targeted population is missing in the sampling ledger, an appropriate measure(s) should be taken to compensate it.
4. The sampling ledger should contain recent information. As things change very rapidly today, one has to be careful about how old the sampling ledger is.

As this project will investigate fisheries, these ledgers such as registration records of fishing licenses, fishing boats and fishermen, a taxation ledger, and documents of fishery cooperatives could be possibly used as a sample ledger. However, based on the ex-ante field trip JICA already had in these fishing ports, the taxation ledger of fishing boats seems to be most suited as a sampling ledger since it meets four requirements mentioned above.

First of all, the taxation ledger prepared at each port includes information about every fishing method and gear, the size of fishing boats, their engine horsepower. Secondly, since the taxation ledger is renewed every year, its information is relatively up-to-date. Thirdly, according to the ex-ante fieldwork, leakage from the taxation ledger appears to be within a manageable range. In other words, the concern about tax-evading fishermen exists but is not very serious in Vietnam. On the basis of these considerations, it seems reasonable to adopt the taxation ledger as the sample ledger of our survey. In case, however, any crucial problem arises during fieldwork in using taxation ledgers, we must be flexible to change to turn to other documents to be used as a sampling ledger.

3.2. Sampling

This section describes in what ways and how many samples should be selected. When it comes to choose samples, specifically in this case, an appropriate number of fishing boats must be representing each type of fishery. The taxation ledgers prepared by prefectural fishery departments contain information of the number of fishing boats in each district, their gross tonnage, horsepower, the number of new boats, the number of boat classified by fishery, etc.. It is also an advantage of the taxation ledger that formats used at different fishing ports are somehow uniform.

This survey is aimed at clarifying how much and what kind of fish are caught by what kind of boat in what ways. Therefore, let us pay attention to two sections of the taxation ledger; they are "the number of boats classified by the type of fishery" and "the number of boats classified by length." The selection of samples should not be skewed in

terms of length of boats within each type of fishery.

The first issue is the determination of the number of fishing boats as samples. We may select boats using a table like Table 1 below. In Table 1, L means the length of fishing boats, which are classified into four categories.

Table. 1

	L<8m	8m<L<15m	15m<L<20m	20m<L	TOTAL
Trawl	3	3	3	3	12
Purse Seine	3	3	3	3	12
Gill Net	3	3	3	3	12
Lift Net	3	3	3	3	12
Set Net	regardless of length of hull				12
Shrimp Trawl	3	3	3	3	12
Others	3	3	3	3	12

Table 1 indicates that three samples have to be collected for every cell. There must be at least two samples in each cell so as not to make data skewed. Practically, however, three is the minimum number for samples, if one out of three samples is considered an unreliable data for whatever reasons. Even if every three samples collected in each cell are "usable", the total number of samples will amount to 84. If only two samples are all right, the total will be 56. We must, therefore, secure at least 56 good samples.

The next issue is how to select samples. "simple random sampling" is one of the most basic statistical method. However, although the principle of "simple random sampling" is indeed simple, it has some complications in practice. For example, the larger the number of samples is, the more cumbersome its procedures will be. In simple random sampling, a random number table always has to be used to select samples. In order to avoid such a disadvantage, this survey will adopt "systematic sampling" which is another kind of random sampling method. Although the systematic sampling at first similarly uses a random number table, samples are later selected at an interval, without depending on the table. The interval of sampling can be simply calculated by dividing the number of the targeted group (statisticians call it "population") by the the number of required samples. As samples selected through this procedure are supposed to have the same character with the "population", we can avoid the problem of simple random sampling. As discussed earlier, this survey will select samples in each type of fishery classified in taxation ledgers prefectural fisheries departments compile.

3. 3. Survey Items

1) The Number of Fishing Boats

As to the number of fishing boats, this survey will use "the number of boats" classified by the type of fishery in taxation ledgers to estimate actual numbers of fishing boats, together with the results of questionnaires for which we will discuss later. We consider that data of taxation ledgers must be verified since criteria used to collect data for taxation ledgers may vary from prefecture to prefecture. For instance, some prefecture do not include non-powered boats in their taxation ledger, while others do. Before one relies on one single set of data, it is always better to check other data to verify it.

2) The Number of Fishing Unit

The term "fishing unit" may not sound familiar. The fishing unit is a group of fishing boats, more precisely a group of fishing boats and other boats such as transportation boats and light boats needed to carry out a certain fishery. It is very important to know the number of fishing unit because the fishing unit is the smallest operational unit for that fishery.

In order to know the number of fishing unit, it is recommended to examine different information sources such as records concerning fishing license, fishing gear license, and information from fishermen's cooperative associations. Again, it is better not to depend on one single source of information. In this survey, the number of fishing unit will be calculated from the number of fishing boats classified by type of fishery and from information obtained through questionnaires, which will include a question: "Do you catch fish by cooperating with other boats?" and "If so, how many boats are cooperating in your group?"

3) Catch in Quantity

a) Catch by the Type of Fishery

In this survey, we also assume a conservative position towards the reliability of the existing catch data. It means that we had better not to easily depend on the existing data and instead make every efforts to increase the reliability of data collected through this survey. As shown in Table 1 on page 6. This survey will select three fishing boats (or units) of the same size from each type of fishery. (However, in case of set net, the size of fishing boats is not an important factor due to its character of operations.)

Taking trawlers less than 8m as an example, let us first label their total monthly catch as TR1 (see Table 2 below). Similarly, we call TR2 for the total monthly catch from

all trawlers belonging to the class from 8m to 15m. This survey will pick up three boats as samples in each cell. The individual monthly catches of, for example, three sample trawlers less than 8m can be labeled as TR1.1, TR1.2, TR1.3 respectively. Of course, TR1.1 means a monthly catch of the first of the three trawlers.

Table. 2

	L<8m	8m<L<15m	15m<L<20m	20m<L	TOTAL
Trawl	TR1	TR2	TR3	TR4	TR
Purse Seine	PS1	PS2	PS3	PS4	PS
Gill Net	GN1	GN2	GN3	GN4	GN
Set Net	regardless of length of hull				SN
Lift Net	LN1	LN2	LN3	LN4	LN
Shrimp Trawl	ST1	ST2	ST3	ST4	ST
Other Fisheries	OF1	OF2	OF3	OF4	OF

With the formula below, we can calculate TR1 that is an estimated total catch by all trawlers belonging to the class less than 8m.

$$TR1 = (TR1.1 + TR1.2 + TR1.3) \div 3 \times \text{the Number of Boats in the Same Class}$$

Then total monthly catches by type of fishery can be obtained by adding up all catches of different sizes. For example, the total catch of all trawlers (TR) will be calculated with the formula below.

$$TR = TR1 + TR2 + TR3 + TR4$$

Lastly, the total fisheries production (TFP) -- that is, the grand sum of catches from all fisheries can be calculated with the formula below.

$$TFP = TR + PS + GN + SN + LN + ST + OF$$

b) Catch by Species

The calculation of catches classified by species is basically the same as that of catch classified by the type of fishery. By the same token, let us assume a conservative position towards the reliability of the existing catch data by species.

Catch data by species gathered through this survey will be filled out in a table like

Table 3. It is desirable to let fishermen fill out the tables by themselves if they volunteer to do so. In many cases, however, surveyors may have to fill them out through interviews with fishermen. The names of important species should be put in advance in the column of species as this will lessen burden on cooperating fishermen. Securing cooperation of fishermen is an important consideration in gathering accurate data effectively.

Table. 3

Trip Number		1	2	3	4	5	6	Total	Fish Price Per Kg	Notes
Species	Fish Name	12.3	23.4	34.5	45.6	56.7	67.8	240.3		average 40.05 Kg

Catches classified by species will also be calculated on a monthly basis. Let us practice it, taking an example from Table 3. This is a case that a fishing boat went out six fishing trips in the previous month. First, put catch volumes by species at individual fishing trips. The catch in the first trip was 12.3 kg. The catch in the second trip was 23.4 kg and so on. Next, sum up these catches and get the total catch of 240.3 kg. Then, put the average catch per trip in the last column.

This sum is the total catch by species harvested by a sample boat in the previous month. Since this survey will collect three samples in each cell in Table 1, the per boat average must be calculated for every cell. Finally, the total catch of a certain species in a cell can be estimated by multiplying the per boat (or per unit) average by the number of fishing boats (or units) in a cell.

<p>Total Catch by Species in a Cell = Average Catch by Species × the Number of Boats (or Units) in the Cell</p>

Next, the total catch by species can be calculated on a fishery-by-fishery basis such as trawlers, purse seiners and gill netters, etc. by adding up all figures in cells under a certain type of fishery.

Total Catch by Species in a Fishery = Sum of Total Catches by Species in All Cells under the Fishery
--

Furthermore, the total catch by species from all fisheries can be derived by summing up these fishery-specific total catches.

Total Catch by Species in All Fisheries = Grand Sum of Total Catches by Species in Every Fishery
--

4) Fish Prices

Average fish prices could be easily calculated by dividing the total production value by volume if we have reliable data about the total catch (or production) volume and value. Nevertheless, as we set very cautious attitude about the reliability of the existing statistics, we should not jump to the conclusion in such a haste way. Again for fish prices, we have to collect data in the field by ourselves.

Fish prices can possibly be investigated in two places. One is fish markets where fish prices are formed through numerous negotiations between fishermen and various kinds of buyers. Checking fish prices in markets frequently is a basic requirement to know fish prices. Fish prices constantly change according to supply and demand in markets. Therefore, it is important to go to markets, check prices and identify factors affecting fish prices.

The other place is processors. The fish landed are divided into two streams; one stream is for fresh fish and flows to consumers through fish shops or venders, and the other stream flows to processors who produce various fish-based products such as canned, frozen, and dried fish, fertilizer, and so on. On the one hand, fresh fish usually pass through fish markets, and therefore, as far as fresh fish are concerned, it may suffice to survey prices in markets. On the other hand, some fish are directly purchased from fishermen by processors, bypassing fish markets, and it is thus necessary to go to processors to inquire fish prices for processing. It may be good enough to visit several big processors once or twice a month because they usually keep records of prices and quantities of purchased fish. Data gathered at processors may also be useful to crosscheck catch data we discussed in the previous sections.

5) Fishing Boats

We will study fishing boats by examining the following aspects with questionnaires.

- Hull: length, width, depth, capacity, materials.
- Engine: powered or non-powered, outboard engine or inboard engine, horse power, fuel.
- Year of Building
- Fishing Gear : major and subsidiary fishing gear used by fishing boats
- Fish Preservation Facility: facilities for freezing, cold storage, chilled watering, icing, salting.

6) Fishing Operations

We will also use questionnaires to study fishing operations, specifically in the following aspects.

- Average Length of Fishing Trips: Ideally, fishermen will be requested to record the number of days spent for each fishing trip. If difficult, let us check it through interviews.
- The Number of Crew Members
- Fishing Grounds: Questionnaires will include a simple chart with which fishermen can possibly locate their fishing grounds.
- Fishing Unit (Fleet) : If more than one boat catch fish together, we will clarify composition of fishing unit (or fleet) .
- Fish Preservation Method: This is closely related to "Fish Preservation Facility" discussed above. The difference is that this is aimed at knowing how fish are actually preserved onboard. Selection will be made among various preservation methods in the questionnaire.
- The Disposal of Trash Fish :Fish that cannot be sold for human consumption but have a limited economic value are categorically called as "trash fish." This survey will check how they are disposed. Trash fish may be discarded in the sea, may be used as raw material for fish meal or for fish sauce, or may be used for animal feed. A composition of choices in the questionnaire must properly reflect local situation.

7) Fisheries Infrastructure

Survey on fisheries infrastructure has an apparently different purpose from other types of surveys; this is aimed at shedding light on the present status of as well as future needs for fisheries infrastructure. Specifically, fishing port facilities, market facilities, and processing facilities will be checked out at each fishing port. Their capacities will be described in appropriate terms including m² , ton, Km, etc.

- Port Facility: landing pier (or jetty), mooring jetty, shipyard, anchorage, breakwater, port office, fuel tank, fuel station, water tank, water supply, sewage, crew lodging facility.

- Market Facility: market hall, market office, retail market, warehouse, cafeteria, communication facility, access road, parking lot, truck scale.
- Processing Facility: ice plant, ice storage, cold storage, standby generator house.

4. Important Considerations for Conducting Survey

In order to ensure successful implementation of this survey, there are several aspects to which those engaging in the survey should pay adequate attention. Here, let us focus on a few of them which we consider are particularly relevant to this survey.

First, it is very critical to have a good questionnaire which include an appropriate set of questions and answer choices. The questionnaire should not be too long and be contained within a time limit of respondents patience. It would be helpful for communication between respondents and surveyors if surveyors have i) cards (rather than books) illustrating important species and fishing gear and ii) maps and charts.

Second, we must be aware that some survey items are relatively constant regardless of timing of survey while data on other items would be highly changeable and time-specific. The former type of items include the numbers of fishing boats and fishing units which do change over time but most likely in a predictable pace. Fishing boat and fisheries infrastructure would not change rapidly either. On the other hand, the latter type of items include catch data, fish prices and fishing operations. It is always desirable to follow up these items regularly so that we will be able to know their changes in a time series. Nevertheless, since we are always under constraints in terms of time, budget and manpower, it is impractical to expect a perfect survey. Often the best approach to this problem is to construct questionnaire covering over a certain period of time, maybe last six months or last twelve months and to pay attention to the changeable nature of these survey items.

Last but not least, we must be very careful about the attitude of surveyors during fieldwork. In some countries, surveyors who are usually government officials and university students are not always polite towards respondents such as fishermen and middlemen because of their social status and influence. If this actually happens, we may not be able to expect cooperation and honest answers from respondents. In order not to intimidate respondents, surveyors must wear, ask and talk in a locally amicable manner. It is also important for surveyors to clearly explain respondents that their survey is not intended to collect more tax.

5. Analysis and Compilation of Survey Results

On page 3 of this manual, remember that we have listed the eight important aspects we aim to understand through this survey. Now, let us return them and discuss how to analyze and compile survey results in the context of these eight aspects. It is also useful to

consider how to present survey results effectively.

(1) Catches in Quantity and Value and Their Seasonal Changes

Our survey already covers both quantity and value of catches. Seasonal catch changes can be better understood with graphs of monthly catch data.

(2) Fish Species Composition and Fish Prices

Fish species composition can be understood by calculating the catch ratio of each species against the total catch. A raider type graph may be suited to visually present fish species composition. Fish prices can be known with information from sample fishing boats and be double-checked through investigation at fish markets and processors.

(3) Ratio of Trash Fish to Total Catch

Approximate ratio of trash fish can be calculated from information from fishing boats.

(4) Freshness and Post-Harvest Loss

Our survey will investigate preservation methods adopted by fishing boats. We can also check the freshness of fish and how they are landed at the five fishing ports. All these kind of information will help us estimate post-harvest loss.

(5) Fishing Grounds

Information from sample fishing boats on fishing grounds can be visualized by plotting the number of boats operating in grids on charts. Data should be presented by the type of fishery and on a seasonal basis.

(6) Fishing Boats and Gear

The survey is designed to have an adequate coverage over fishing boats and gear. However, we have yet to find out ways to present the survey results effectively.

(7) Fishing Productivity

Fishing productivity can be derived from various data on the number of fishing boats (units), catches, fish prices and operation costs. We will be able to present with graphs productivities in the cross section of different types of fisheries.

(8) Fishery Infrastructure

Maps of fishing ports showing the location of various facilities will help understand the present condition of fishery infrastructure. A matrix of existence (○) and nonexistence (X) will also be a good idea to compile survey results.

QUESTIONNAIRE

Sample No. _____

Province : _____ District : _____ Date : _____
 Name of boat : _____ Name of major landing center : _____

◎FISHING BOAT

• Tonnage : _____ t.
 • Dimension of hull Length : _____ m Width : _____ m Diphth : _____ m
 • Powerd Boat → Horsepower _____ Hp • Fuel in use Gasoline
 Non-powerd Boat Diesel Oil
 • Name of Registered Port : _____ Others
 • Year of building : _____
 • Material used for hull : Wood Steel Fibreglass Others

◎OPERATIONS

• Type of Gear

[Trawl]	[Set net]	[Lift net]
<input type="checkbox"/> Double rig shrimp trawl	<input type="checkbox"/> Large set net	<input type="checkbox"/> Boat/Raft lift net
<input type="checkbox"/> Otter trawl	<input type="checkbox"/> Small set net	<input type="checkbox"/> Scoop net
<input type="checkbox"/> Other trawls		<input type="checkbox"/> Other lift net

[Purse seine]	[Hook and line]
<input type="checkbox"/> Purse seine	<input type="checkbox"/> Tuna long line
<input type="checkbox"/> Beach seine	<input type="checkbox"/> Drift long line other than Tuna
	<input type="checkbox"/> Set long line

[Gill net]	<input type="checkbox"/> Skipjack pole and line	[Trap]
<input type="checkbox"/> Drift gill net	<input type="checkbox"/> Other pole and lines	<input type="checkbox"/> Stow net
<input type="checkbox"/> Encircling gill net	<input type="checkbox"/> Troll lines	<input type="checkbox"/> Portable trap
<input type="checkbox"/> Shrimp gill net		<input type="checkbox"/> Other traps
<input type="checkbox"/> Set gill net		

• Fishing place : _____
 • Number of crew : _____
 • Do you catch fish, forming fishing fleet? :
 Yes → Fleet composition : _____
 • Preservation method : Freezing Icing Others(_____)
 Chilling water Refrigerating Salting
 • Quantity of Trash Fish Quantity or Percentage : _____ kg/ _____ %
 • Disposal of Trash Fish _____
 • The cost of maintenance/year : _____

©FISHERIES INFRASTRUCTURE

{Port Facility}	{Market Facility}	{Processing Facility}
<input type="checkbox"/> Landing Pier (or jetty)	<input type="checkbox"/> Market hall	<input type="checkbox"/> Ice plant
<input type="checkbox"/> Mooring jetty	<input type="checkbox"/> Market Office	<input type="checkbox"/> Ice storage
<input type="checkbox"/> Shipyards	<input type="checkbox"/> Retail market	<input type="checkbox"/> Cold storage
<input type="checkbox"/> Anchorage	<input type="checkbox"/> Warehouse	<input type="checkbox"/> Standby generator house
<input type="checkbox"/> Breakwater	<input type="checkbox"/> Communication facilities	
<input type="checkbox"/> Port office	<input type="checkbox"/> Access road	
<input type="checkbox"/> Fuel tank	<input type="checkbox"/> Parking lot	
<input type="checkbox"/> Water land	<input type="checkbox"/> Truck scale	
<input type="checkbox"/> Water supply		
<input type="checkbox"/> Sewage facilities		
<input type="checkbox"/> Crew lodging		

Catch by Species in Each Trip

No. Trip	1	2	3	4	5	6	Total	Catch in Value/Kg	Notes
Trip Days									
Date									
Gear									
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
Trash Fish									
TOTAL									

N A M E O F F I S H

5

付 図

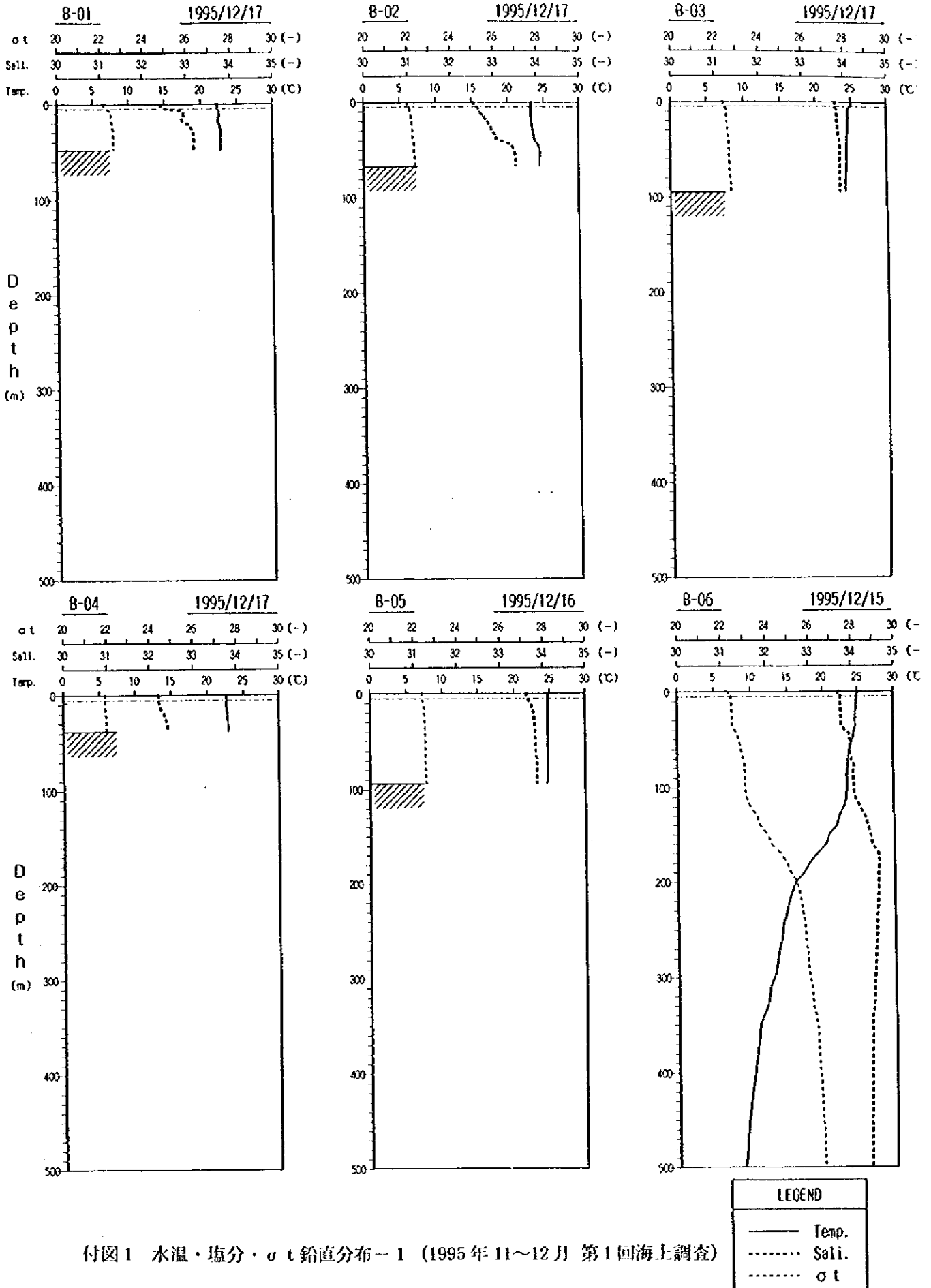
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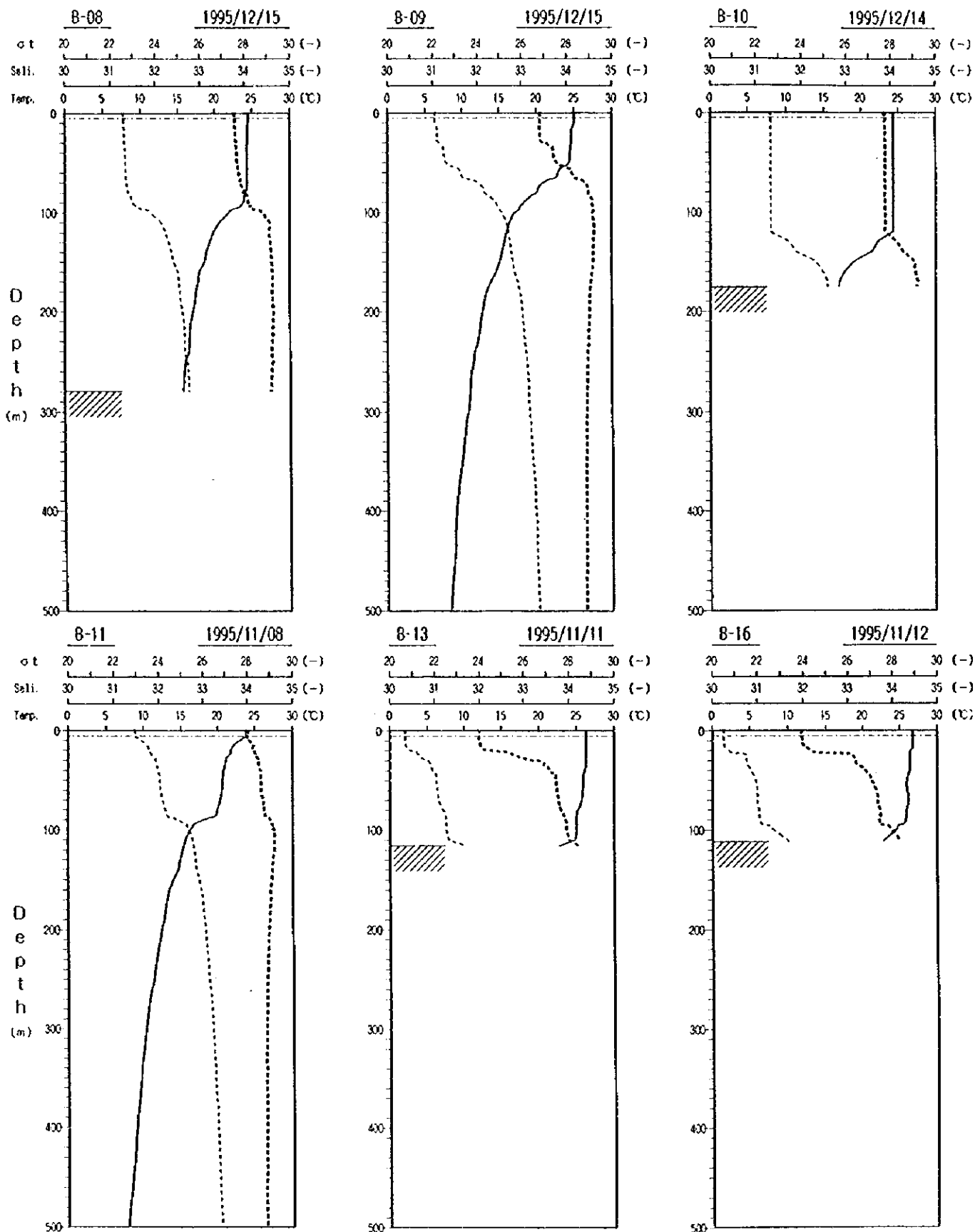
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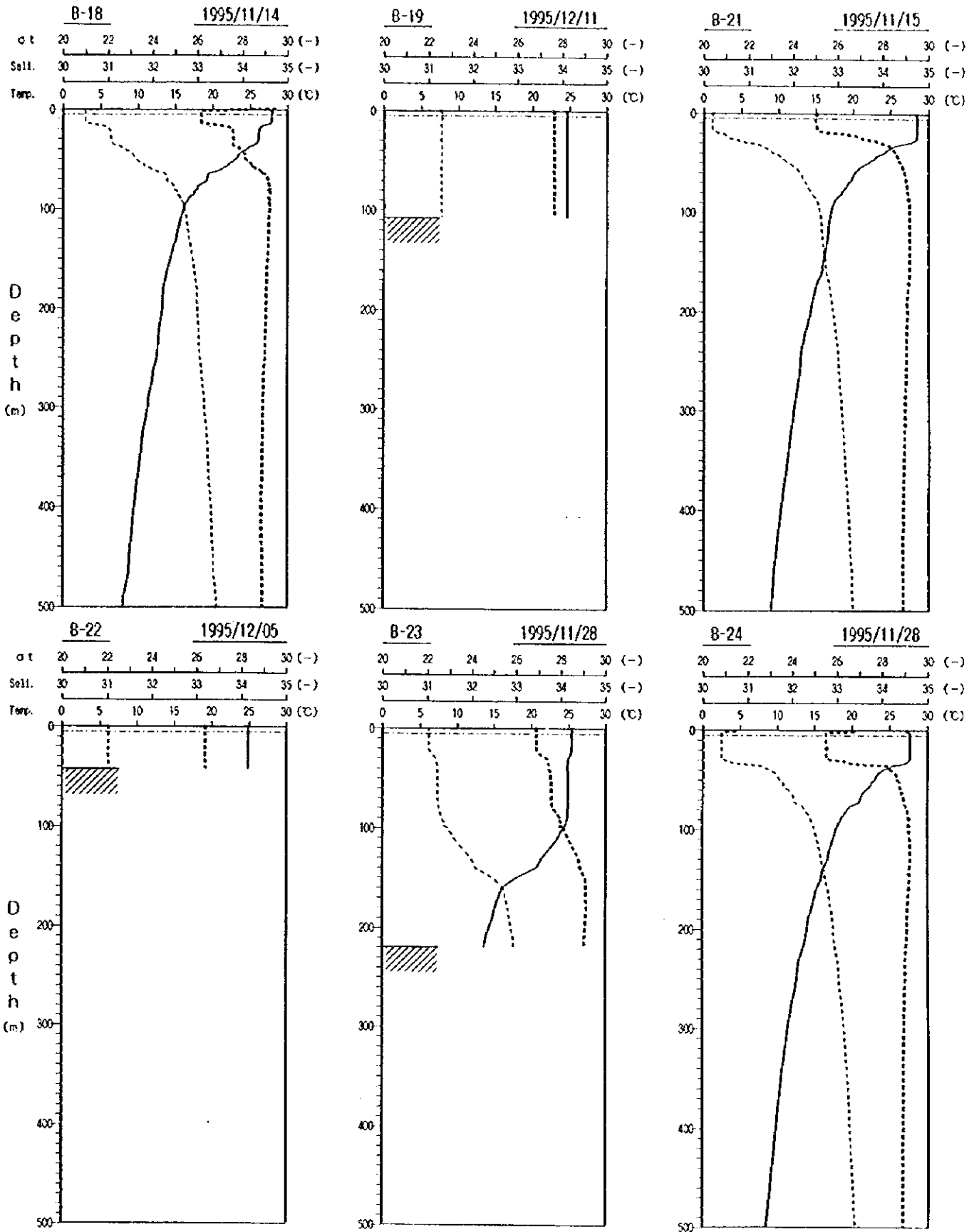


付図1 水温・塩分・ σ_t 鉛直分布-1 (1995年11~12月 第1回海上調査)

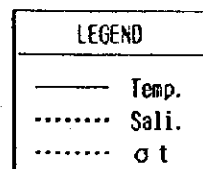
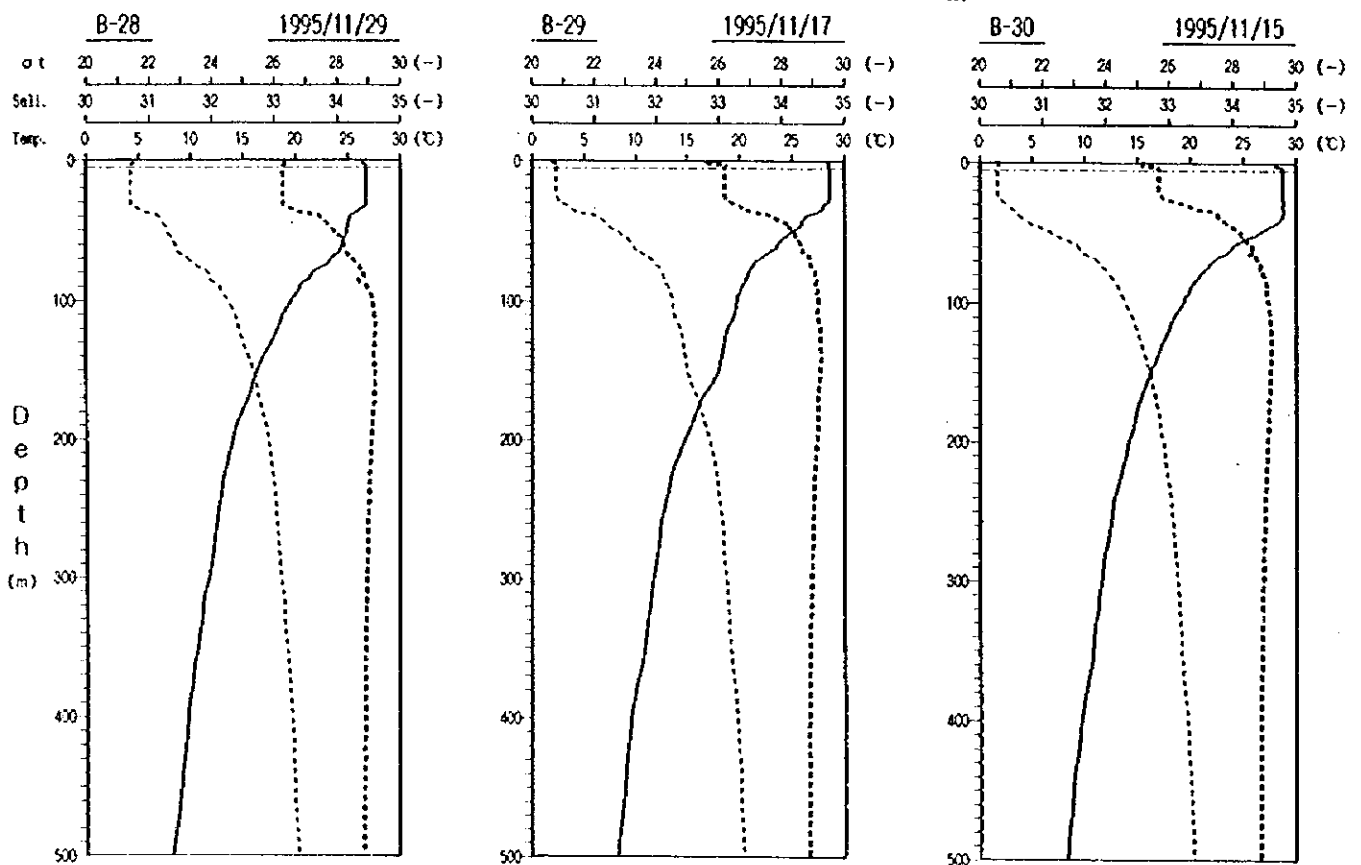
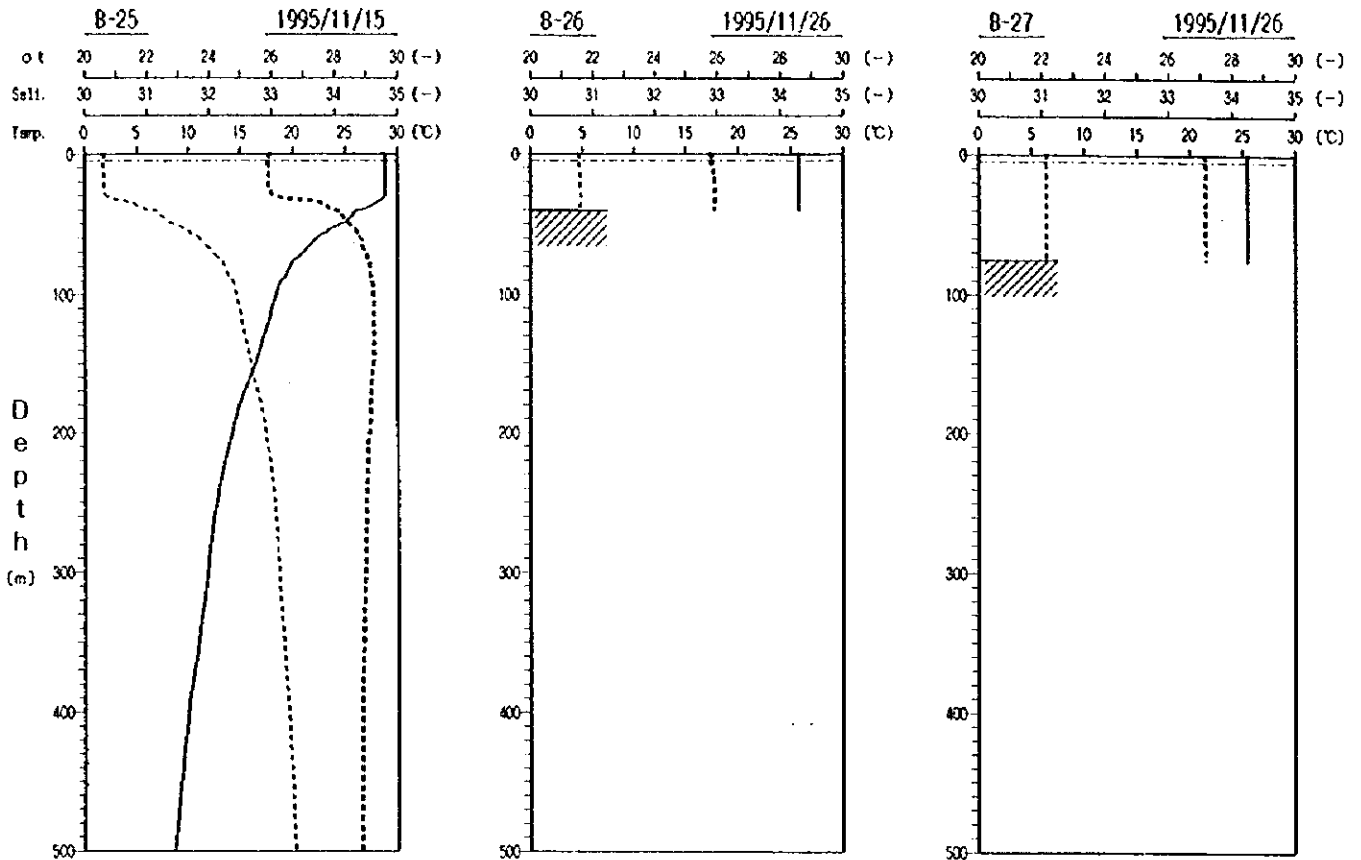


LEGEND	
—	Temp.
.....	Sali.
-----	σ_t

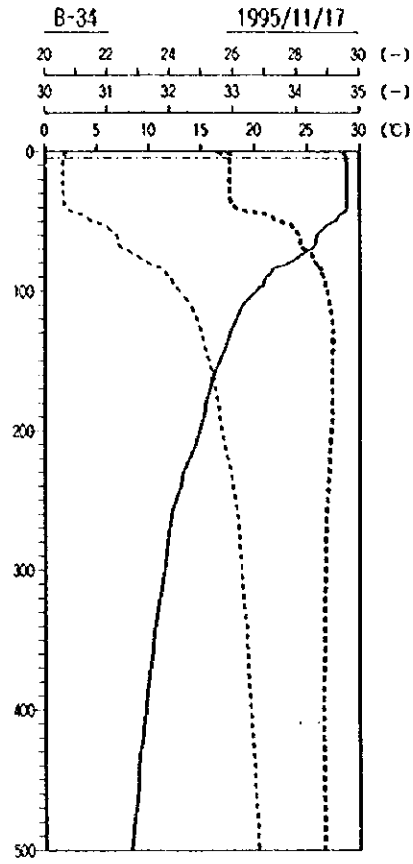
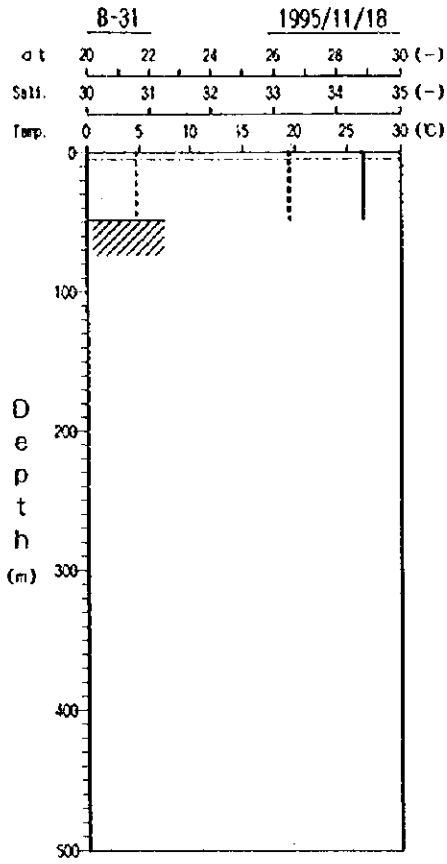
付図2 水温・塩分・ σ_t 鉛直分布--2 (1995年11~12月 第1回海上調査)



付図3 水温・塩分・ σ_t 鉛直分布-3 (1995年11~12月 第1回海上調査)

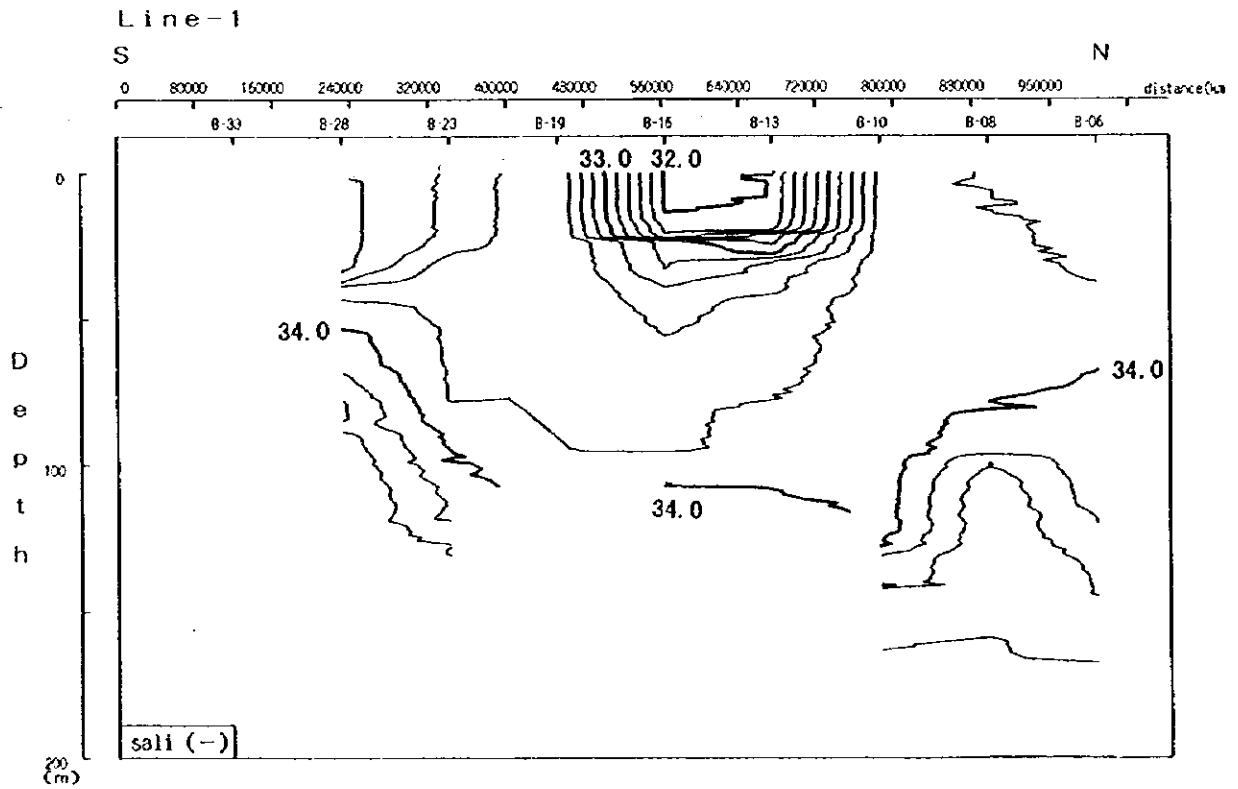
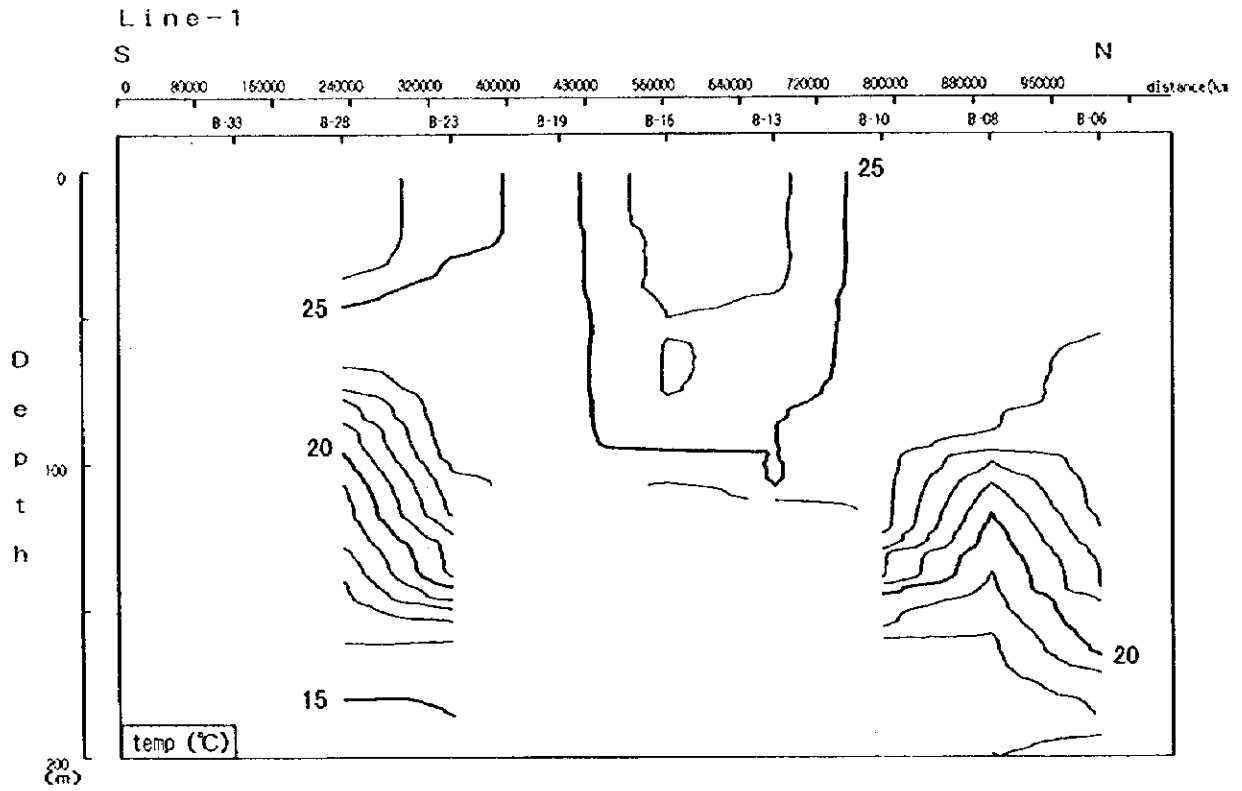


付図4 水温・塩分・ σt 鉛直分布--4 (1995年11~12月 第1回海上調査)

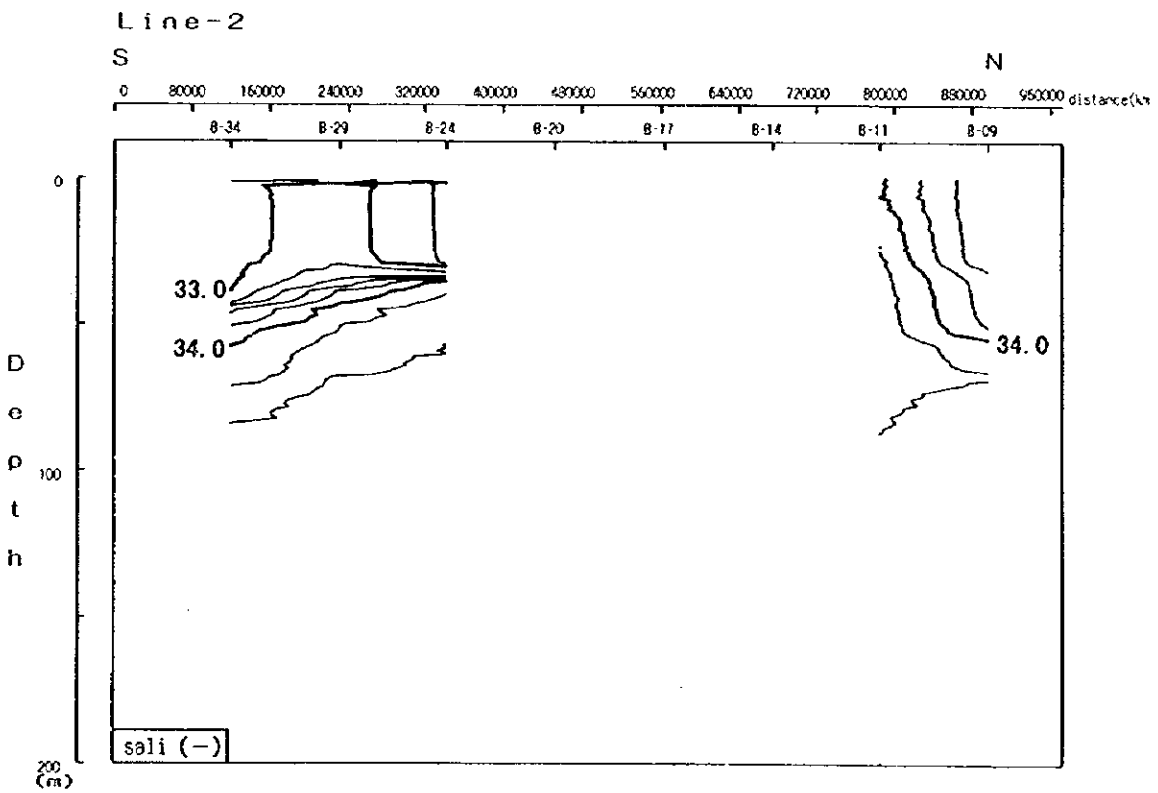
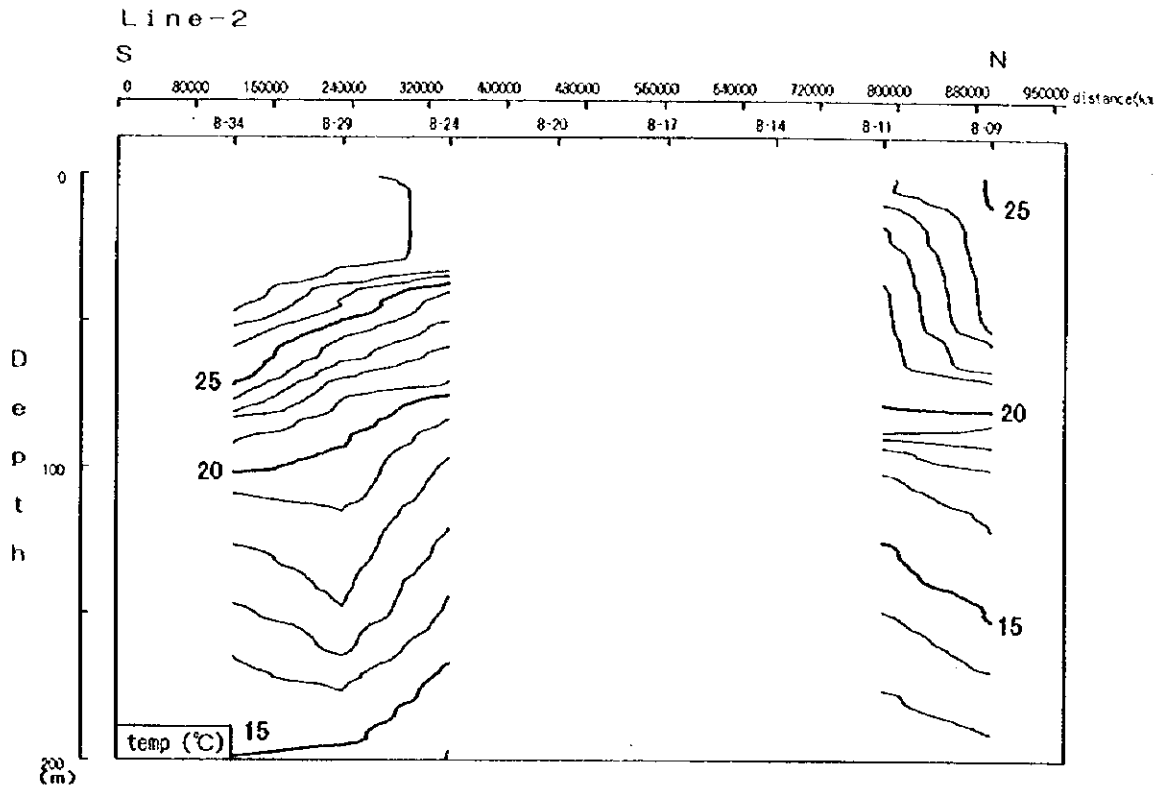


LEGEND	
—	Temp.
.....	Sali.
- . - . - .	σ_t

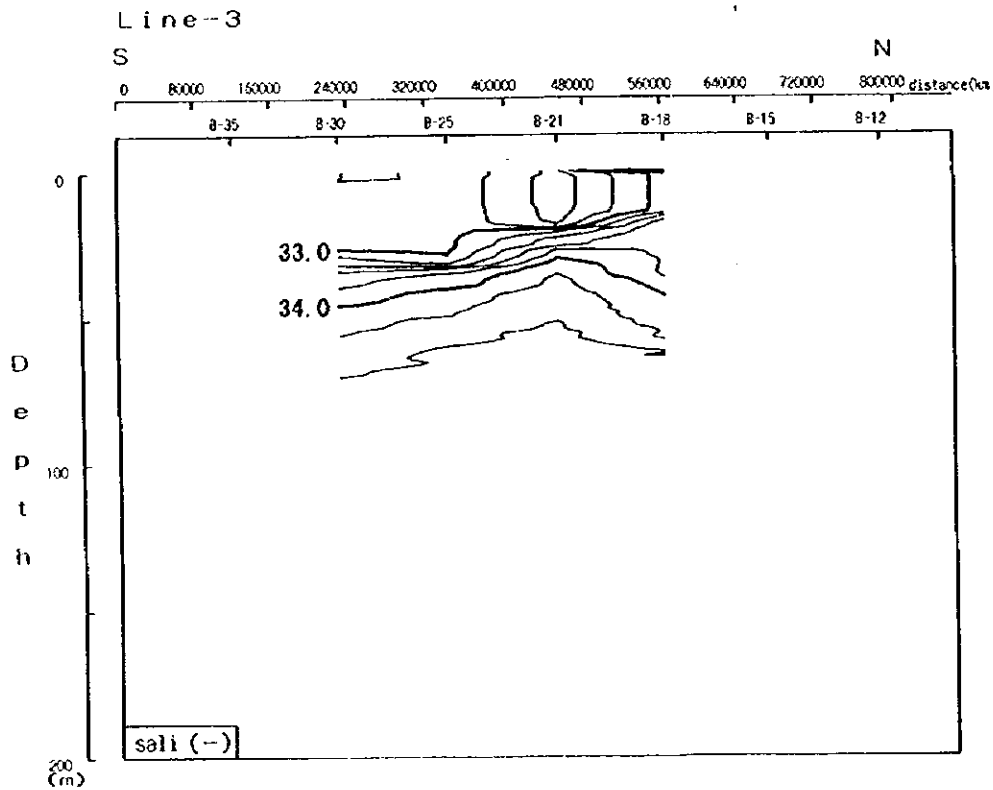
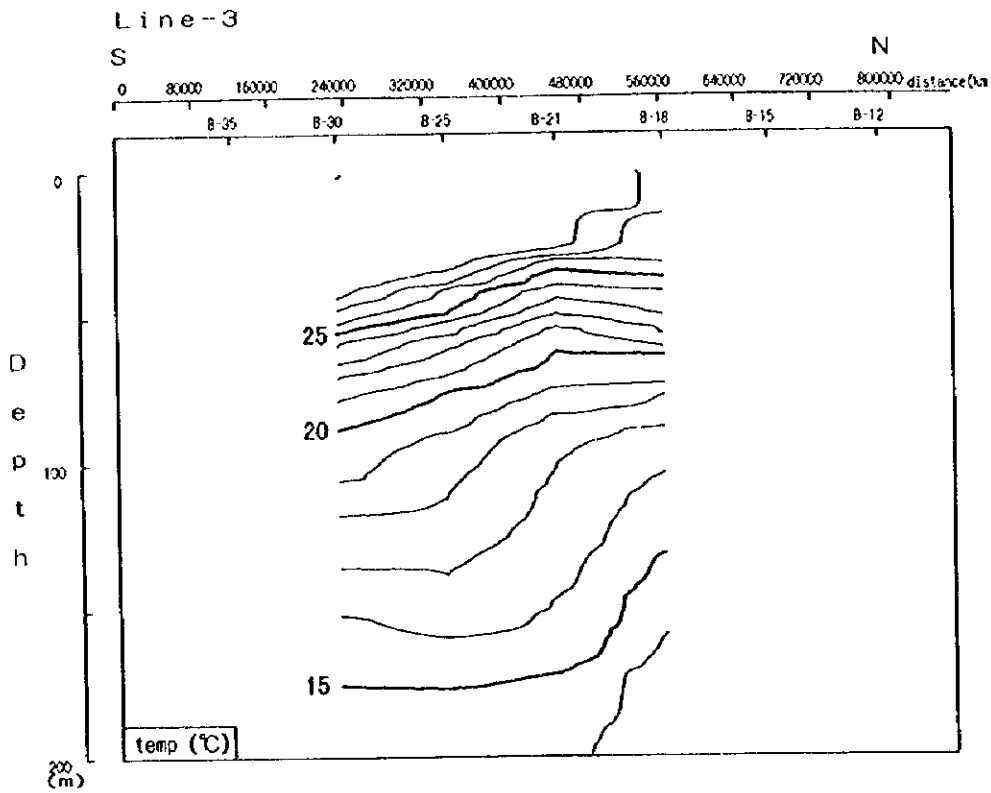
付図5 水温・塩分・ σ_t 鉛直分布--5 (1995年11~12月 第1回海上調査)



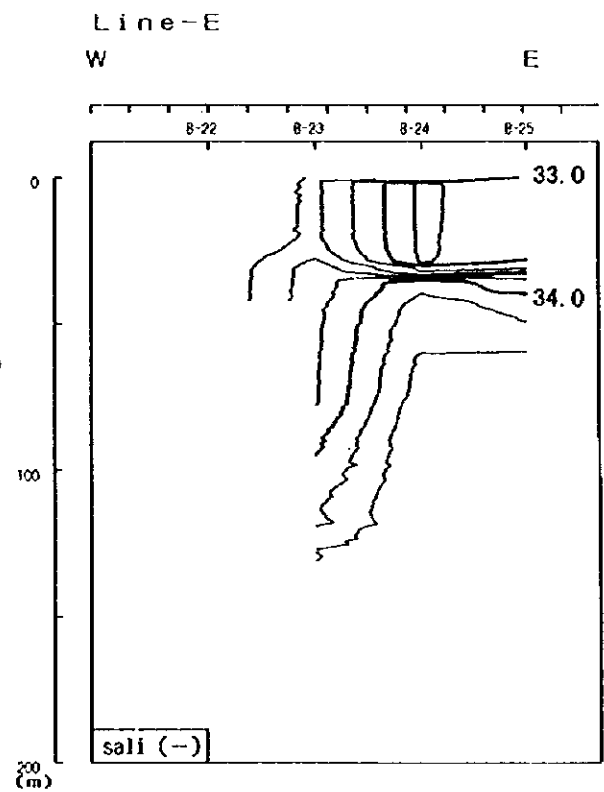
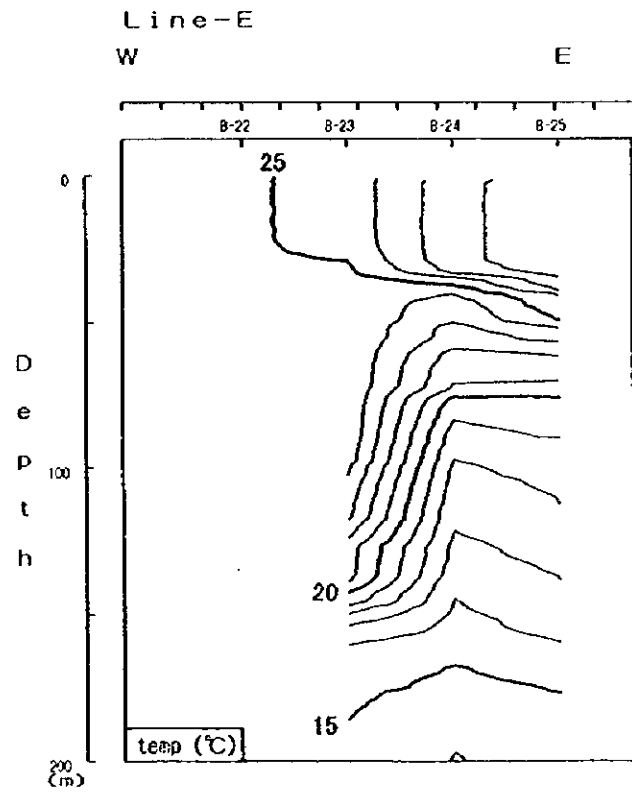
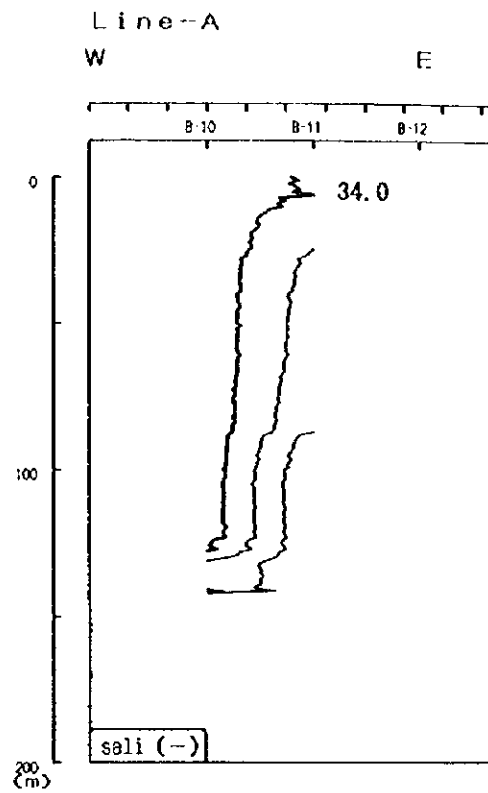
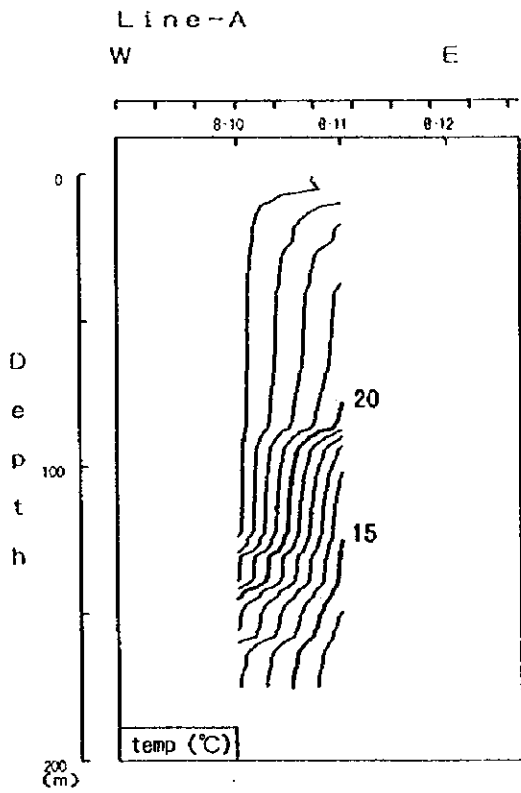
付図6 Line-1の水温・塩分鉛直断面 (水温1°C、塩分0.2間隔)
1995年11~12月 第1回海上調査



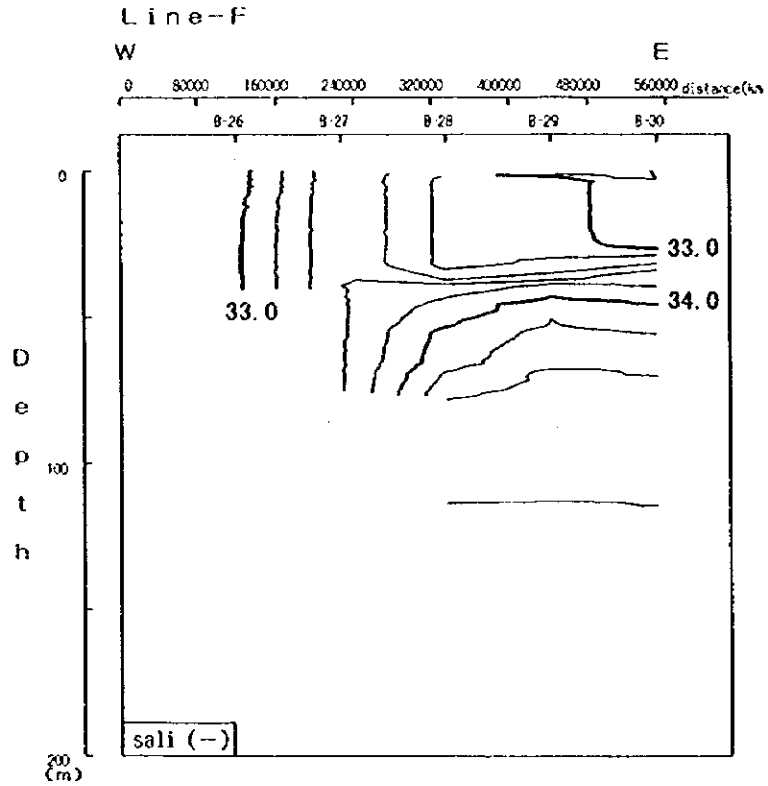
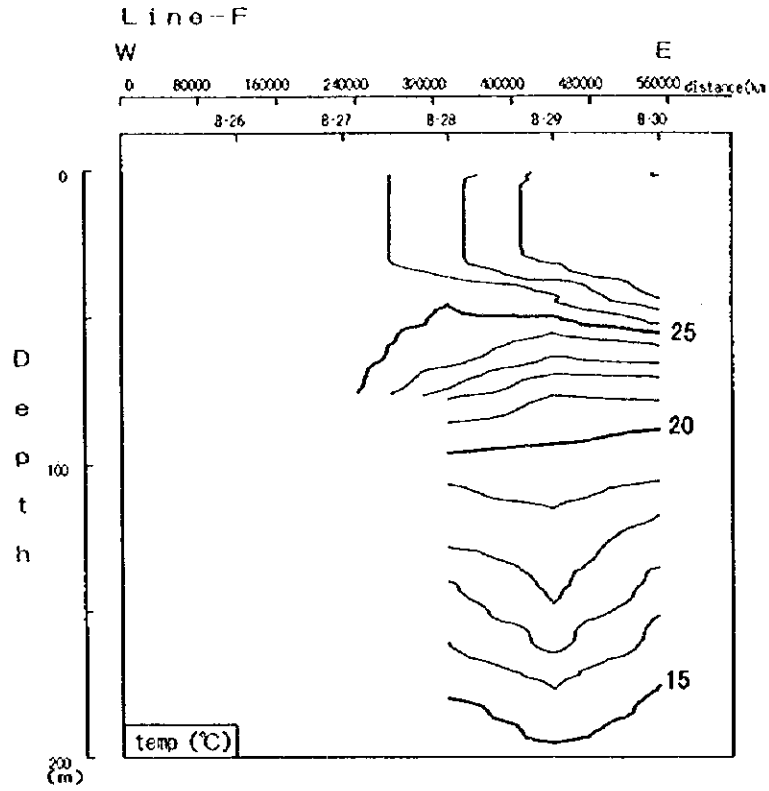
付図7 Line-2の水温・塩分鉛直断面 (水温1℃、塩分0.2間隔)
1995年11~12月 第1回海上調査



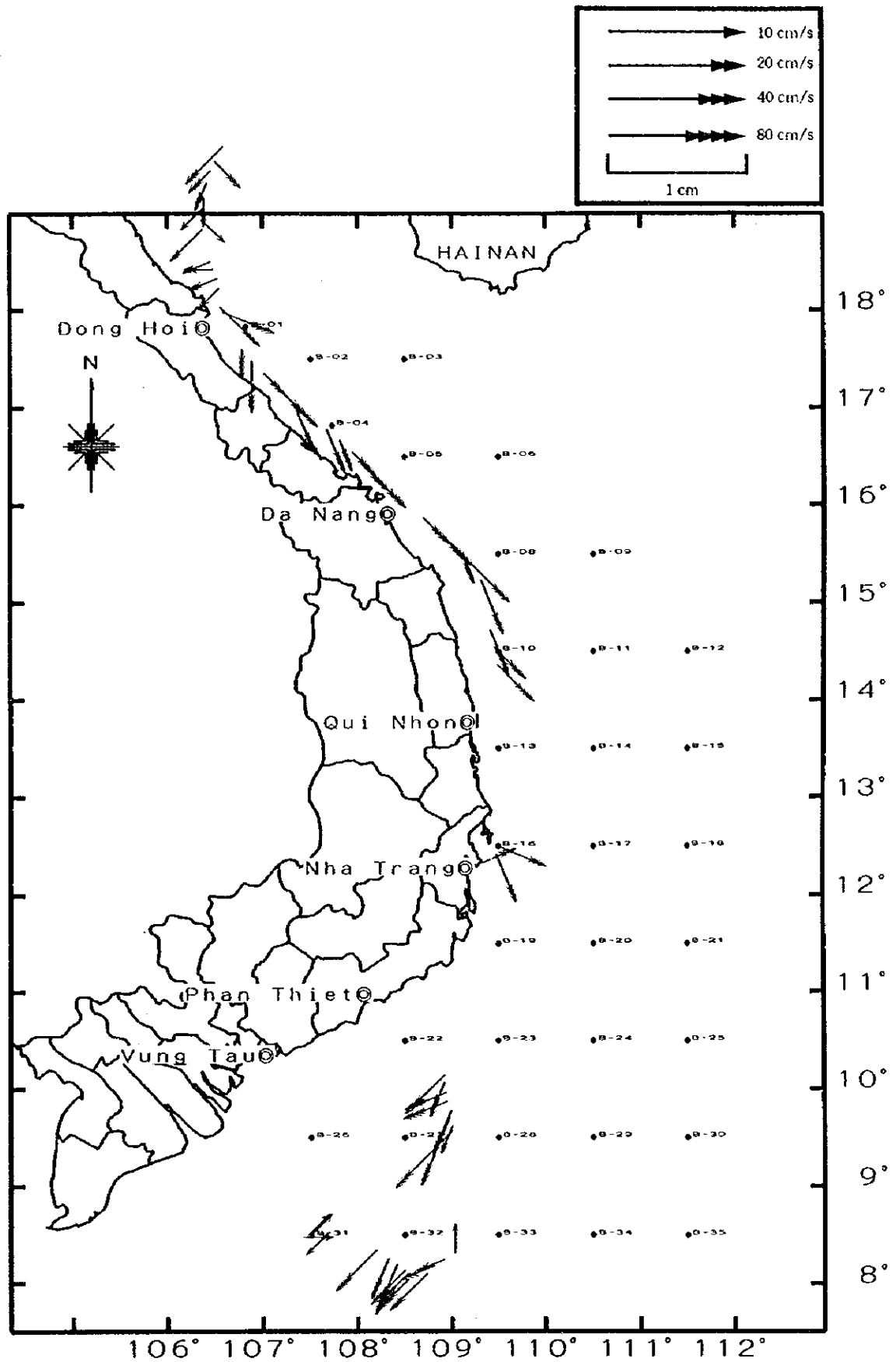
付図8 Line-3の水溫・塩分鉛直断面(水溫1°C、塩分0.2間隔)
1995年11~12月 第1回海上調査



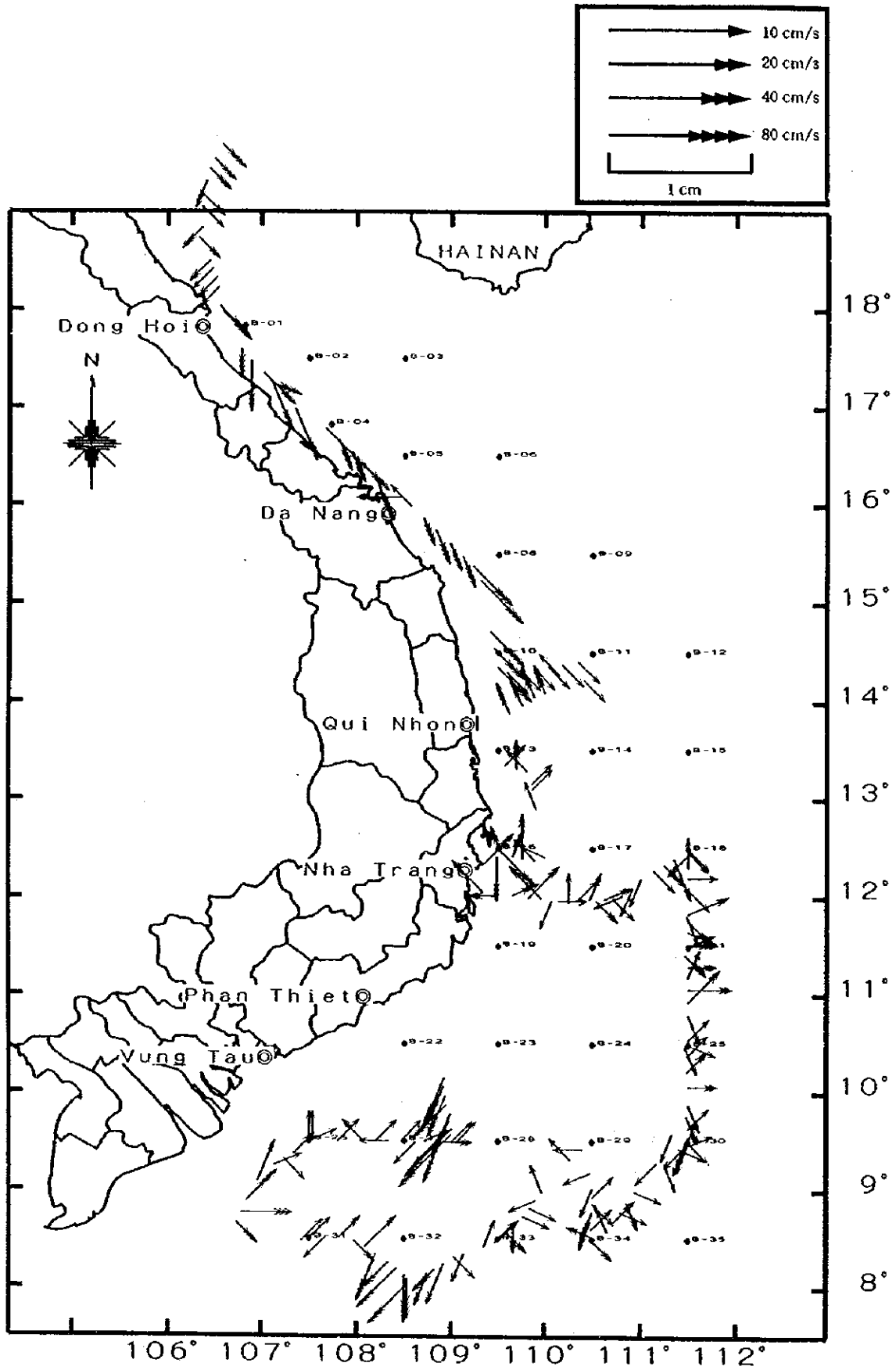
付図9 Line-A, Eの水温・塩分鉛直断面 (水温1°C、塩分0.2間隔)
1995年11~12月 第1回海上調査



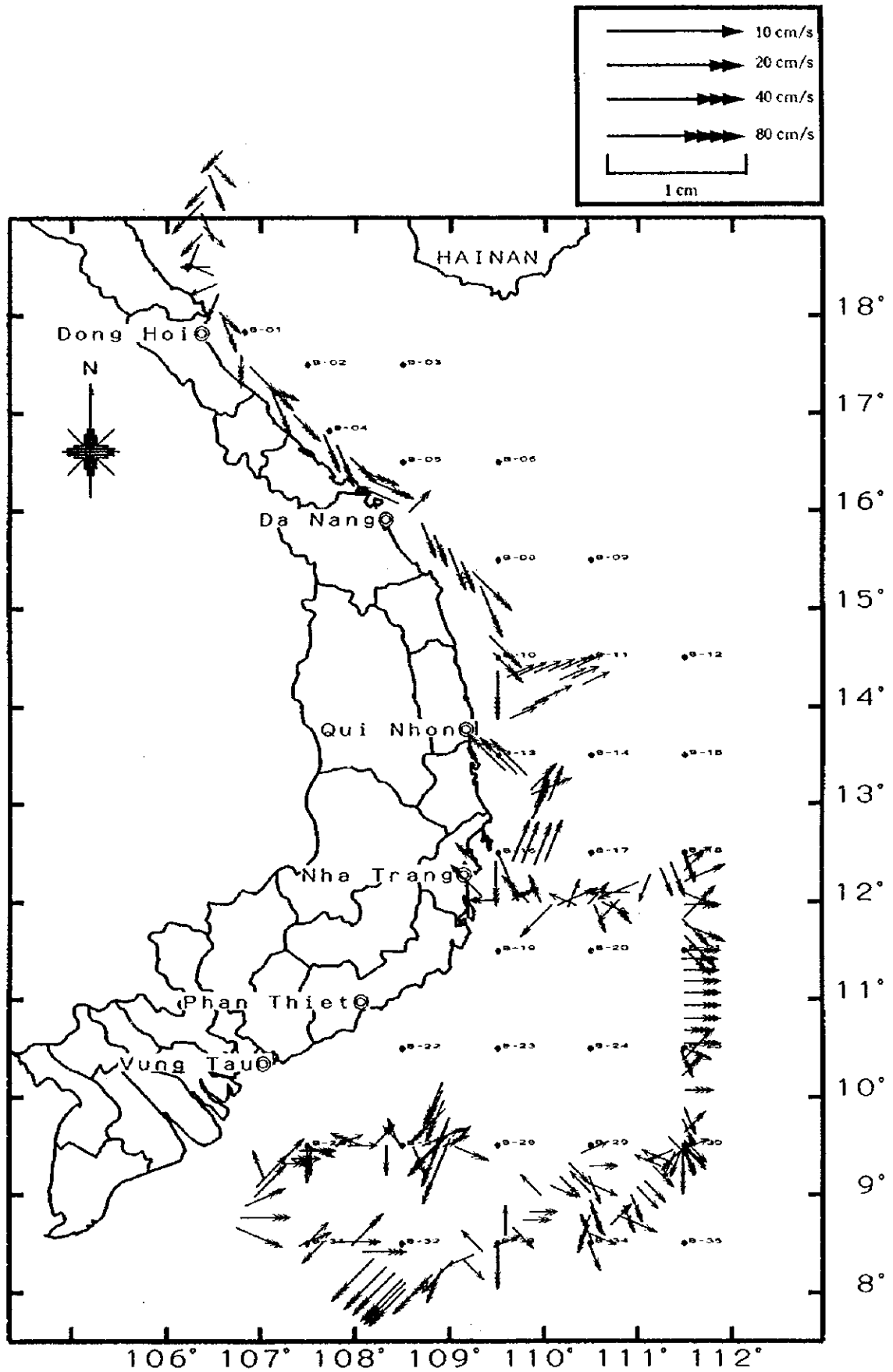
付図10 Line-Fの水温・塩分鉛直断面 (水温1°C、塩分0.2間隔)
1995年11~12月 第1回海上調査



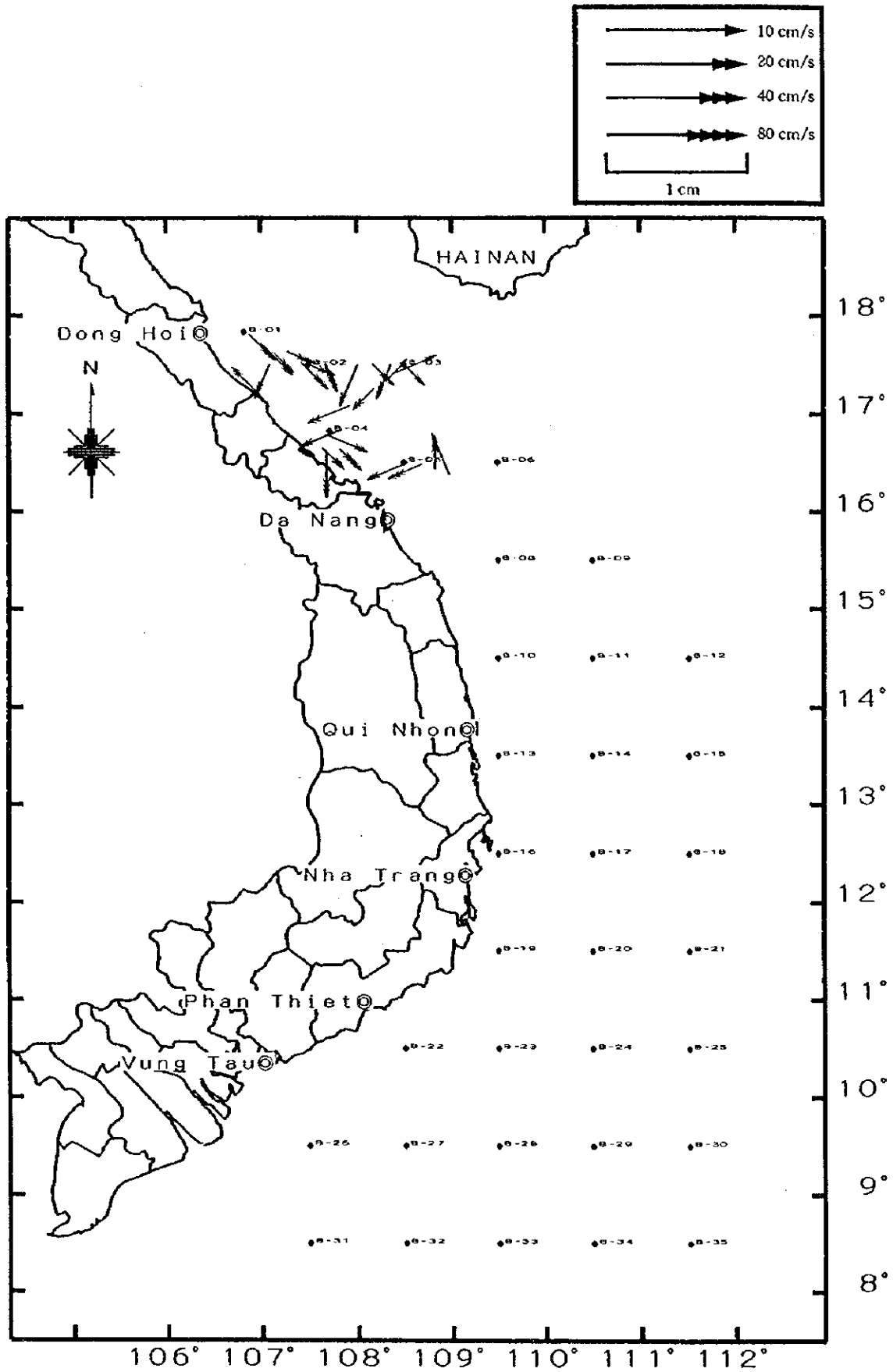
付図11 流向・流速分布図 2 m (1995年11月)



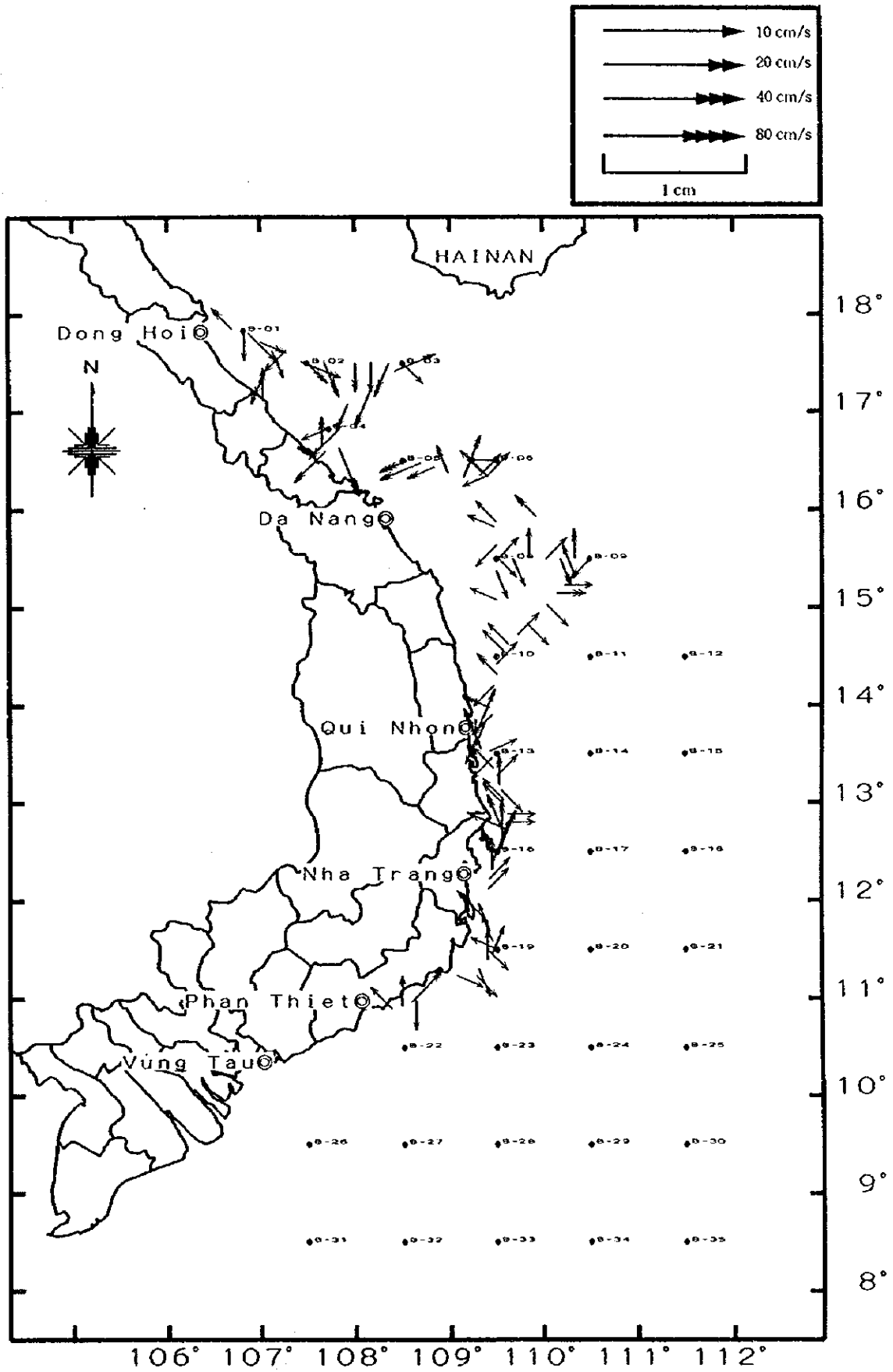
付図12 流向・流速分布図 10 m (1995年11月)



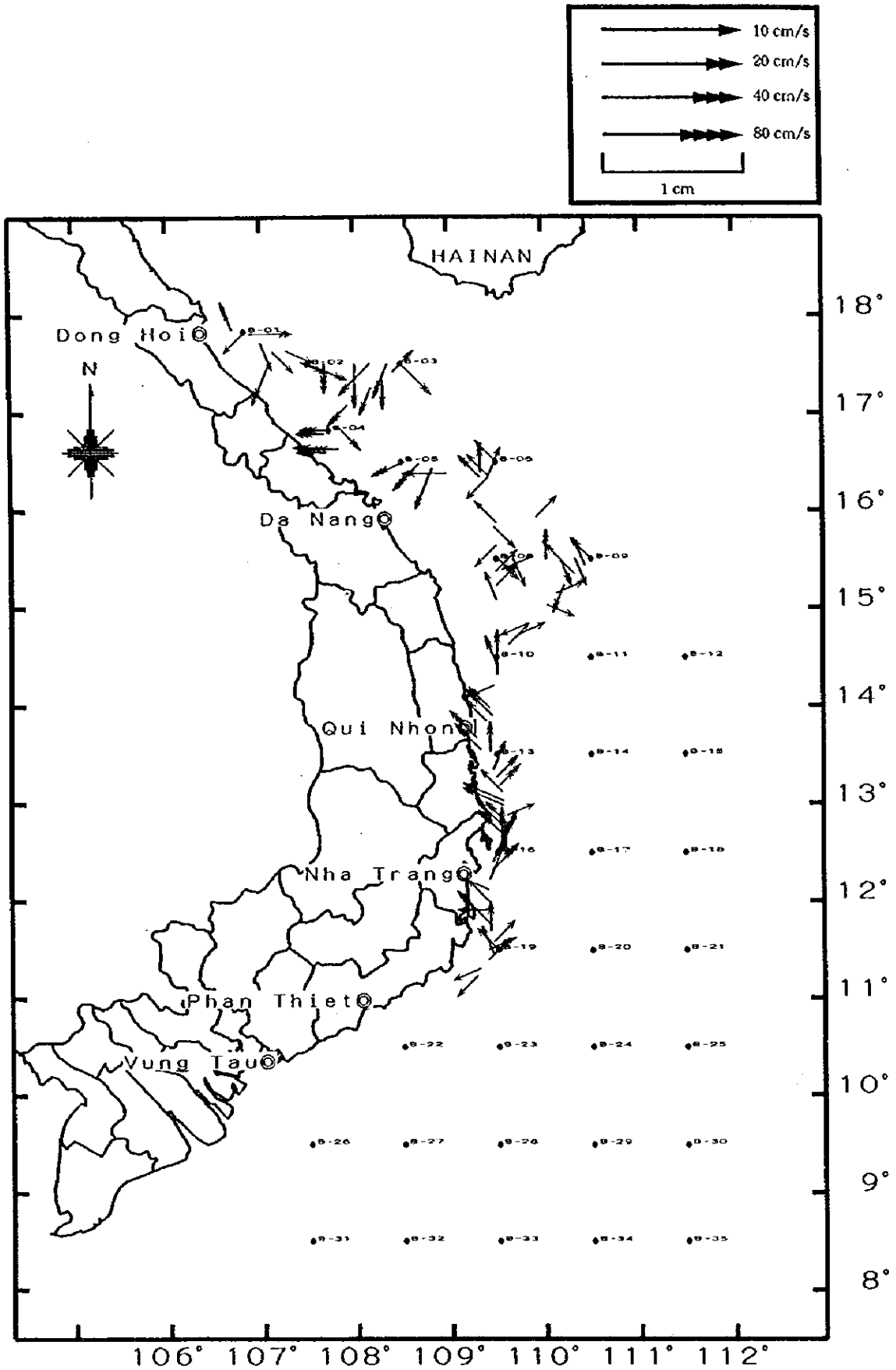
付図13 流向・流速分布図 30 m (1995年11月)



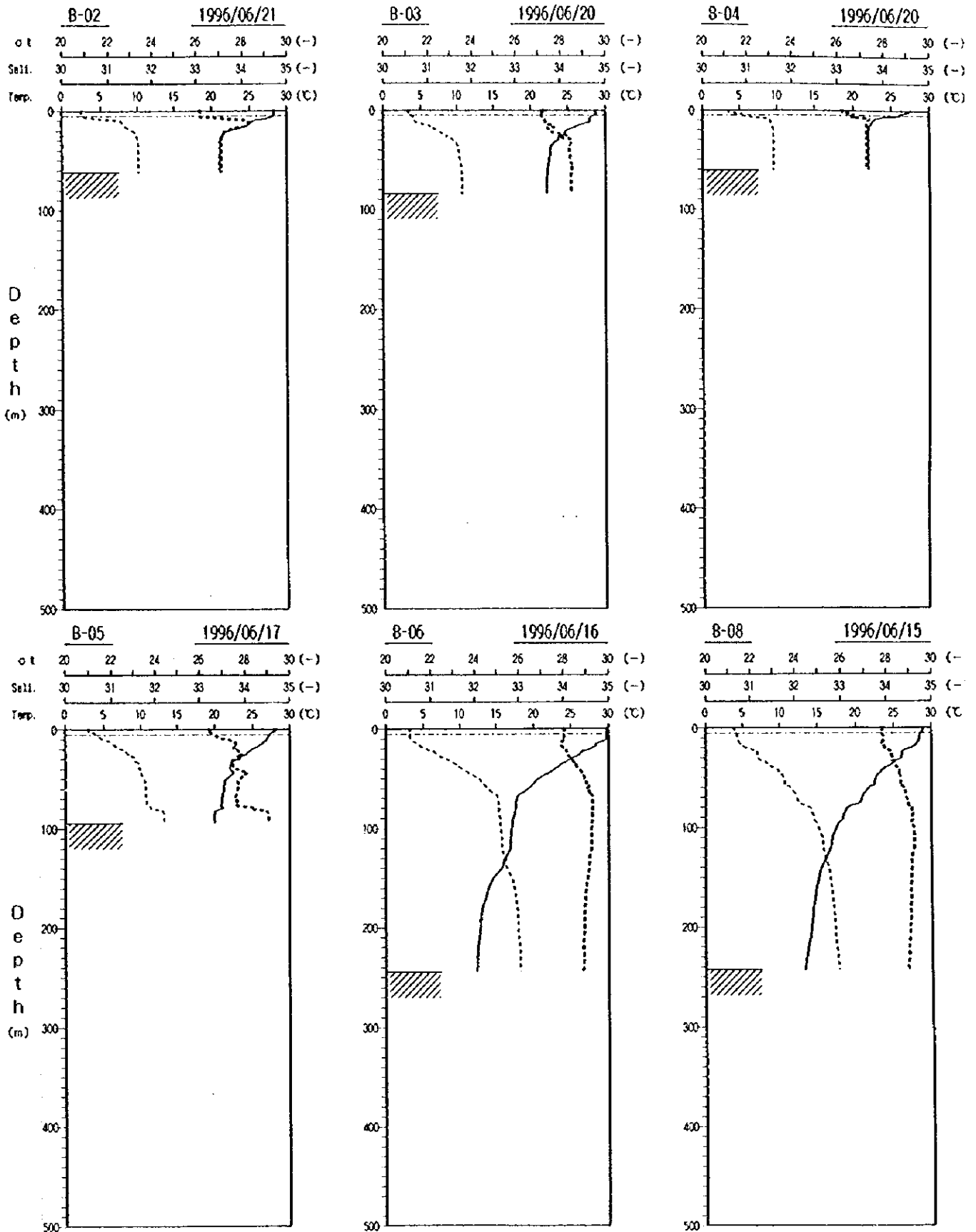
付図14 流向・流速分布図 2m (1995年12月)



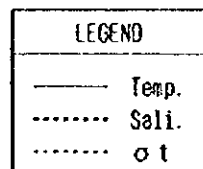
付图15 流向·流速分布图 10 m (1995年12月)

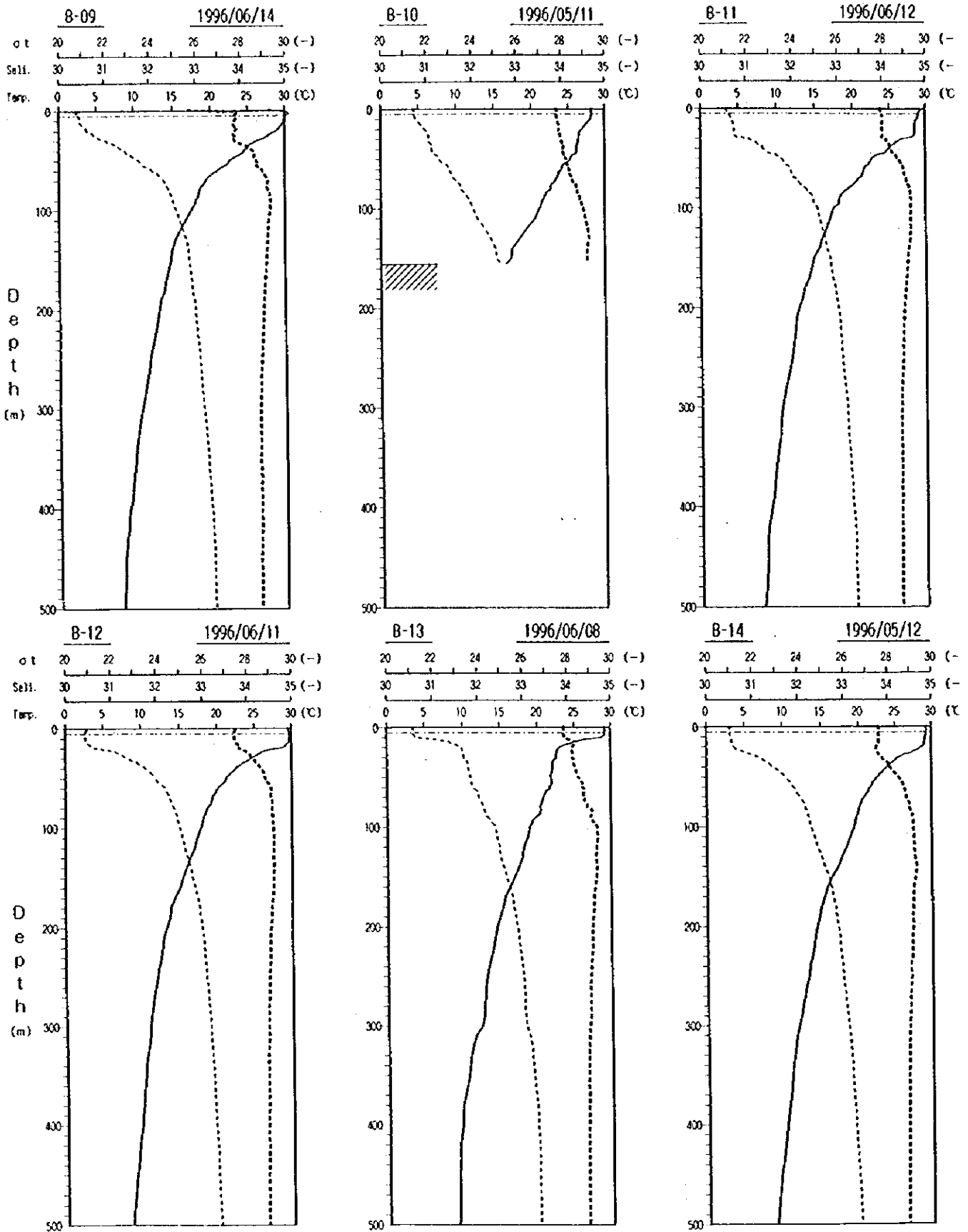


付图16 流向·流速分布图 30 m (1995年12月)

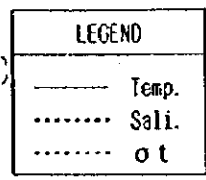


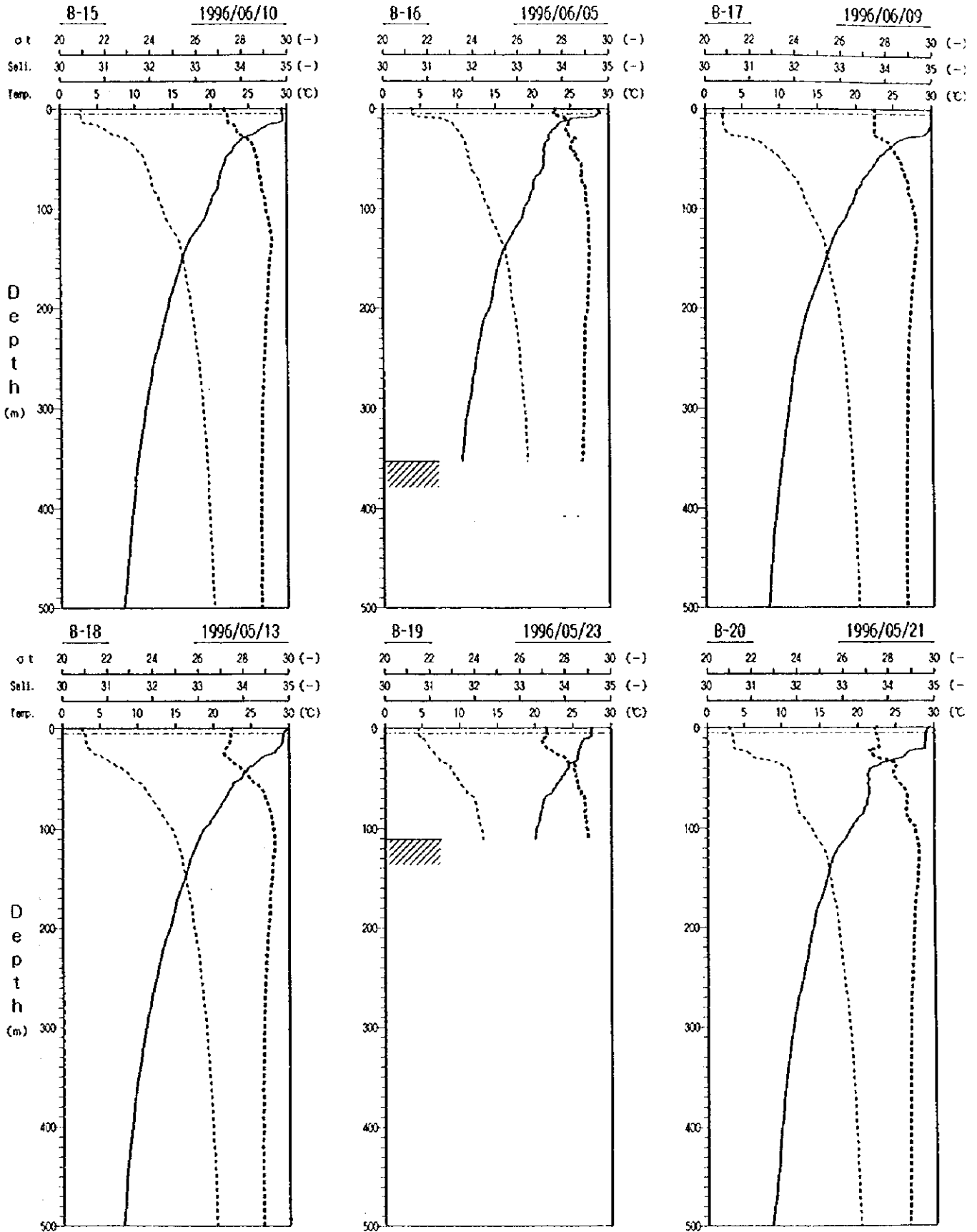
付図17 水温・塩分・ σ_t 鉛直分布—1 (1996年5~6月 第2回海上調査)



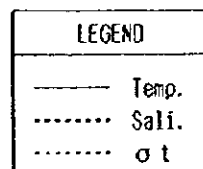


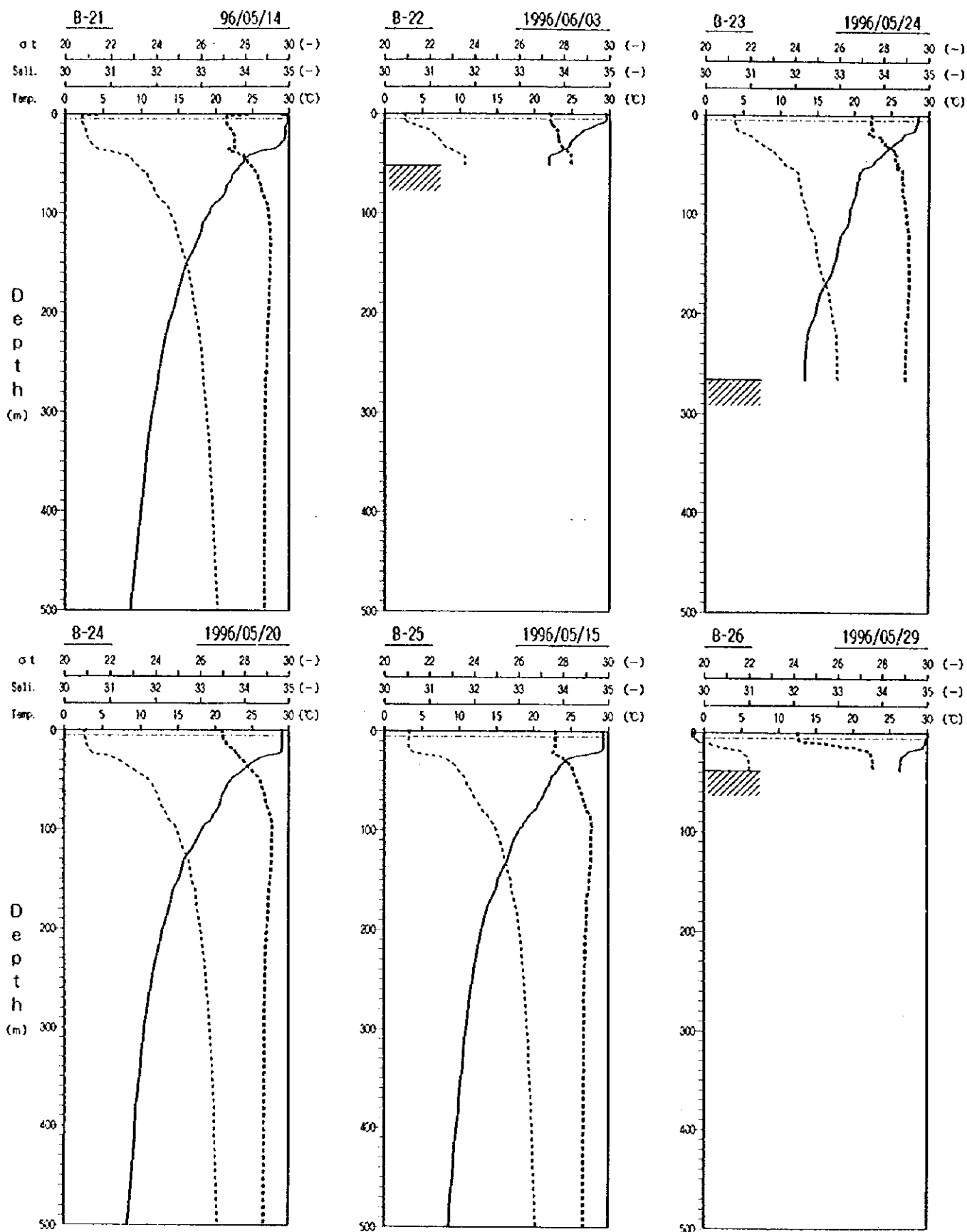
付図18 水温・塩分・ σt 鉛直分布-2 (1996年5~6月 第2回海上調査)



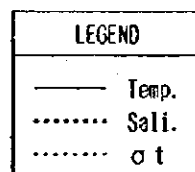


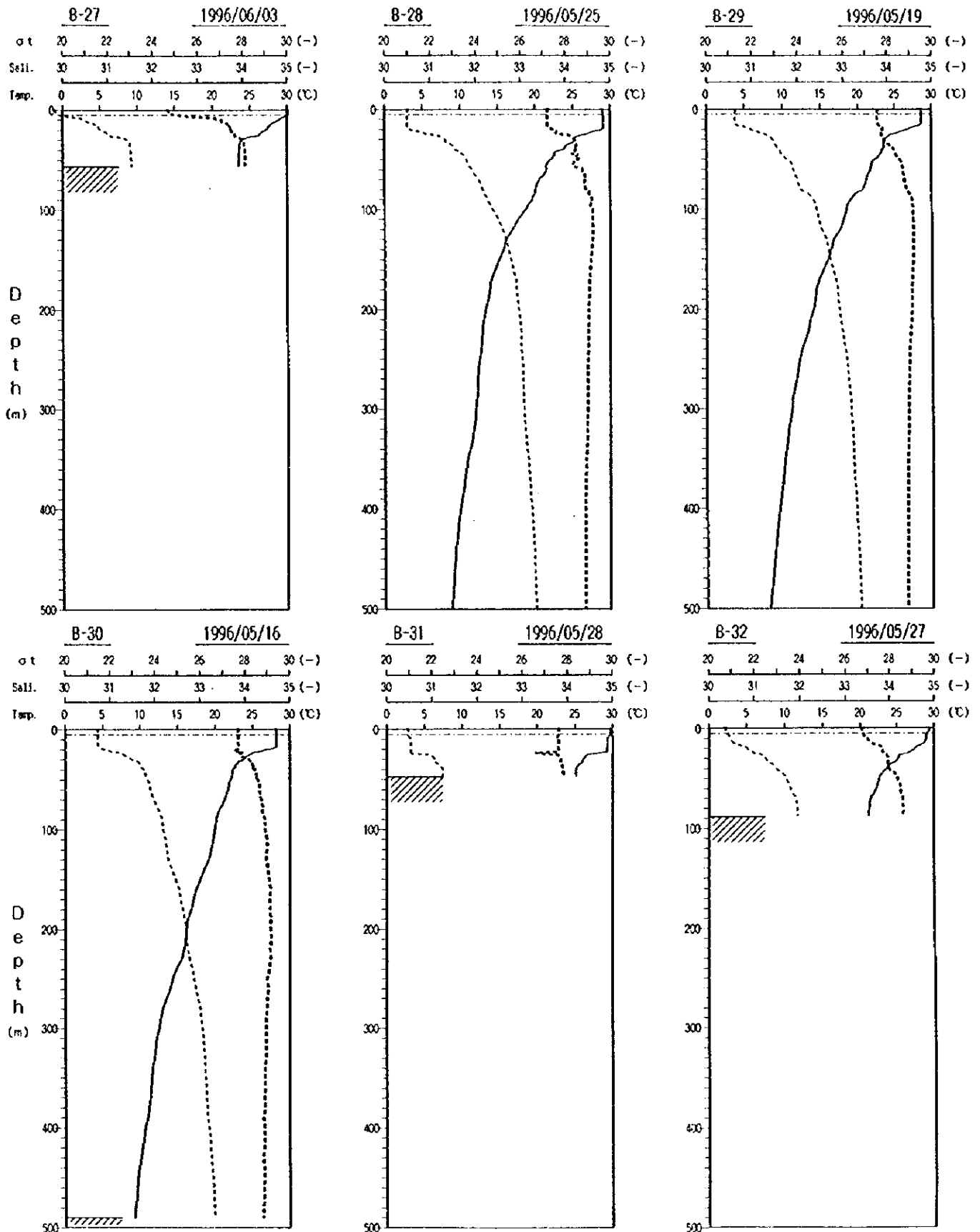
付図19 水温・塩分・ σ_t 鉛直分布-3 (1996年5~6月 第2回海上調査)



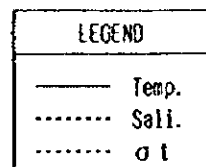


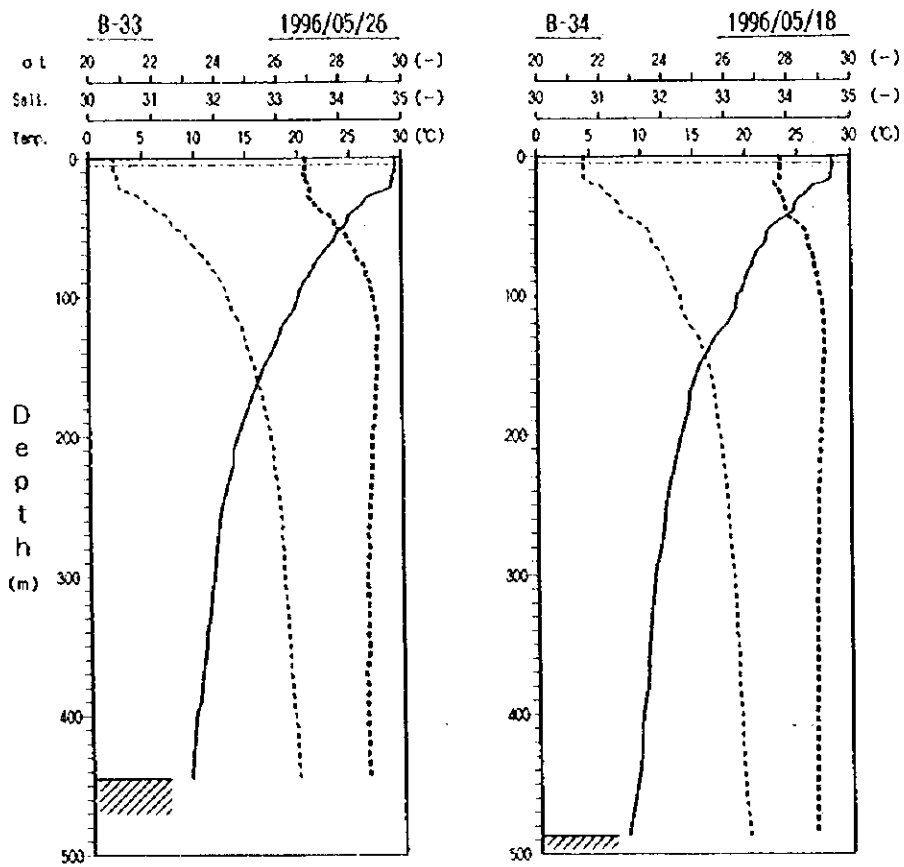
付図20 水温・塩分・ σ_t 鉛直分布-4 (1996年5~6月 第2回海上調査)





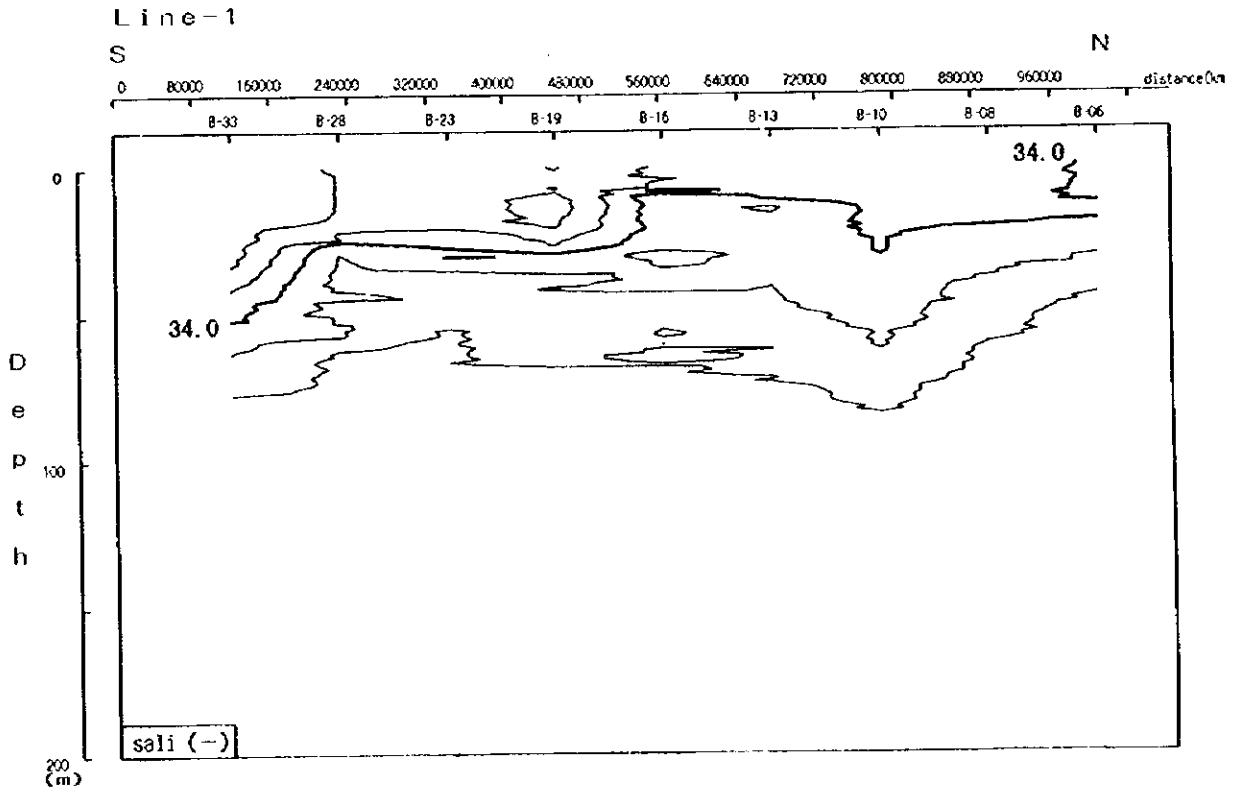
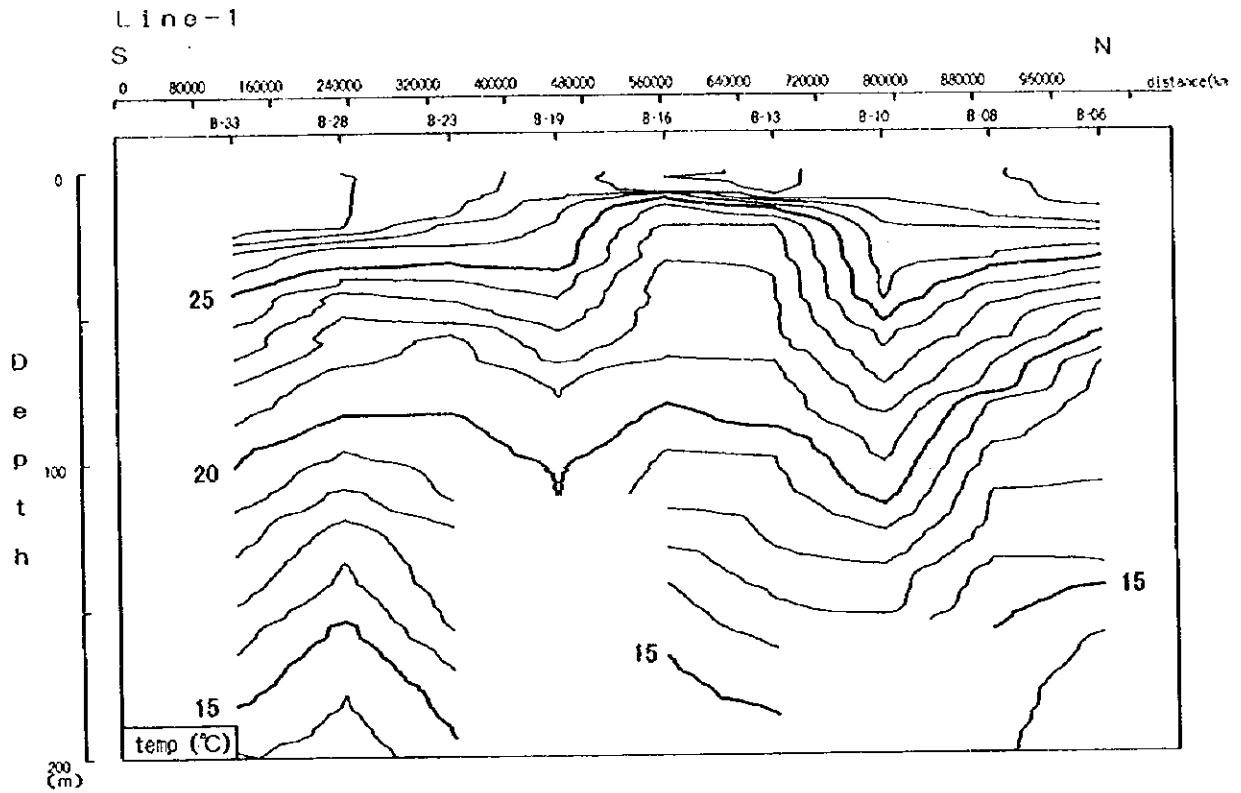
付図21 水温・塩分・ σt 鉛直分布-5 (1996年5~6月 第2回海上調査)



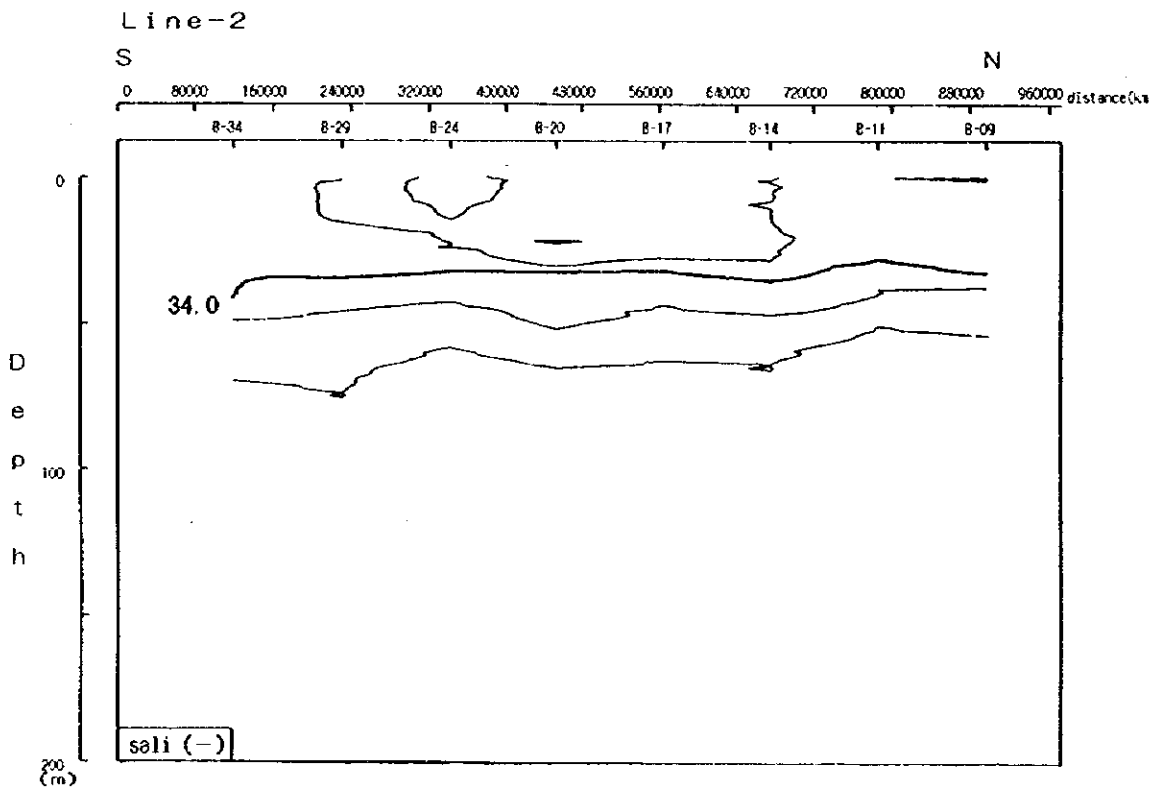
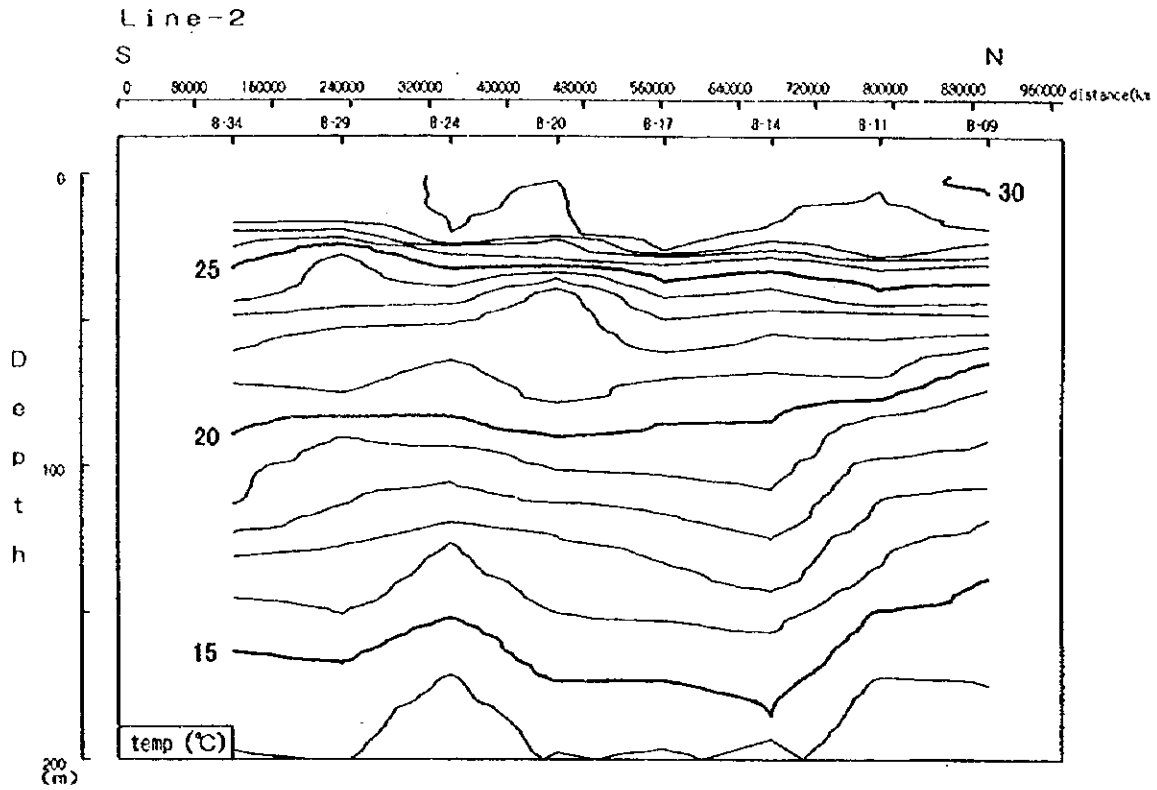


付図22 水温・塩分・ σ_t 鉛直分布—6 (1996年5~6月 第2回海上調査)

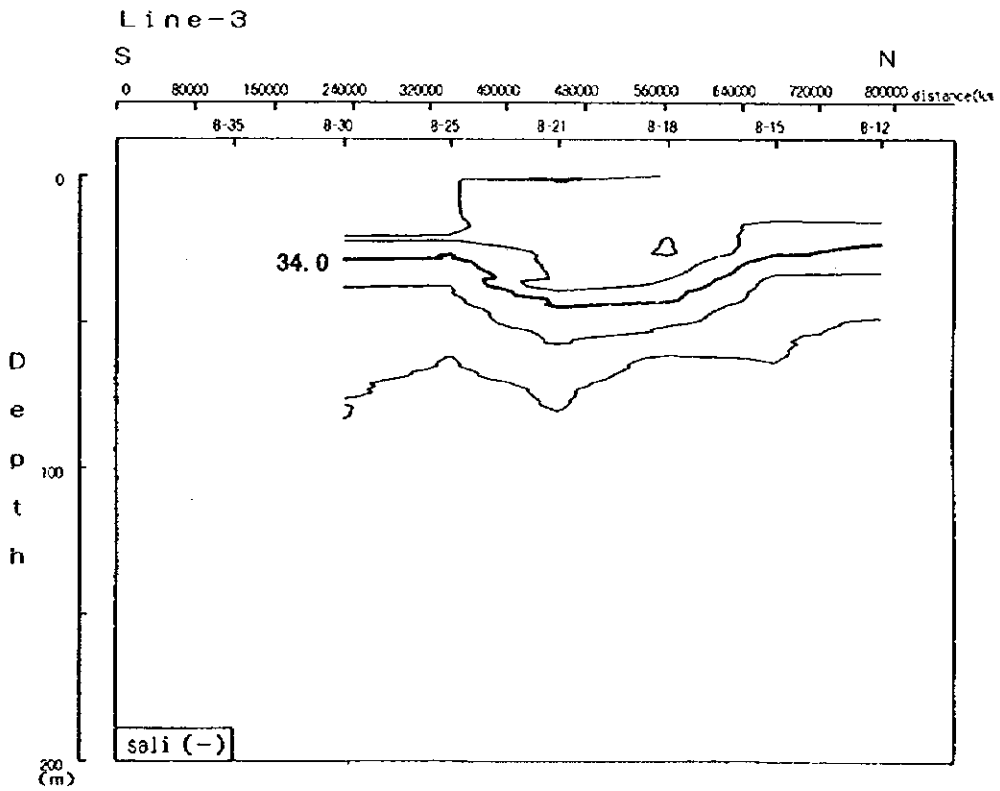
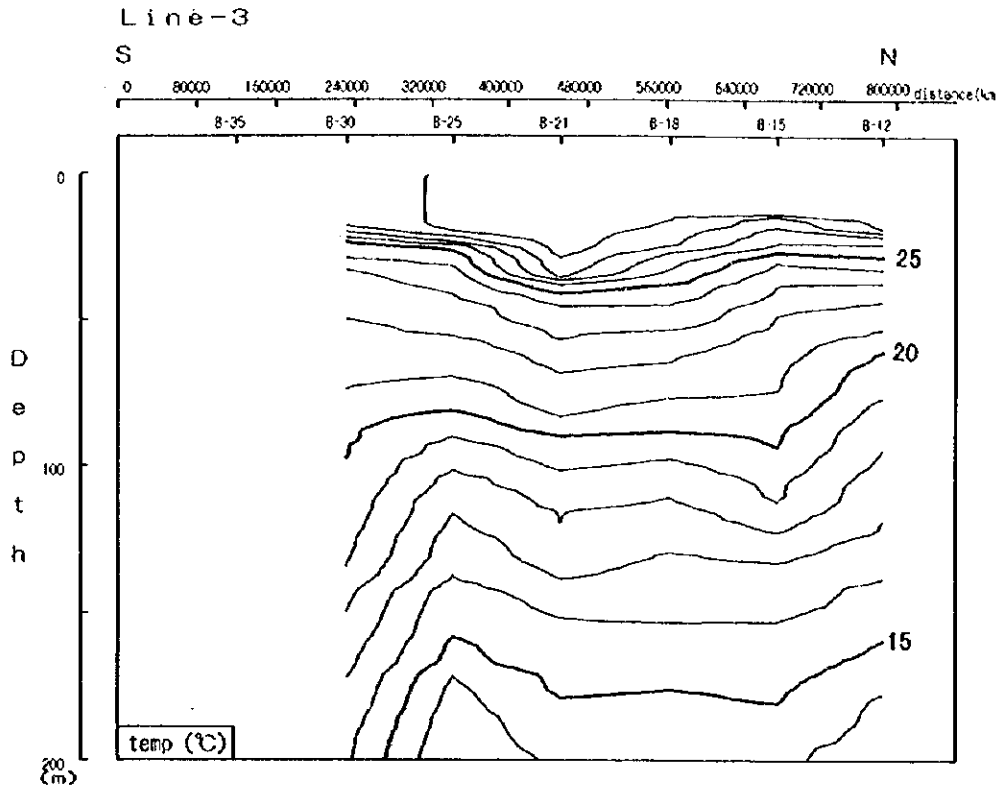
LEGEND	
—	Temp.
.....	Sali.
.....	σ_t



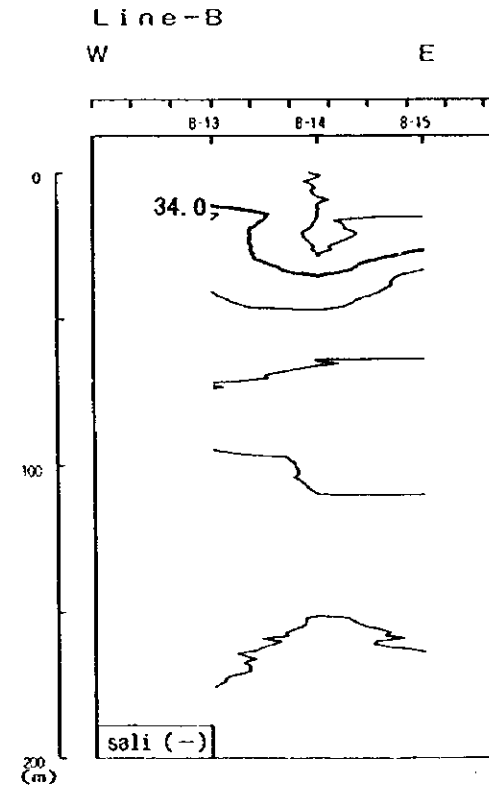
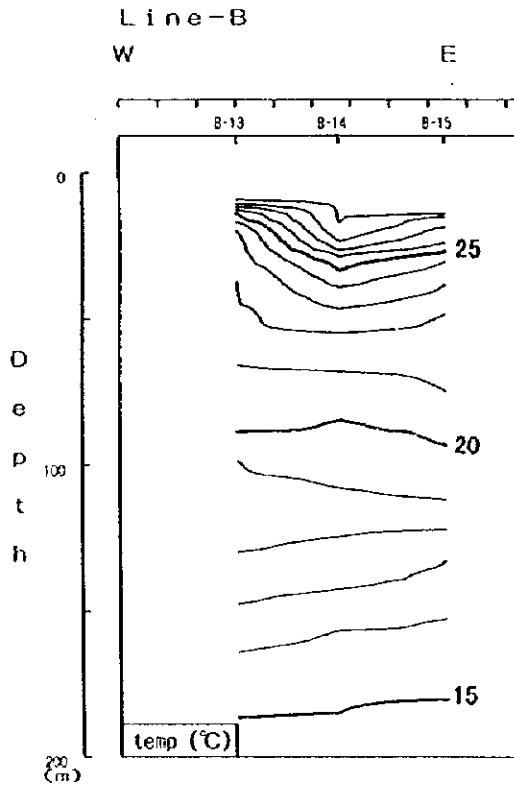
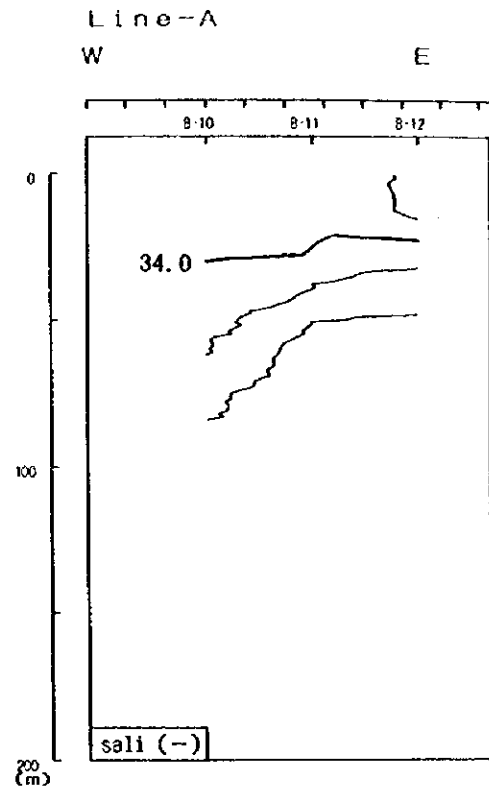
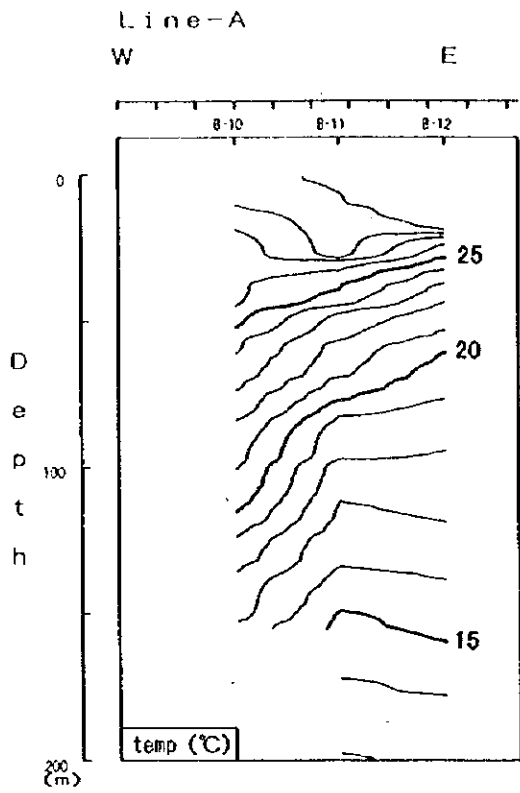
付図23 Line-1の水温・塩分鉛直断面 (水温1°C、塩分0.2間隔)
1996年5~6月 第2回海上調査



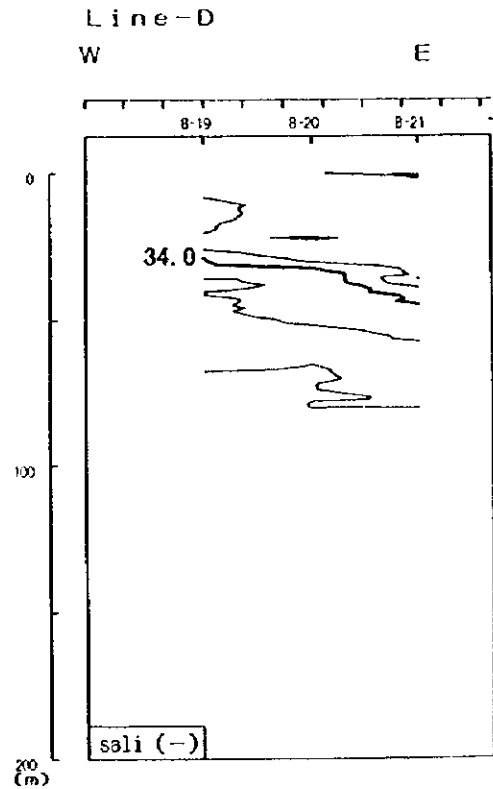
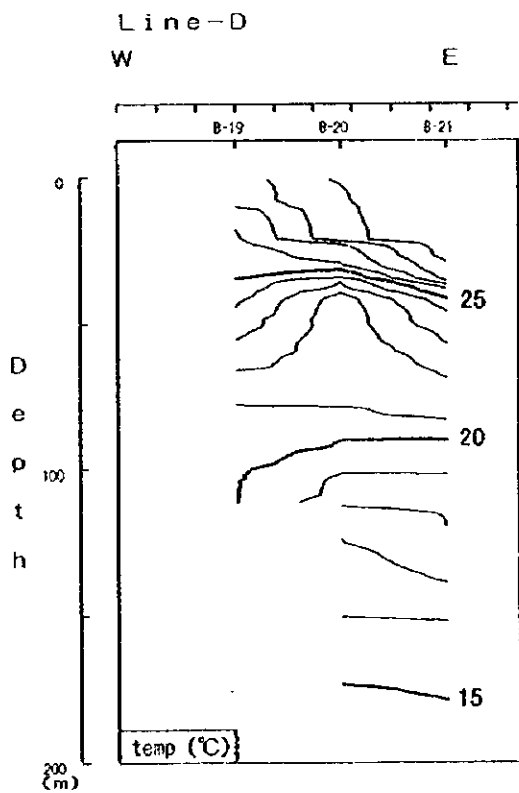
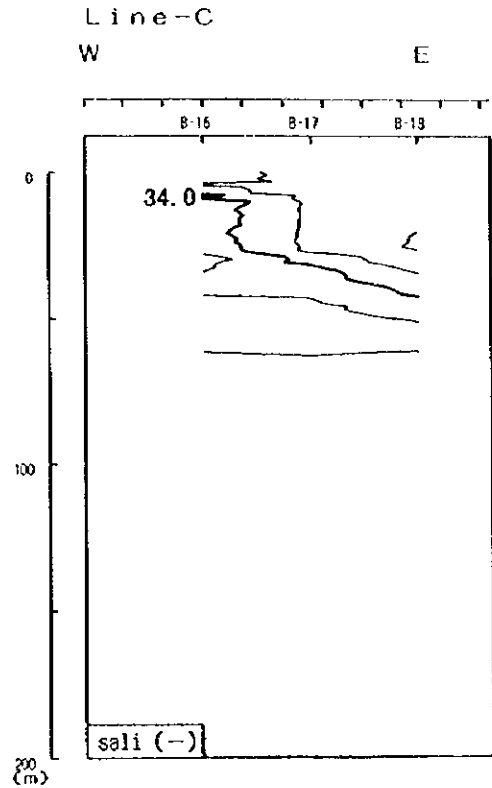
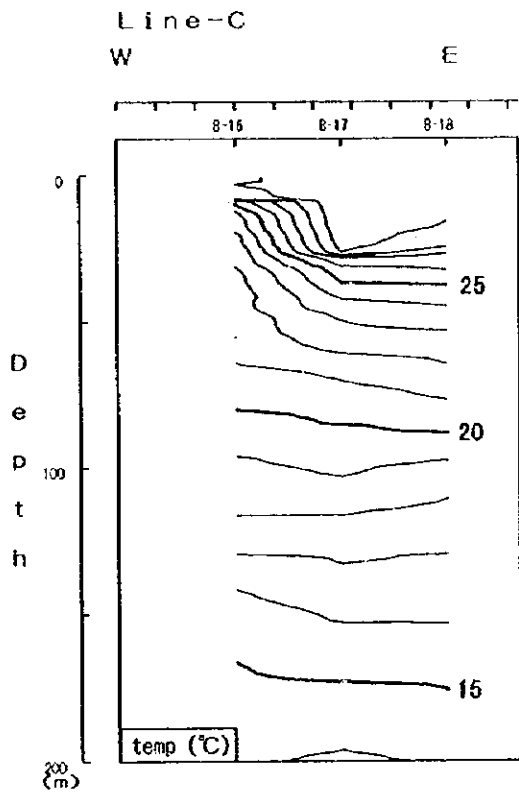
付図24 Line-2の水温・塩分鉛直断面 (水温1°C、塩分0.2間隔)
1996年5～6月 第2回海上調査



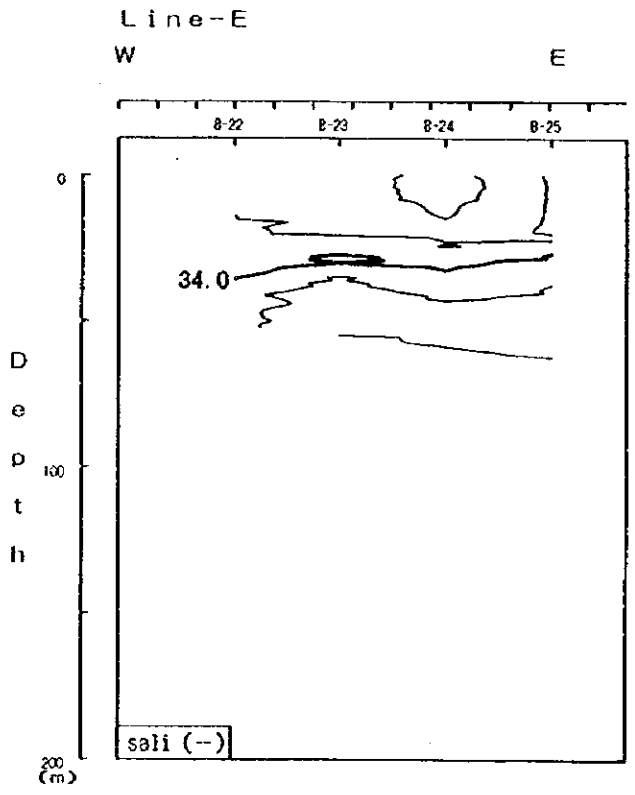
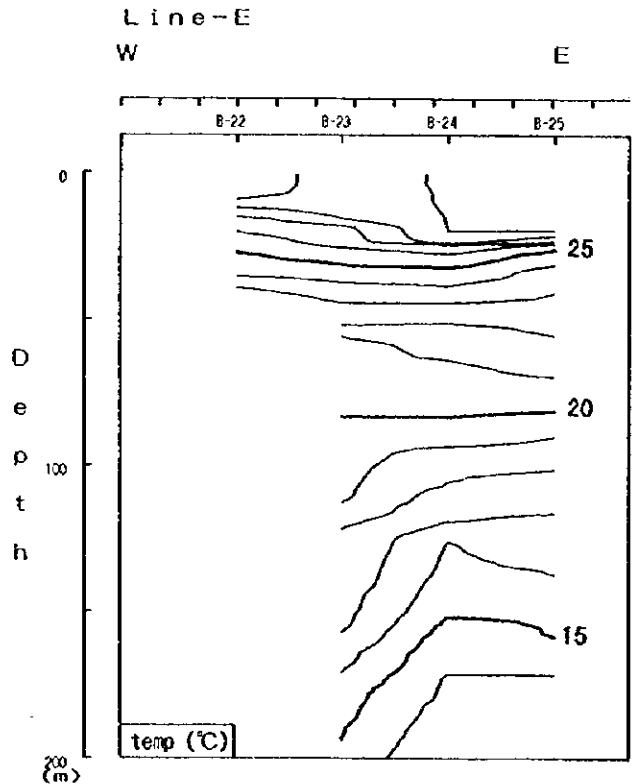
付図25 Line-3の水温・塩分鉛直断面（水温1°C、塩分0.2間隔）
1996年5～6月 第2回海上調査



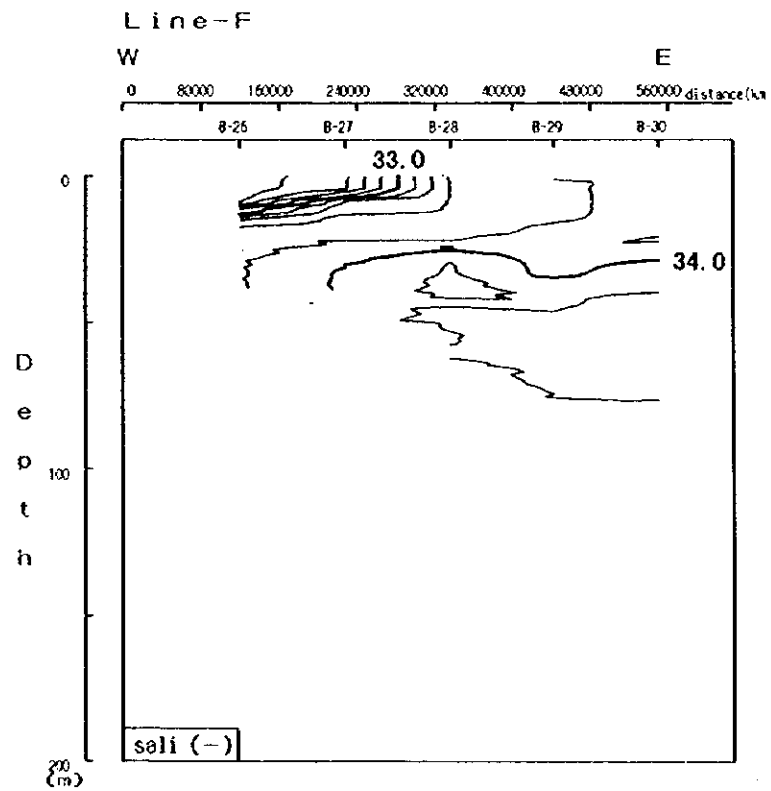
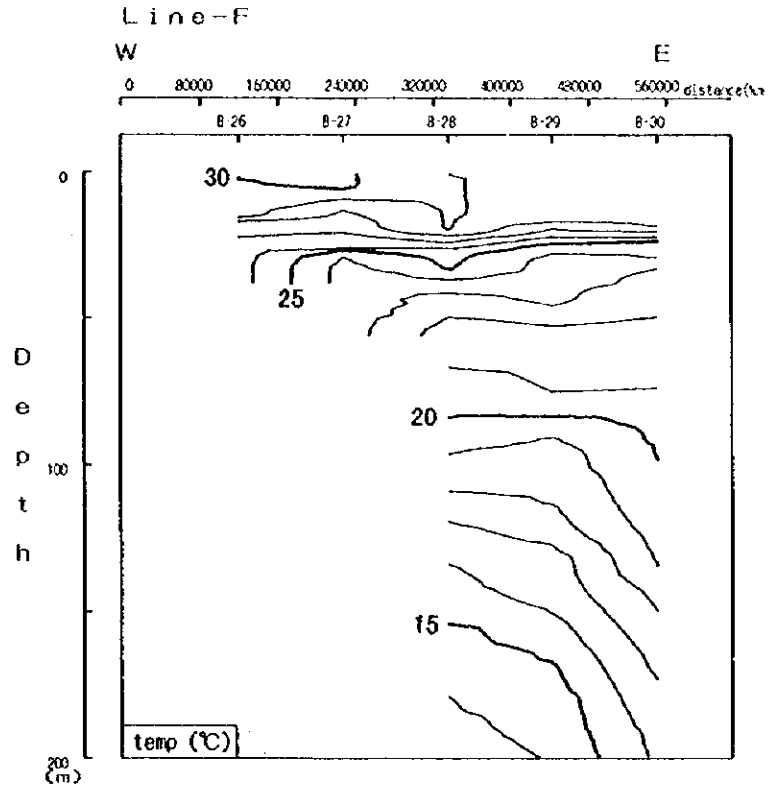
付図26 Line-A, Bの水温・塩分鉛直断面 (水温1°C、塩分0.2間隔)
1996年5~6月 第2回海上調査



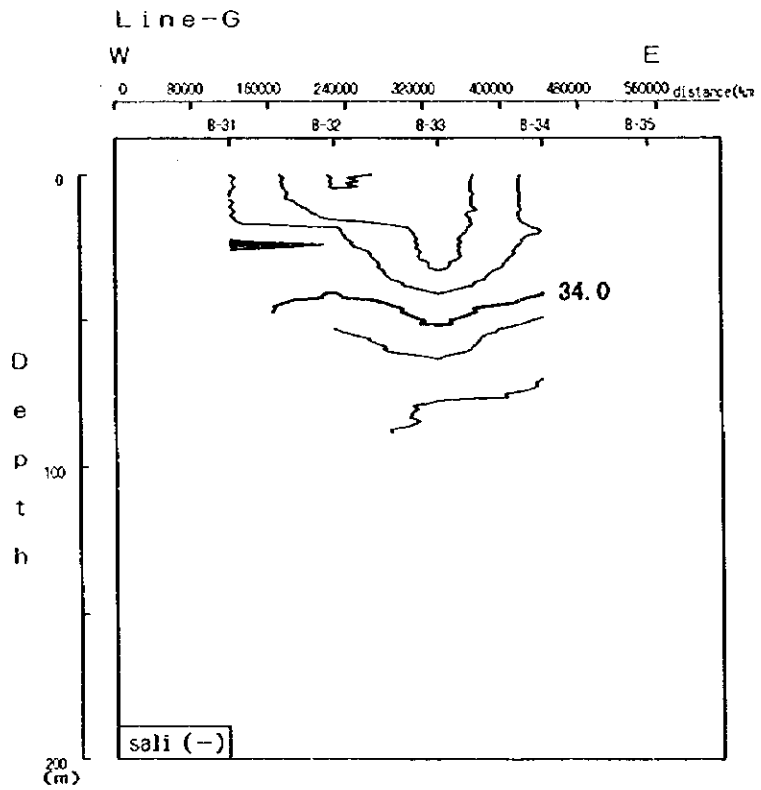
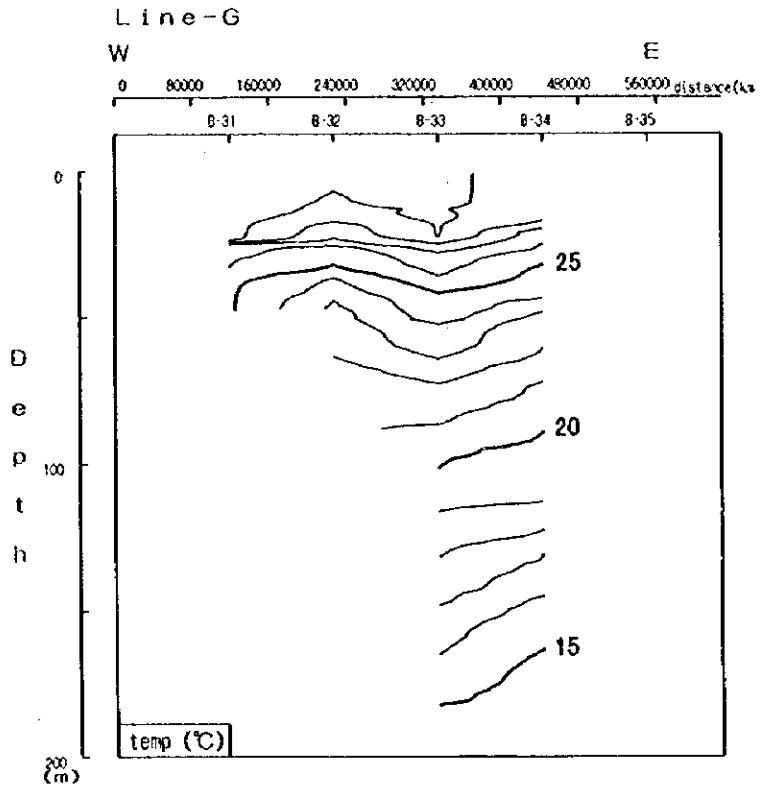
付図27 Line-C, Dの水溫・塩分鉛直断面 (水溫1°C、塩分0.2間隔)
1996年5~6月 第2回海上調査



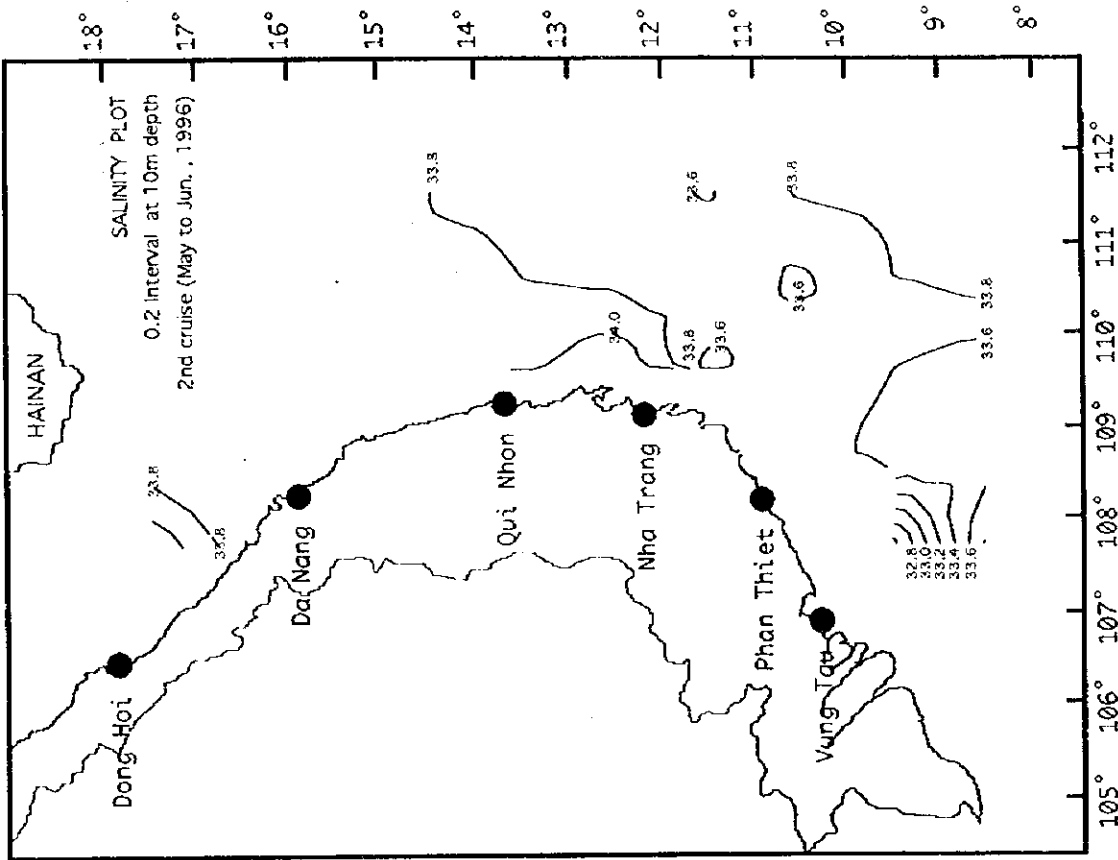
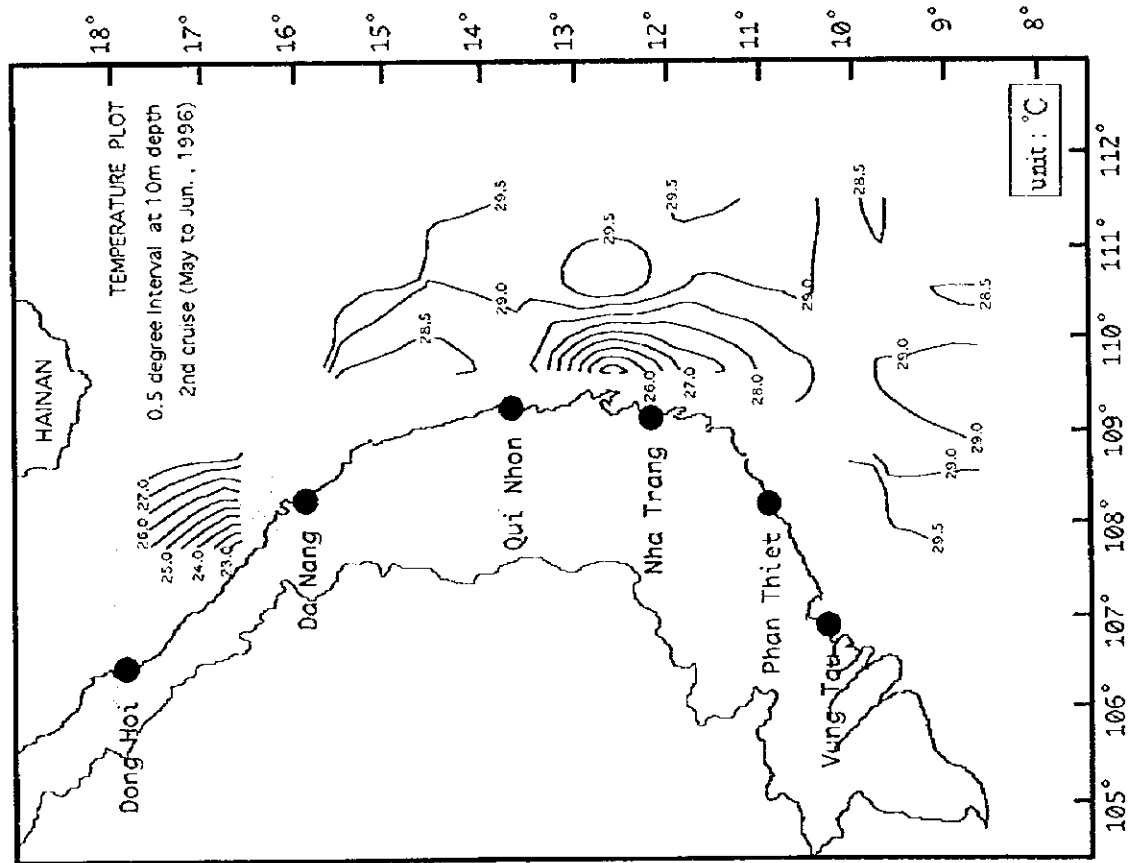
付図28 Line-Eの水溫・塩分鉛直断面 (水溫 1°C、塩分0.2間隔)
1996年5～6月 第2回海上調査



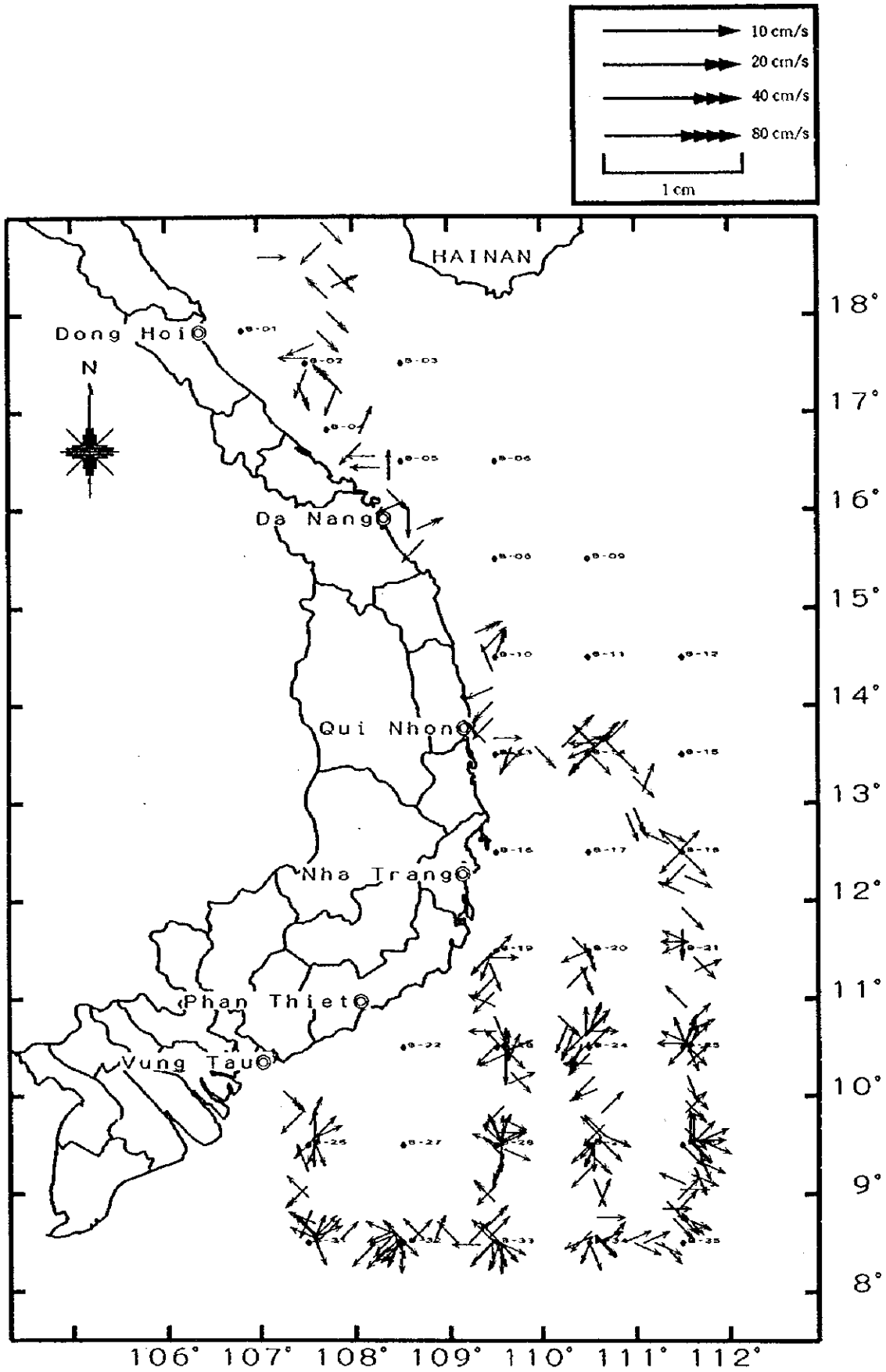
付図29 Line-Fの水温・塩分鉛直断面 (水温 1°C、塩分0.2間隔)
1996年5~6月 第2回海上調査



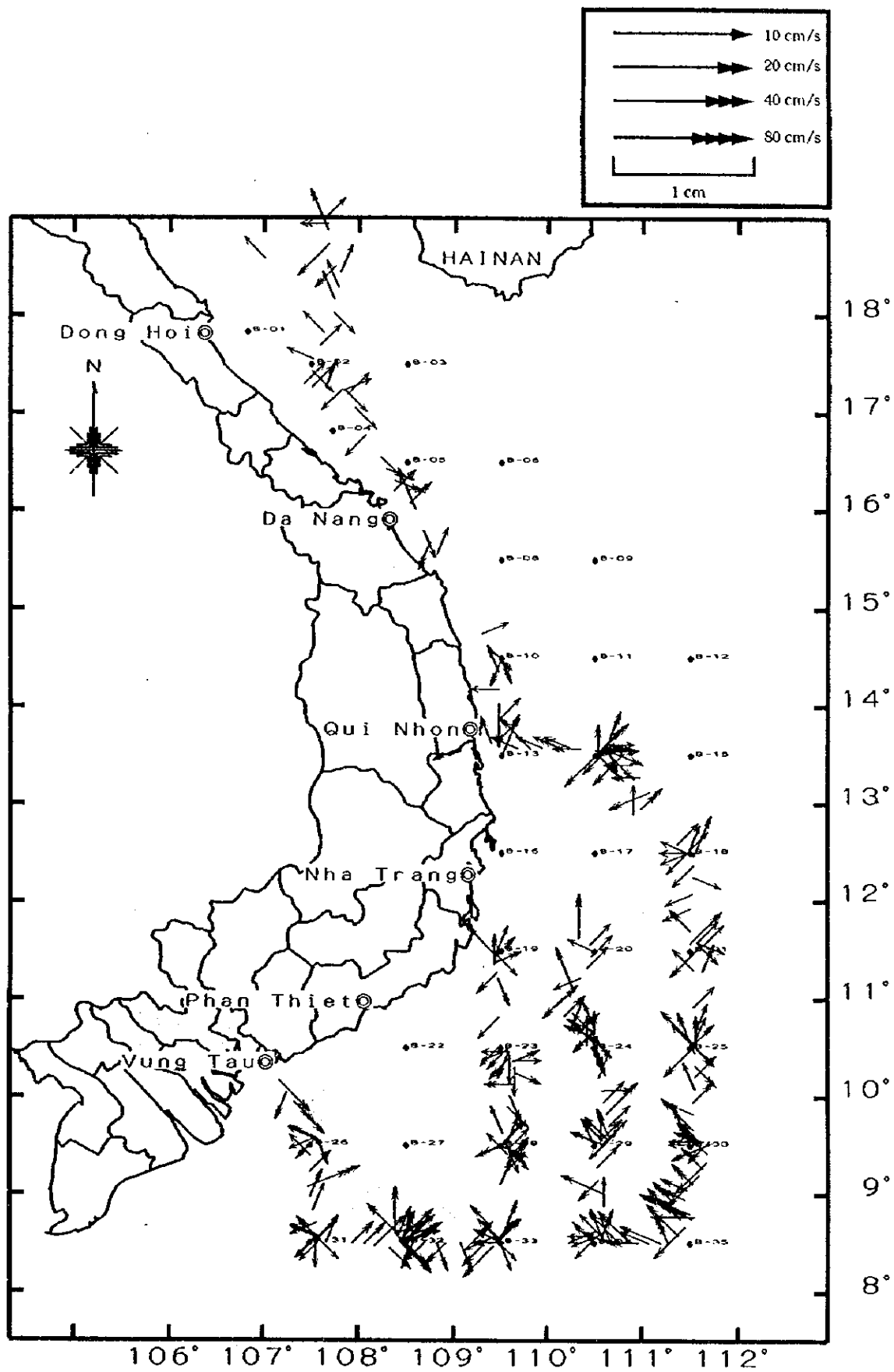
付図30 Line-Gの水溫・塩分鉛直断面 (水溫 1°C、塩分0.2間隔)
1996年5～6月 第2回海上調査



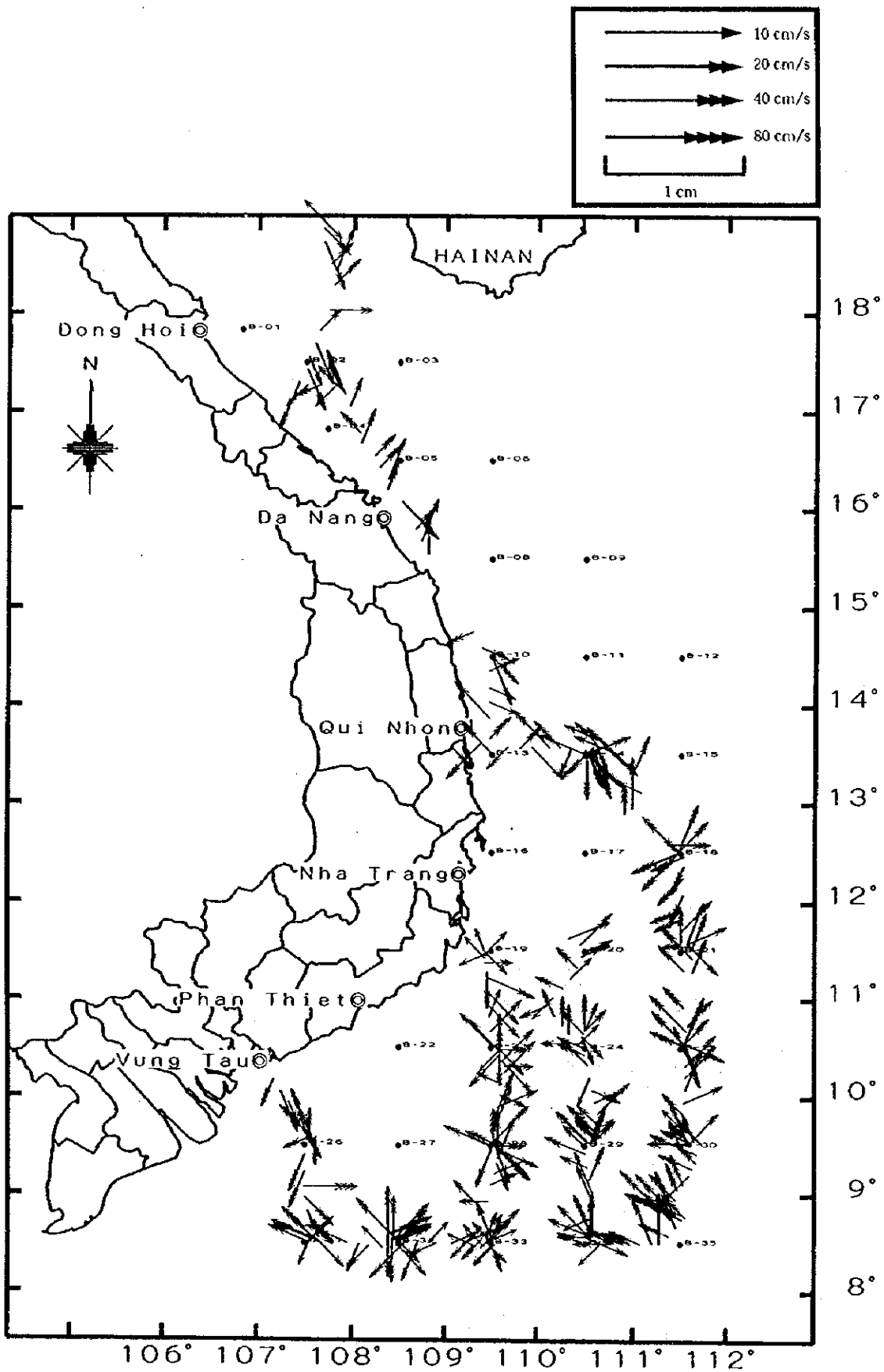
付図31 水温・塩分水平分布, 1996年5~6月 (水温0.5°C, 塩分0.2間隔)



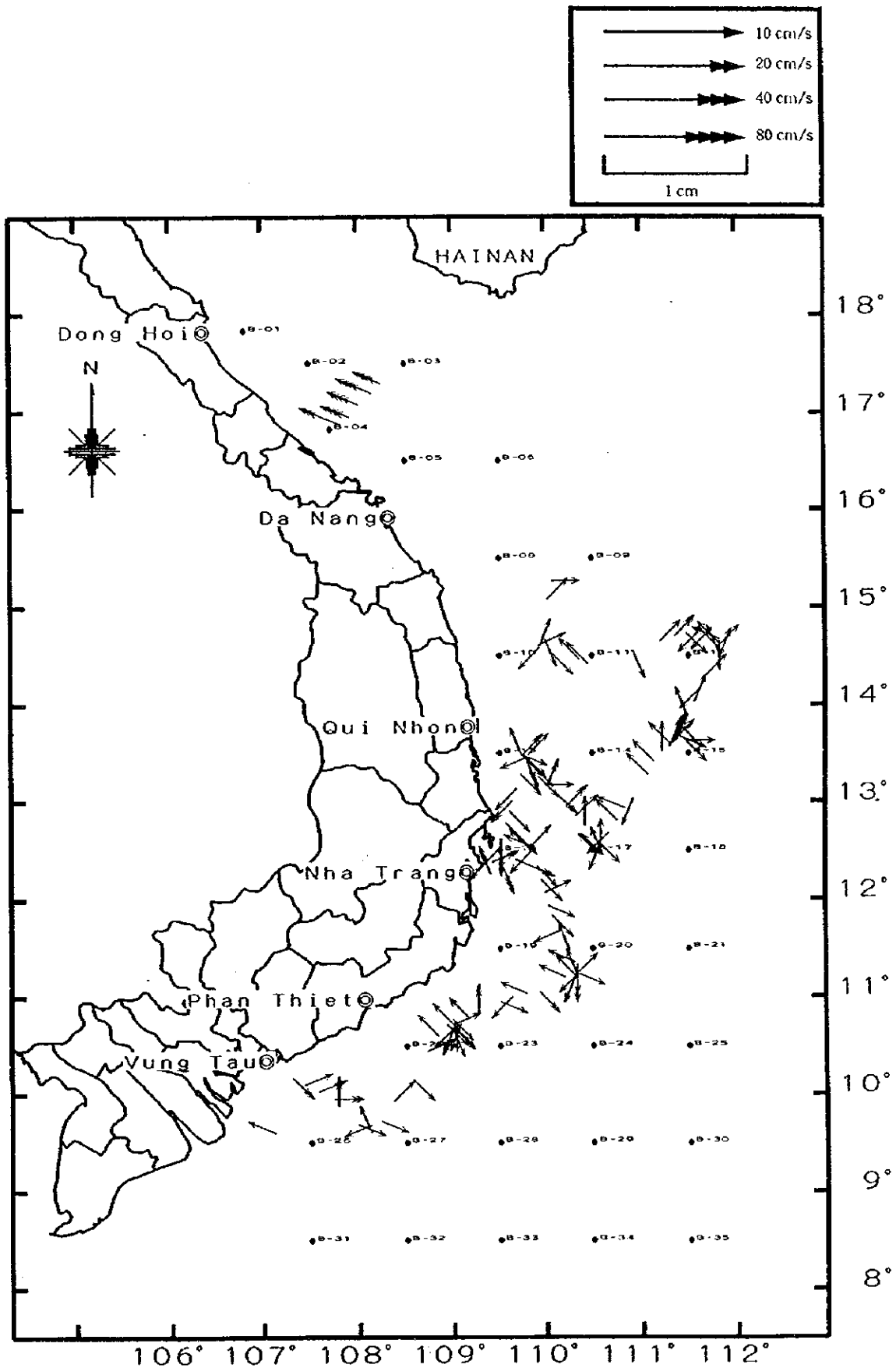
付图32 流向·流速分布图 2 m (1996年5月)



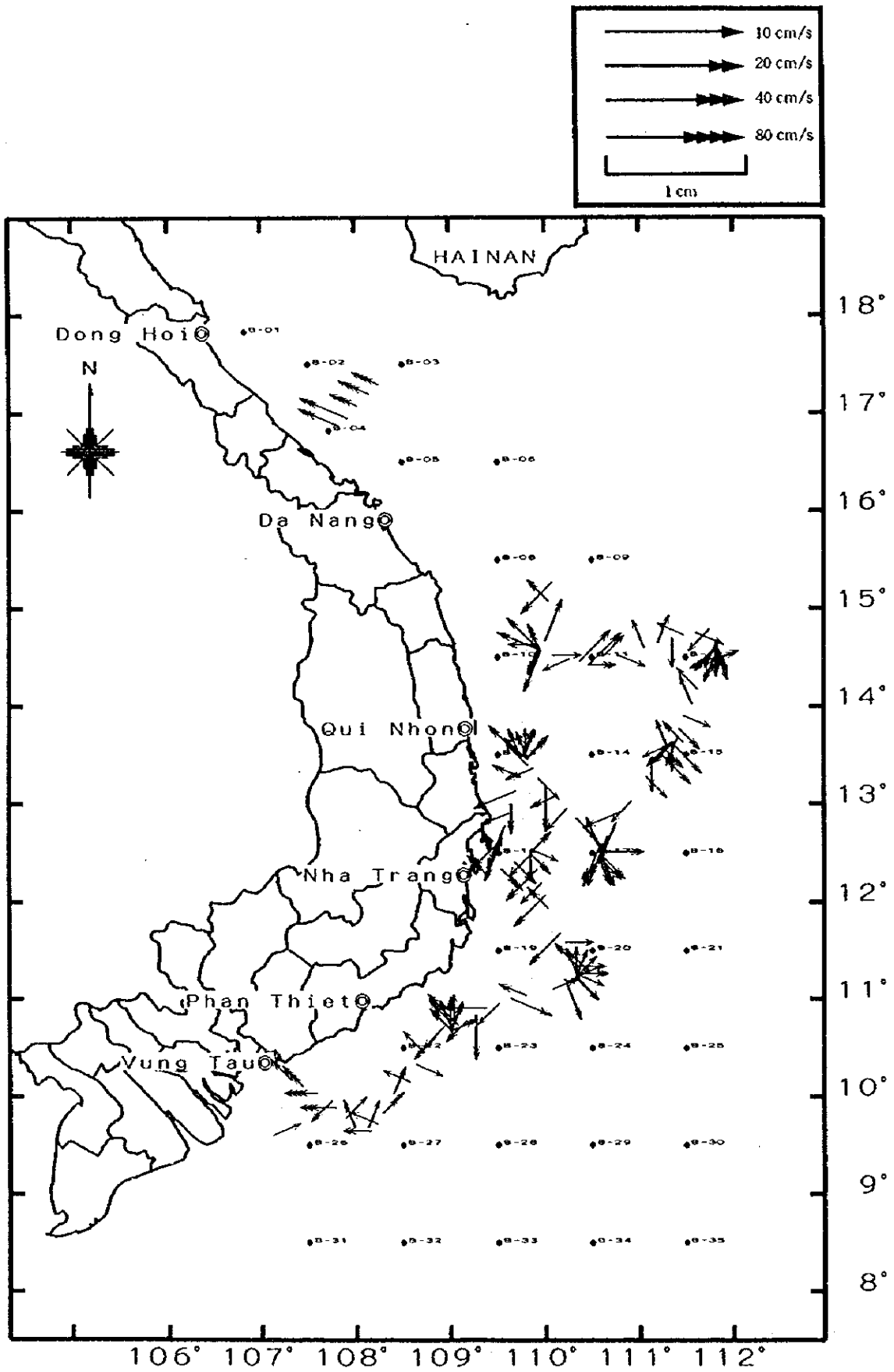
付图33 流向·流速分布图 10 m (1996年5月)



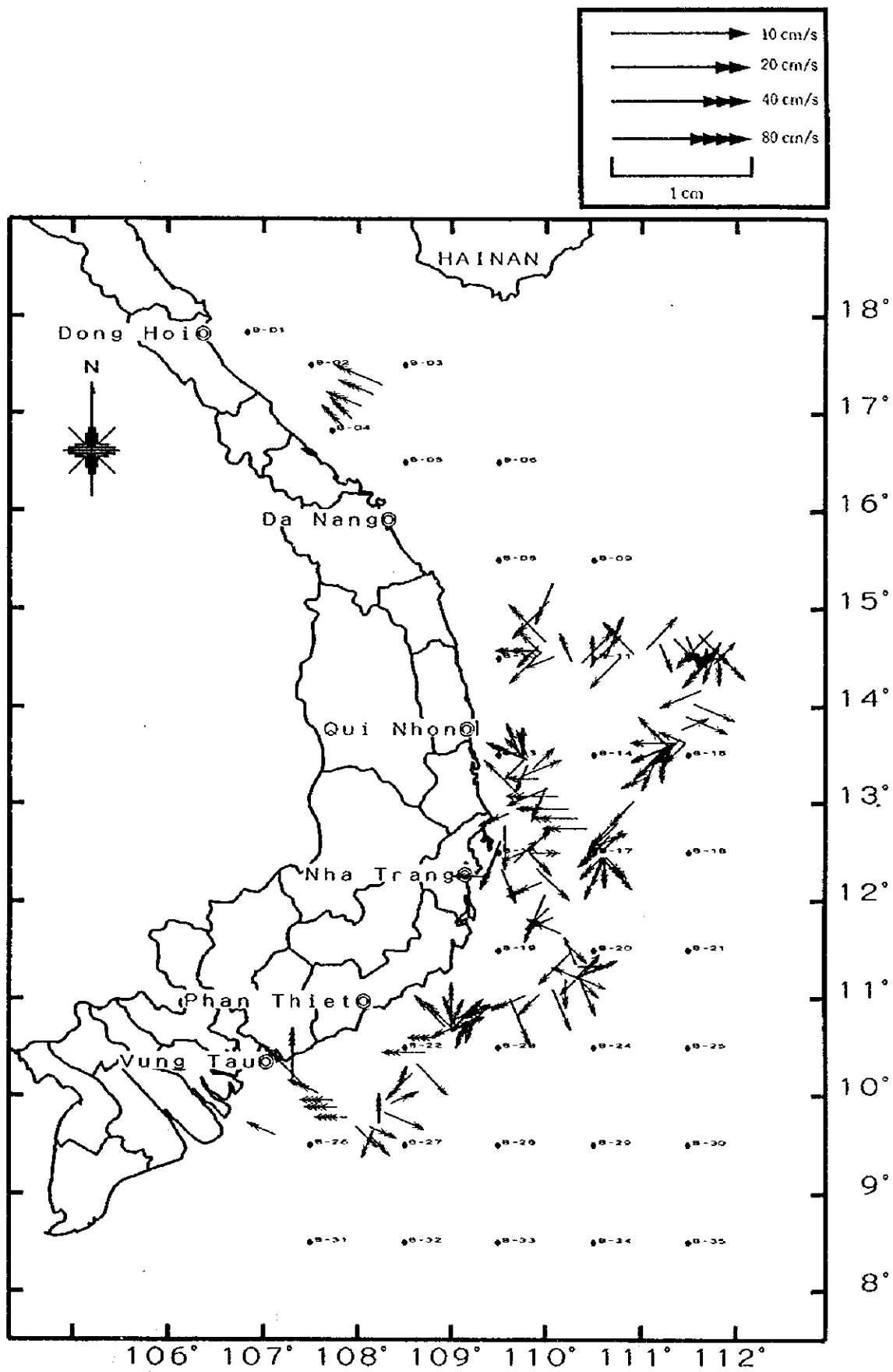
付图34 流向·流速分布图 50 m (1996年5月)



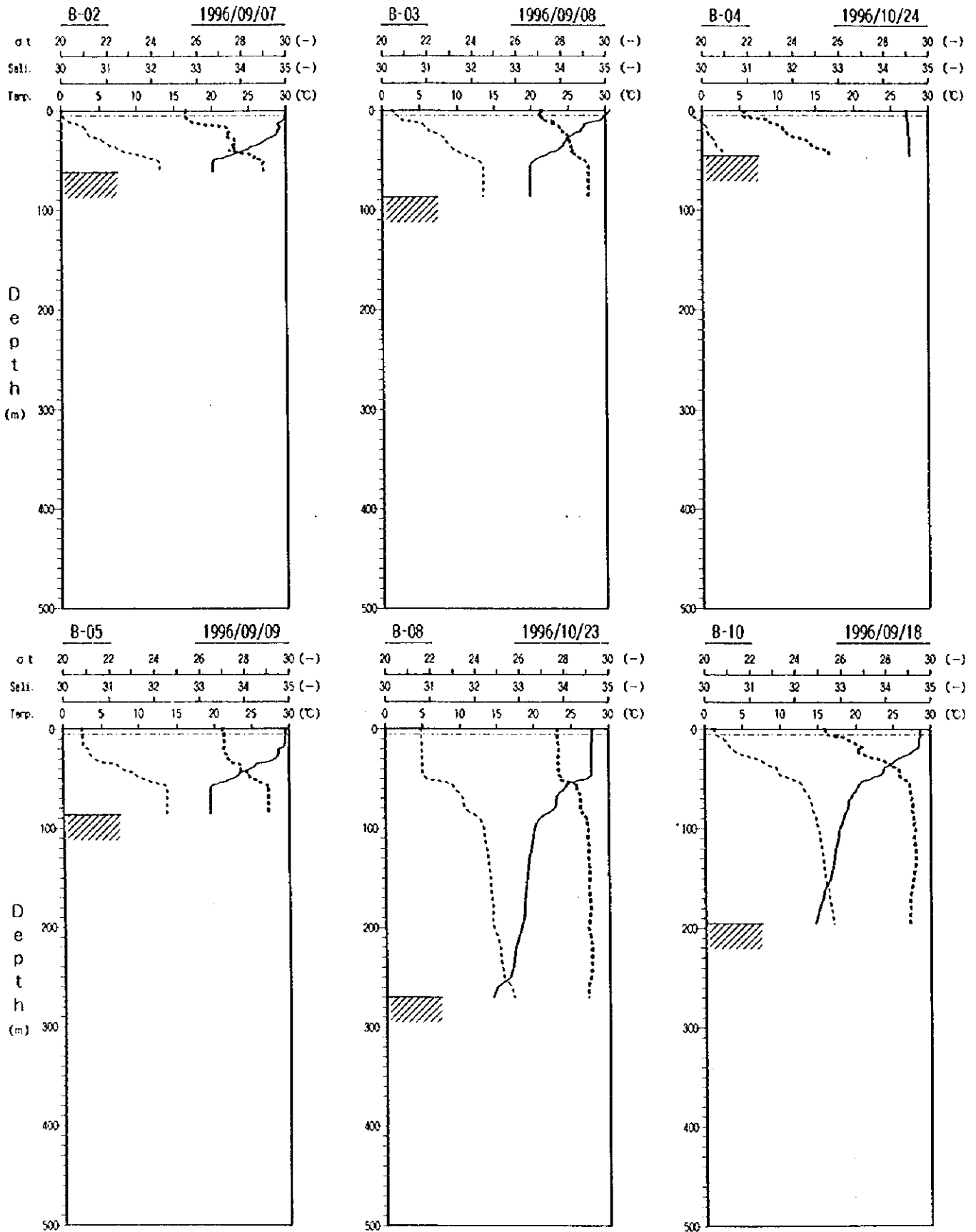
付图35 流向·流速分布图 2m (1996年6月)



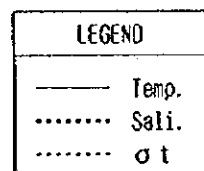
付图36 流向·流速分布图 10 m (1996年6月)

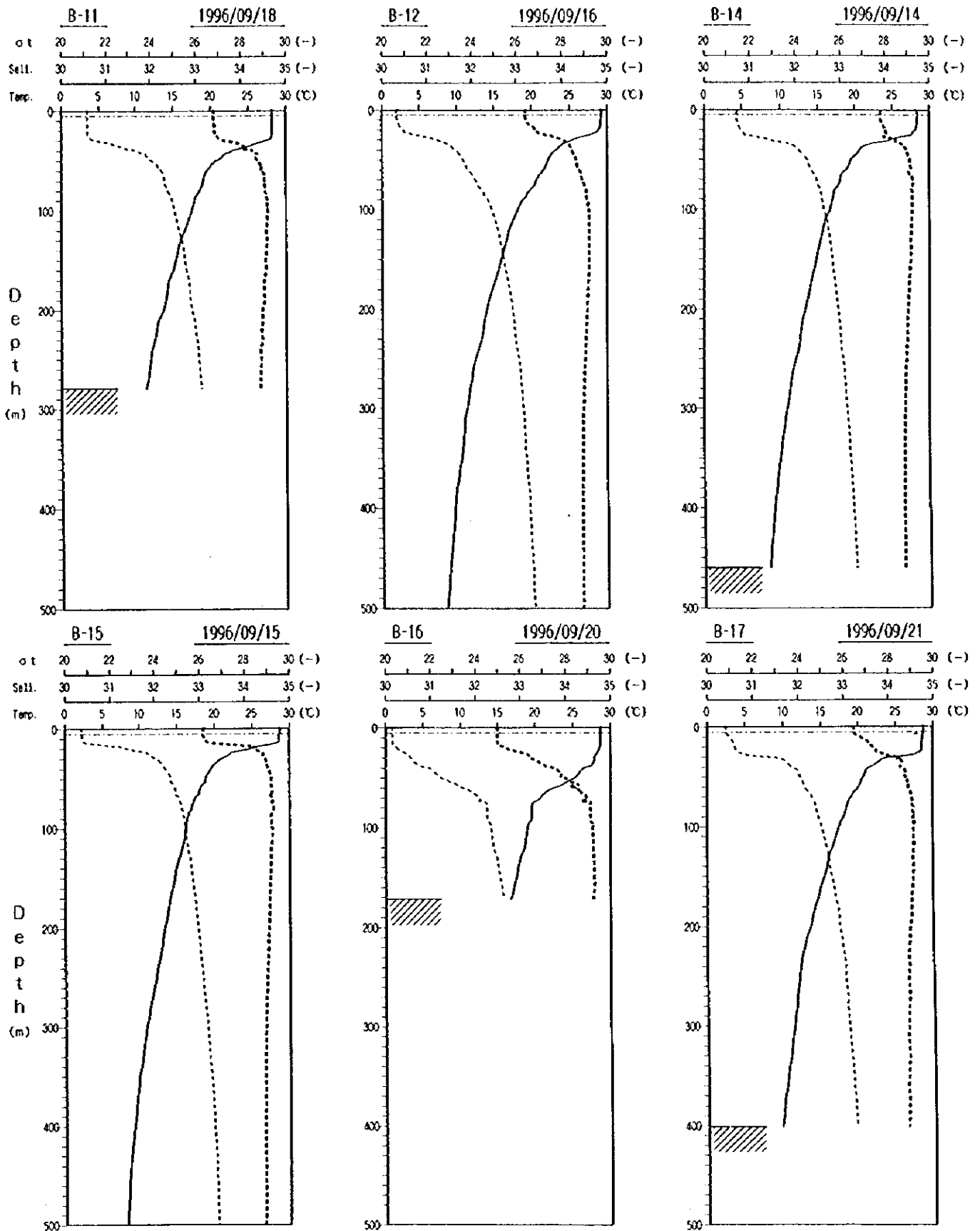


付图37 流向·流速分布图 50 m (1996年6月)

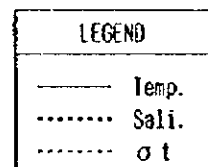


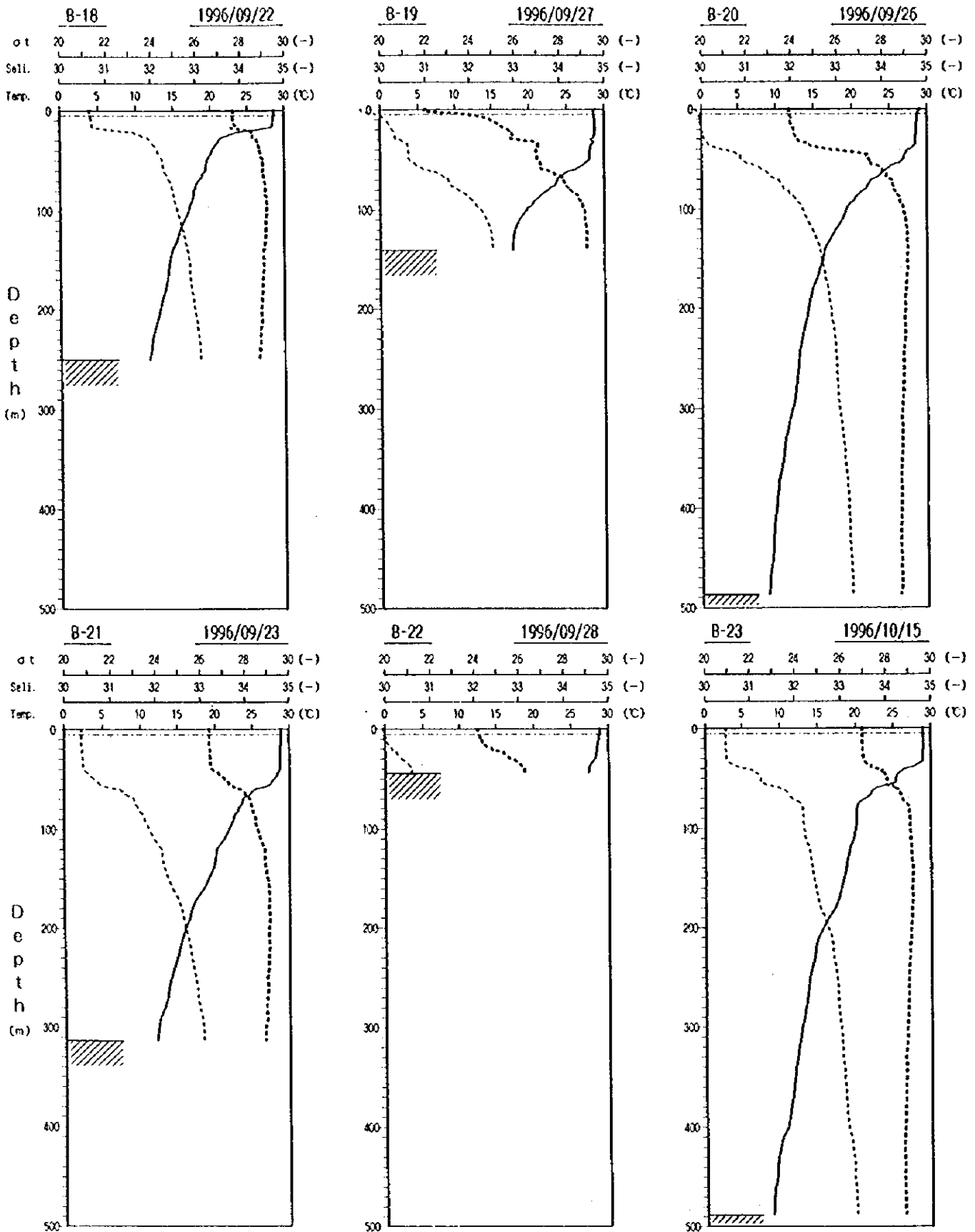
付図38 水温・塩分・ σ_t 鉛直分布-1 (1996年9~10月 第3回海上調査)



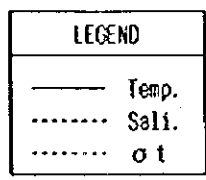


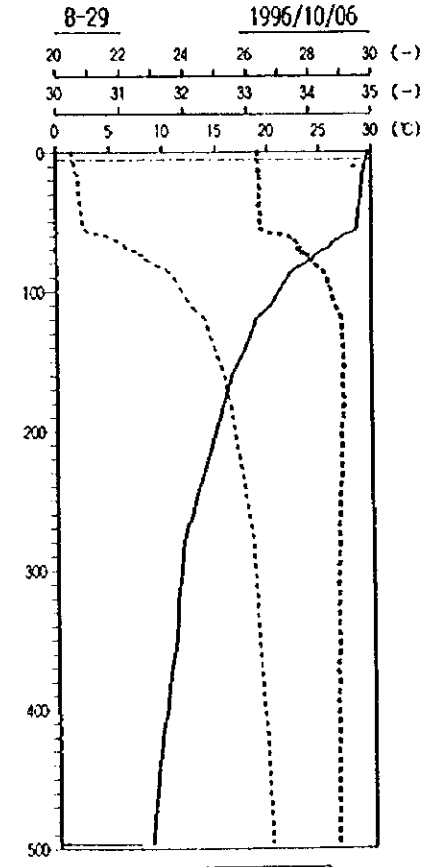
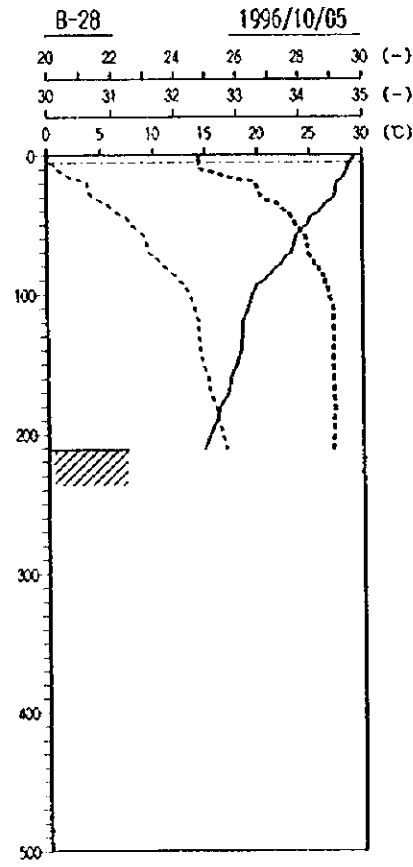
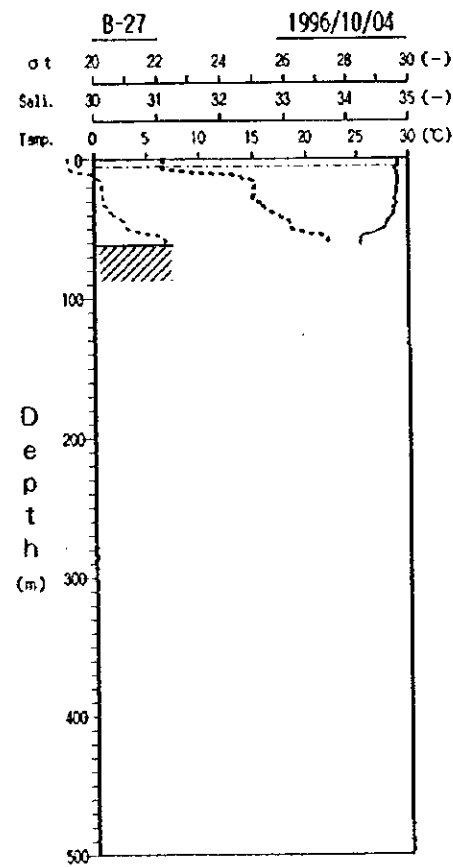
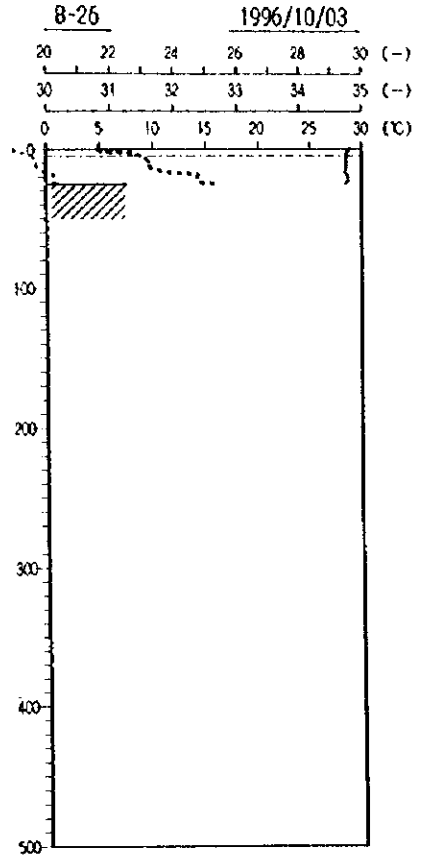
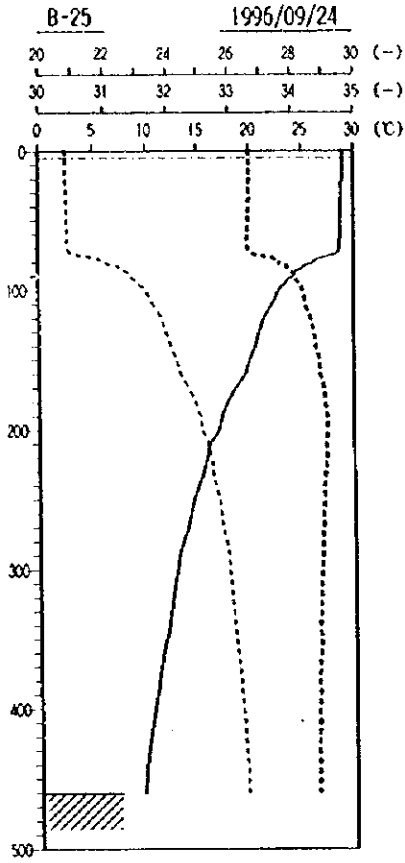
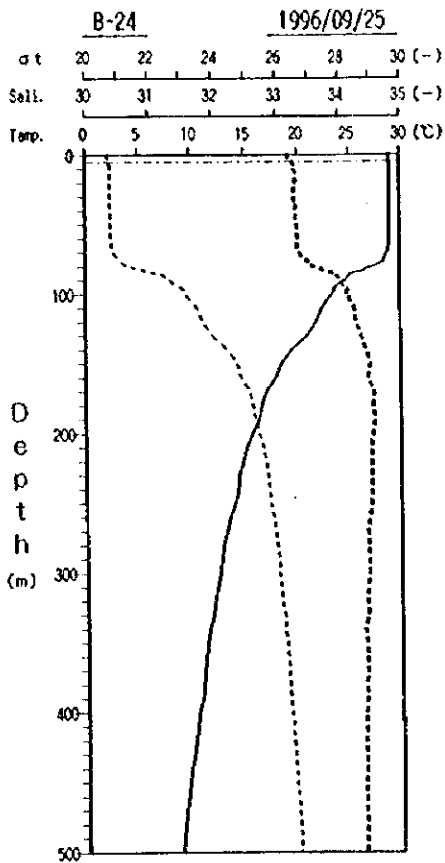
付図39 水温・塩分・ σ_t 鉛直分布-2 (1996年9~10月 第3回海上調査)



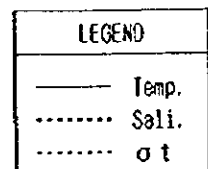


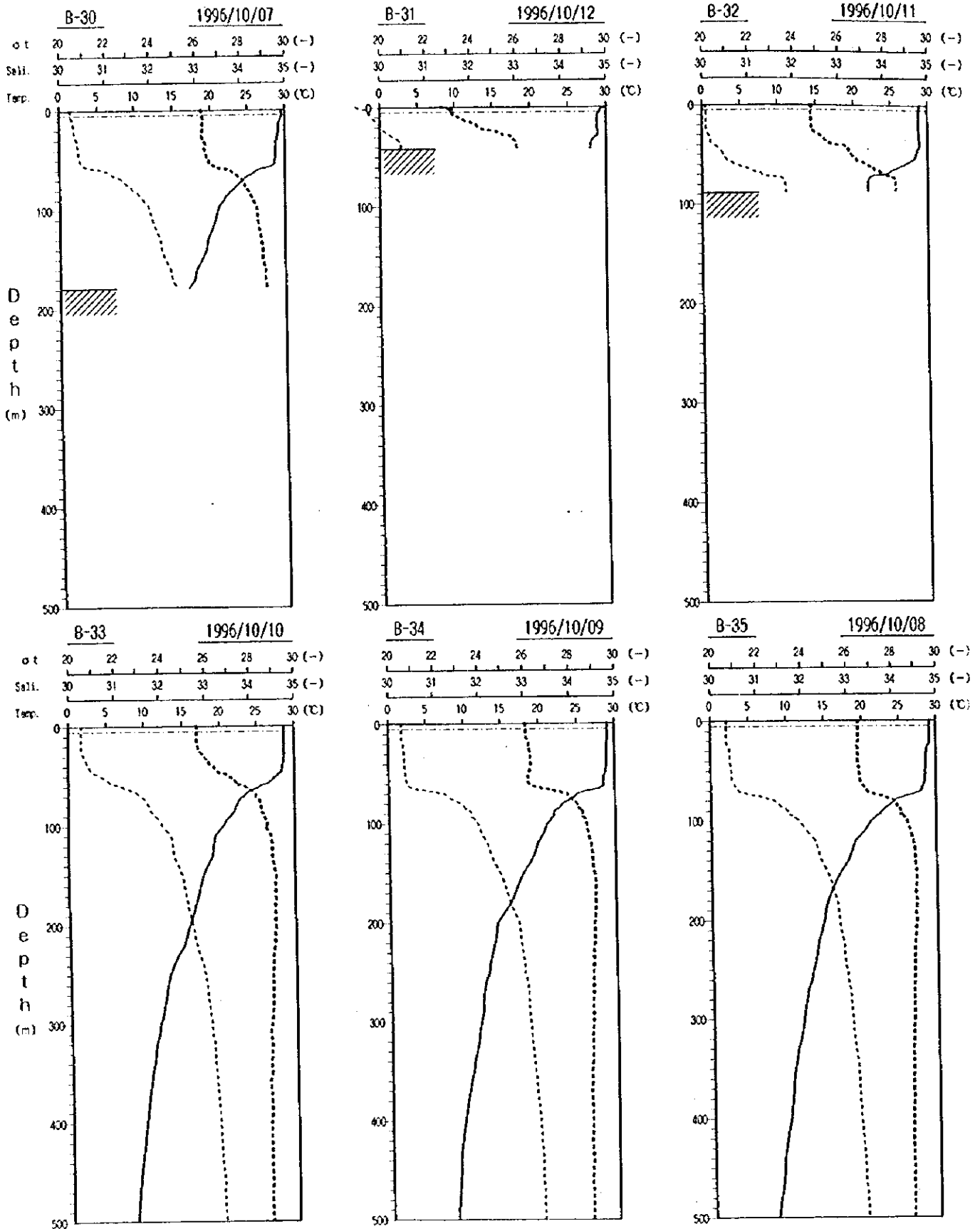
付図40 水温・塩分・ σ_t 鉛直分布-3 (1996年9~10月 第3回海上調査)





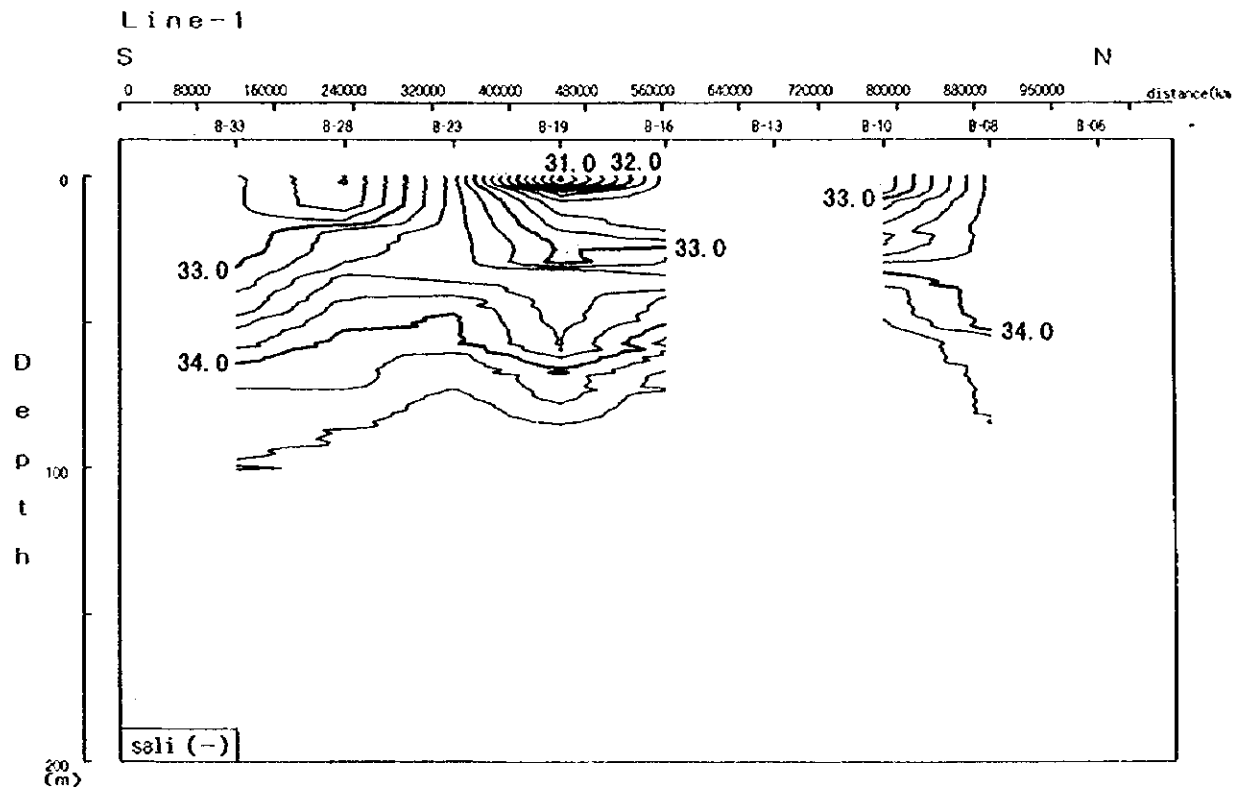
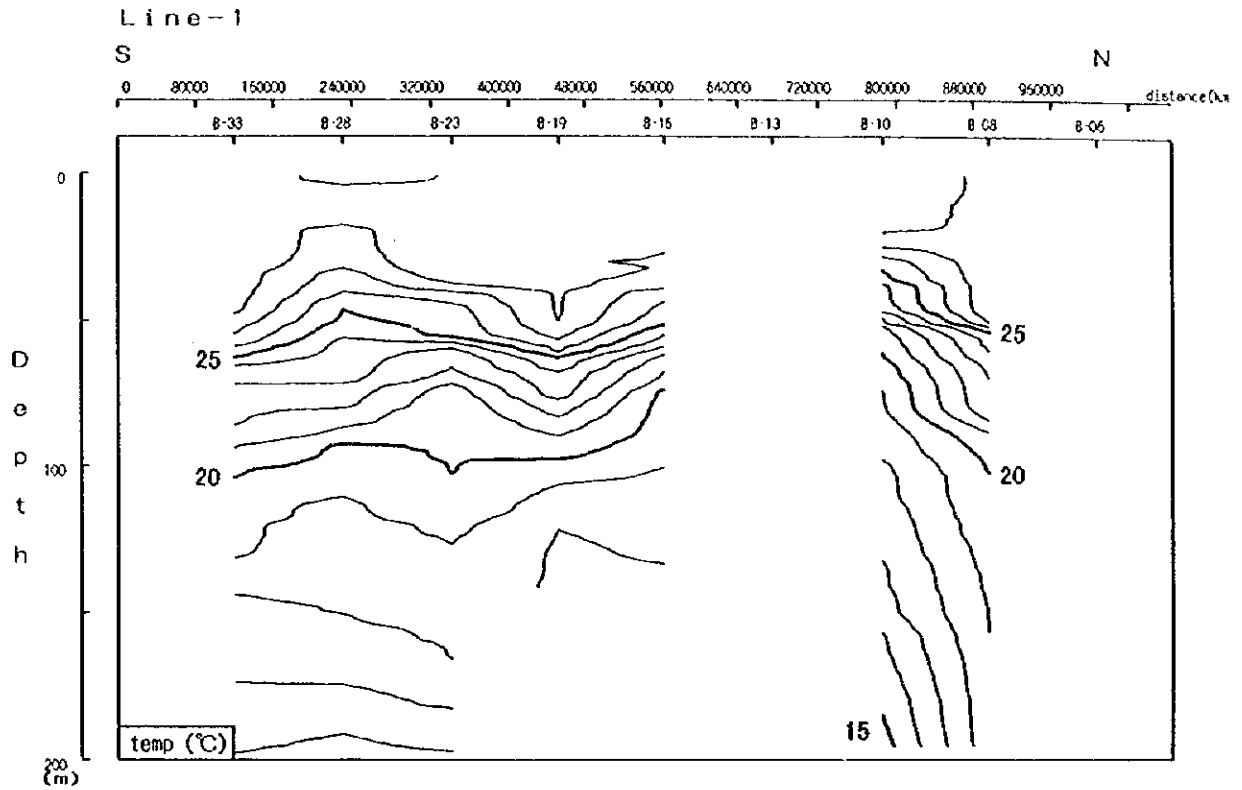
付図41 水温・塩分・ σ_t 鉛直分布-4 (1996年9~10月 第3回海上調査)



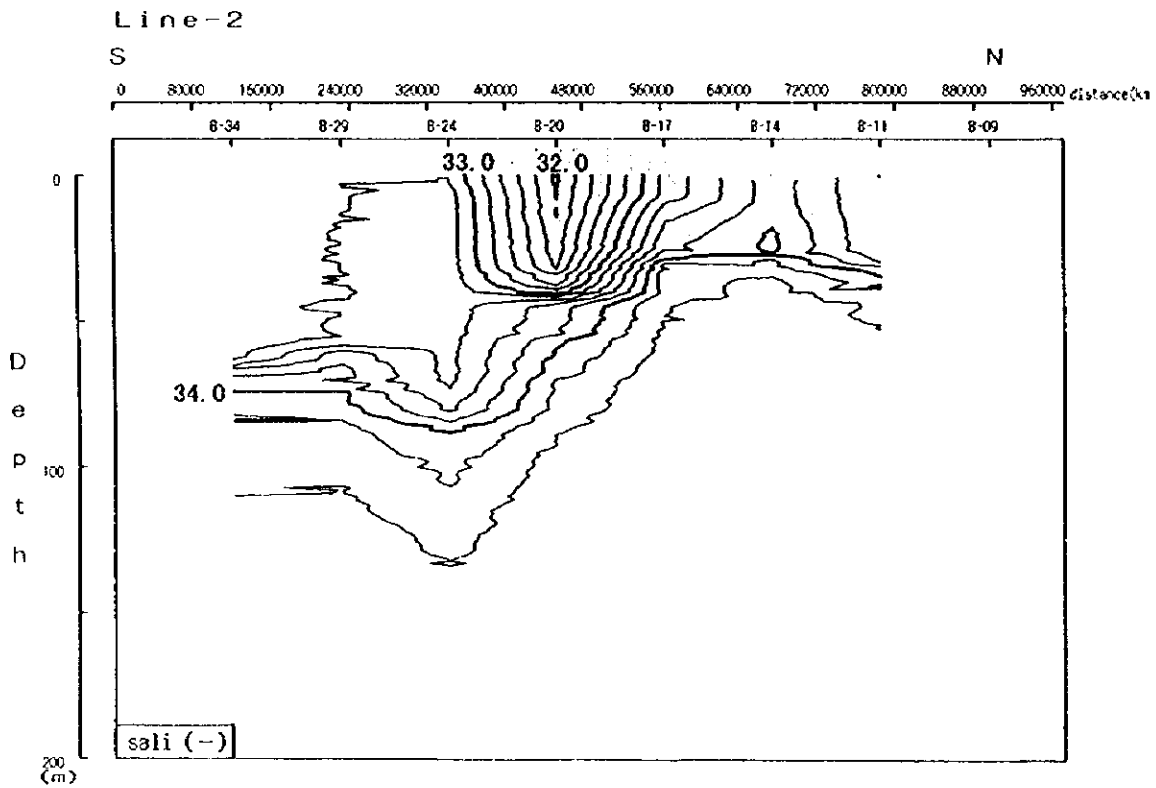
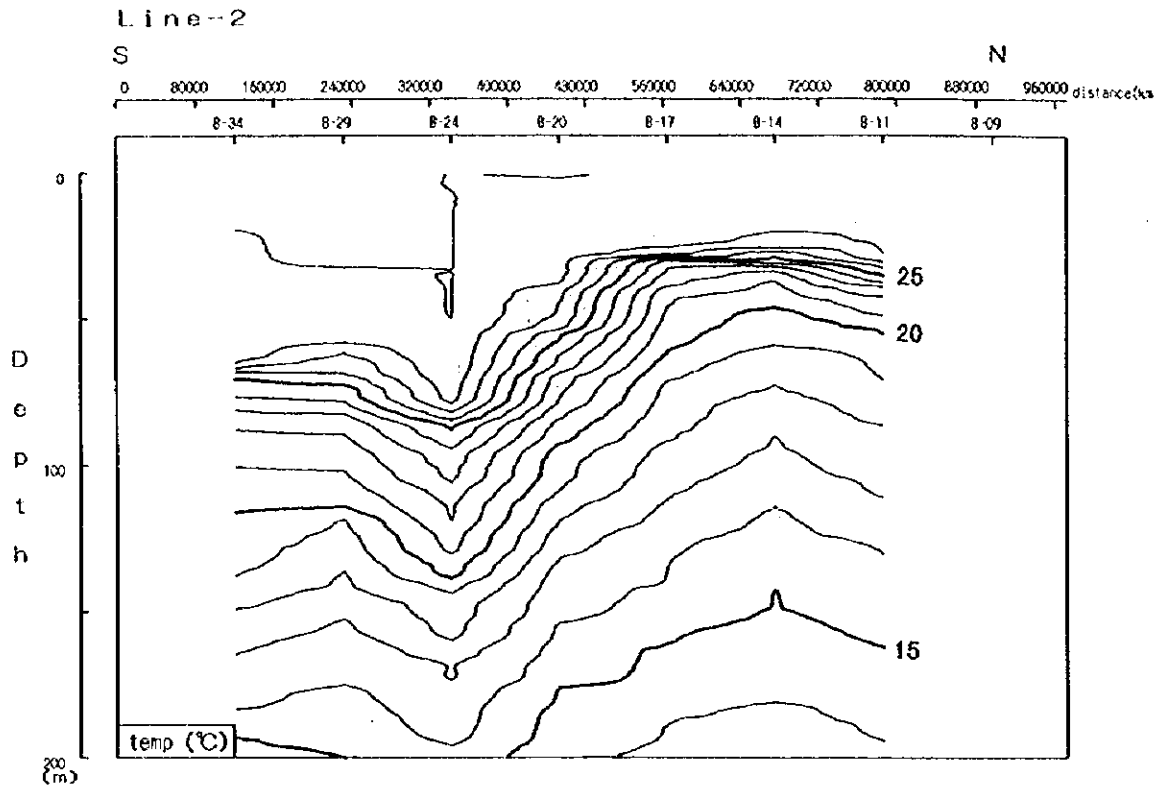


付図42 水温・塩分・ σ_t 鉛直分布-5 (1996年9~10月 第3回海上調査)

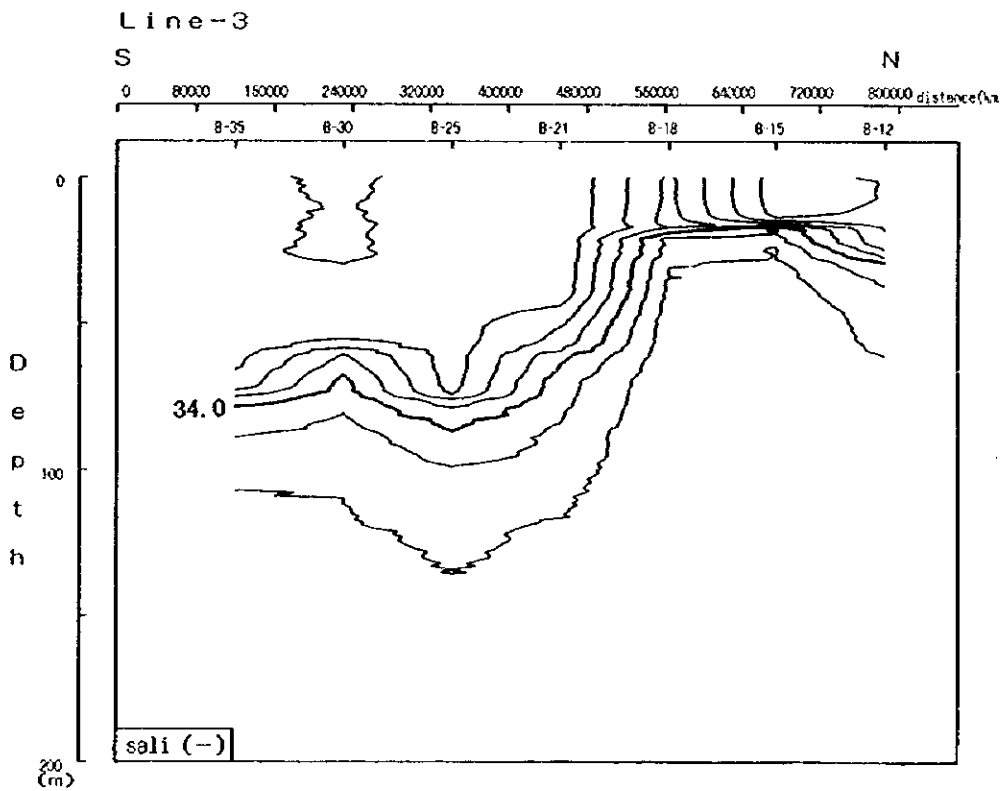
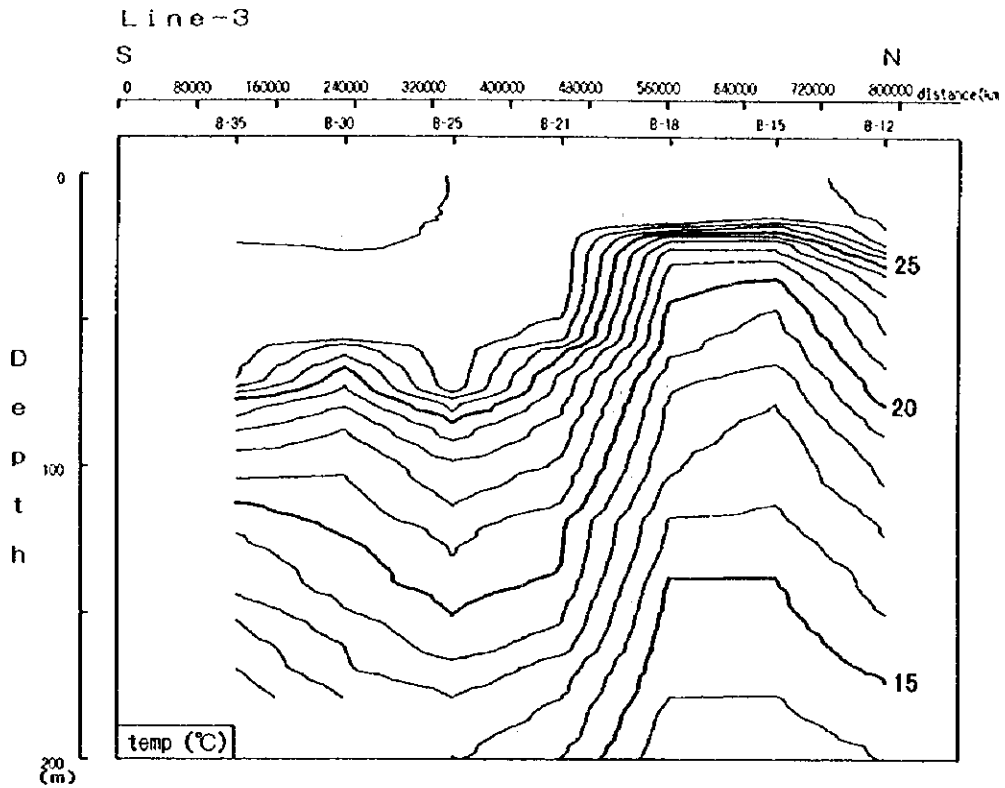
LEGEND	
—	Temp.
.....	Sali.
-----	σ_t



付図43 Line-1の水温・塩分鉛直断面 (水温1°C、塩分0.2間隔)
1996年9~10月 第3回海上調査



付図11 Line-2の水温・塩分鉛直断面（水温1℃、塩分0.2間隔）
1996年9～10月 第3回海上調査



付図45 Line-3の水温・塩分鉛直断面 (水温1°C、塩分0.2間隔)
1996年9~10月 第3回海上調査