

CSIRO

MARINE LABORATORIES

Division of Fisheries Research
Division of Oceanography

A Division of the Institute of Animal and Food Sciences
A Division of the Institute of Physical Sciences

Castray Esplanade, Hobart, Tasmania, Australia 7000

GPO Box 1538, Hobart, Tasmania, Australia 7001
Telephone (002) 20 6222 Telex AA 57182
Facsimile (002) 23 7125

CRUISE PLAN

R.V. 'FRANKLIN' FR 5/85

Itinerary

| | | |
|-------------------|----------|-----------------|
| Depart Cairns | 0700 hrs | 1 October 1985 |
| Arrive Townsville | | 16 October 1985 |
| Depart Townsville | | 19 October 1985 |
| Arrive Townsville | 1500 hrs | 5 November 1985 |

Scientific Programs

1. Hydrographic structure of watermasses at Coral Sea boundaries, interior water masses and East Australian Current.
2. Primary production and biomass of phytoplankton in the Coral Sea.
3. Nitrogen utilization by phytoplankton in the Coral Sea.
4. High accuracy surface temperature from environmental satellites (Hastes).

Principal Investigators

1. John C. Andrews
Australian Institute of Marine Science
P.M.B. No. 3
Townsville, M.C. 4810
Tel: (077) 789-211
2. Miles J. Furnas
Australian Institute of Marine Science
P.M.B. No. 3
Townsville, M.C. 4810
Tel: (077) 789-211
3. Ian Barton
CSIRO Division of Atmospheric Research
Private Bag 1,
Mordialloc Victoria 3195
Tel: (03) 580-6333

Cruise Objectives

For Scientific Program 1

- a. To complete a series of CTD and hydrographic sections (see attachments)

around the perimeter and through the interior of the Coral Sea, with associated nutrient and dissolved oxygen data.

- b. To make a series of hydrographic transects and ADCP current profiles across the East Australian current between Cook's Passage and Townsville.

For Scientific Program 2

- c. To conduct a series of phytoplankton productivity experiments with ^{14}C methods using phytoplankton populations from boundary and interior regions of the Coral Sea.

For Scientific Program 3

- d. To conduct a series of nitrogen uptake experiments using ^{15}N tracers to estimate ammonium turnover and nitrate uptake by phytoplankton populations in boundary and interior regions of the Coral Sea.

For Scientific Program 4

- e. To measure atmospheric and sea surface parameters so as to be able to model atmospheric absorption and sea surface skin effects for the better reduction and interpretation of satellite data.

Cruise Track

The attached diagram (Figure 1) is a zerox from British Admiralty chart 780, which takes in the full study area. On the longer legs we propose to do a CTD/rosette station every 110 km and T7 XBT drops midway between each station. On shorter legs across the EAC, stations will be spaced at equidistant intervals between end points. In addition, 3 hours per day has been budgeted for biology wire time. This includes casts for collecting light profiles, 150 m CTD/rosette productivity casts and vertical zooplankton hauls. It is anticipated that biological sampling will be done daily at or near dawn, with light casts near noon.

In preparing the cruise tracks, we wish to have the end stations at or near the shelfbreak. The end points shown are approximately 15 miles from shore. If we can get closer, so much the better. More detailed maps will be supplied to the ship's Master when we get to Cairns.

ORV Equipment Required

Scientific Sounders

Thermosalinograph (continuous) - with data logging

CTD and 12 bottle rosette and 5 litre Niskin bottles

Reversing thermometers - 2 protected + 1 unprotected

Salinometer

Scintillation counter

T7 - XBT probes (120 approx.) with launcher/recorder

Doppler acoustic velocity profiler (first phase only)

Autoanalyser (standard nutrients) - NH_4 , NO_3 , NO_2 , $\text{Si}(\text{OH})_4$, PO_4

Oxygen (in situ and winkler)

Meteorological equipment

Satnav
Bio-seawater to after deck

Equipment Provided by AIMS

UV-VIS spectrophotometer
Filtration manifolds
Chlorophyll fluorometer and grinding apparatus
Isotope Workstation
On deck incubators
UV light profiler
microscopes

On Board Analyses

At each station, water samples will be collected for salinity, oxygen, nutrient (ammonium, nitrate, nitrite, phosphate, silicate) and chlorophyll analyses. We anticipate using all twelve rosette bottles at each station. We anticipate collecting approximately 1650 samples overall. In addition, ad hoc analyses for dissolved nutrients will be required during experiments.

Time Budget

Assuming a steaming speed of 12 knots, 1.5 hrs for a shallow (1500 m) CTD cast, 3 hrs for a deep (3000 m+) CTD cast and 3 hrs per day for biology on station.

Phase 1 (Legs 1-12)

| | |
|----------------------|-----------|
| Steaming (2425 nm) | 202 hours |
| 27 deep CTD casts | 81 hours |
| 26 shallow CTD casts | 39 hours |
| Biology (14 days) | 42 hours |

Total 364 hours = 15.2 days

Phase 2 (Legs 13-22)

| | |
|----------------------|-----------|
| Steaming (1880 nm) | 157 hours |
| 29 deep CTD casts | 87 hours |
| 29 shallow CTD casts | 44 hours |
| Biology (12 days) | 36 hours |

Total 324 hours = 13.5 days

Assuming that all loading and unloading can take place while the 'Franklin' is alongside in Cairns and Townsville, respectively, our overall time budget is as follows:

| | |
|--|-----------|
| Phase 1 | 364 hours |
| Phase 1 contingency steaming and profiling | 48 hours |
| Load and change in Townsville | 48 hours |
| Phase 2 | 324 hours |
| Phase 2 contingency steaming and profiling | 48 hours |

Total 832 hours = 34.7 days

Such surplus time that is available within the cruise time budget set out will be used for time series biological sampling at one or more locations to be determined during the cruise. The nature of the experiments will be determined on the basis of data obtained during the cruise.

Scientific Personnel

Phase 1

Cairns - Townsville

| | |
|--------------------------------|-----------------------------|
| John Andrews (Chief Scientist) | AIMS |
| Miles Furnas | AIMS |
| Alan Mitchell | AIMS |
| Rosemary Morrow | AIMS |
| David Vaudrey (Cruise Manager) | CSIRO - Marine Laboratories |
| Gary Critchley | CSIRO - Marine Laboratories |
| Bruce Barker | CSIRO - Marine Laboratories |
| Alan Poole | CSIRO - Marine Laboratories |
| Peter Richards | CSIRO - Marine Laboratories |

Phase 2

Townsville - Townsville

| | |
|--------------------------------|------------------------------|
| Miles Furnas (Chief Scientist) | AIMS |
| Alan Mitchell | AIMS |
| Lyle Kelly | AIMS |
| Helen Strurmey | AIMS |
| Ian Barton | CSIRO - Atmospheric Research |
| David Vaudrey (Cruise Manager) | CSIRO - Marine Laboratories |
| Gary Critchley | CSIRO - Marine Laboratories |
| Bruce Barker | CSIRO - Marine Laboratories |
| Alan Poole | CSIRO - Marine Laboratories |
| Peter Richards | CSIRO - Marine Laboratories |

This Cruise Plan is in accordance with the directions of the National Facility Steering Committee for the oceanographic research vessel RV 'FRANKLIN'.

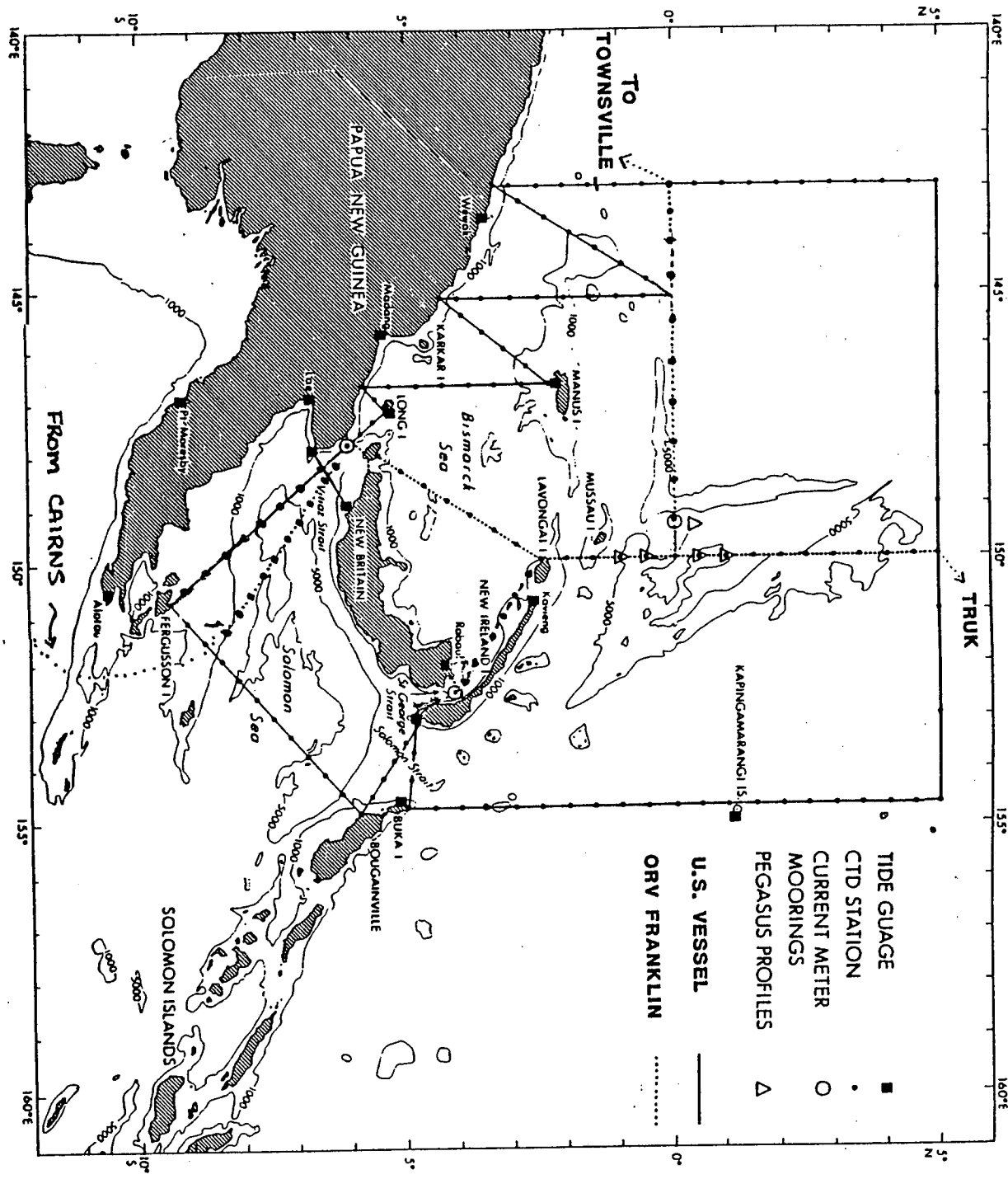


Figure 1. Western equatorial Pacific Ocean and proposed circulation study sampling scheme. The 1000 and 5000 m isobaths are contoured.