

# R.V. FRANKLIN

## NATIONAL FACILITY OCEANOGRAPHIC RESEARCH VESSEL

### RESEARCH PLAN

#### CRUISE FR 1/90

<sup>10</sup>  
Sails Hobart 1000 Thursday ~~5~~ January 1990  
Arrives Hobart 1500 Thursday ~~25~~ January 1990  
<sup>30</sup>

#### Principal Investigators

*Brian Gilchrist?*  
~~Dr Graham Harris~~

CSIRO Division of Fisheries

Dr Denis Mackey

CSIRO Division of Oceanography

Dr Graham Pearman

CSIRO Division of Atmospheric Research

The Role of the Subtropical Convergence in the Tasman Sea

in taking up Carbon Dioxide

Physics, Chemistry and Ocean Production

December 1989

Bernadette Baker

CSIRO Division of Oceanography

HOBART

For further information contact

ORV Operations Manager

c/- CSIRO Division of Oceanography

GPO Box 1538, Hobart, Tas. 7001

Telephone (002) 20 6222

Telex AA 57182

DESIGNED AND OPERATED BY CSIRO

**CRUISE PLAN**  
**R.V. FRANKLIN**  
**FR 1/90**  
**15 JULY 1989**

**ITINERARY:**

DEPART: Hobart 1000 hrs Thursday, 5 January 1990  
ARRIVE: Hobart 1500 hrs Thursday, 25 January 1990

**SCIENTIFIC PROGRAM:**

Results from global carbon models suggest that the region of the Subtropical Convergence (STC) plays an important role in carbon burial. Although a number of investigations have been made of the STC, there is still no good definition of either the physical structure, or biological activity associated with, the STC. This cruise is the first of a series designed to examine the seasonal and interannual variability in the position, the physics and chemistry, and biological productivity of the STC and surrounding waters, and the role of these areas in taking up and burying carbon dioxide.

**PRINCIPAL INVESTIGATORS:**

*Dr. G. Harris Brian Griffiths*  
CSIRO Division of Fisheries  
Box 1538, G.P.O., Hobart, Tasmania 7001

Dr. D. Mackey  
CSIRO Division of Oceanography  
Box 1538, G.P.O., Hobart, Tasmania 7001

Dr. G. Pearman  
CSIRO Division of Atmospheric Research  
Private Bag No. 1, Mordialloc, Victoria, 3195

**CRUISE OBJECTIVES:**

1. To define the physical structure of the Subtropical Convergence, and to determine the nutrients, biomass of phytoplankton and zooplankton, and primary production in relation to the physical structure of the Convergence and surrounding water masses.
2. To describe the relationship between sea surface temperature measured by satellite and the physical and chemical oceanography using underway surface sampling and CTD casts.
3. To relate ocean colour, as measured by an airborne ocean colour scanner on the COSSA research aircraft, and a hand-held multi-channel spectral radiometer, to both surface and water column chlorophyll, phytoplankton biomass, and primary production and zooplankton biomass.
4. To estimate the CO<sub>2</sub> content in the surface water in and around the STC, and attempt to balance the CO<sub>2</sub> content, primary production, grazing and sedimentation rates in and around the STC.
5. To determine the zoogeography and distribution of fish larvae and zooplankton in,

and around, the STC.

6. To estimate mixing rates and processes across the STC by analyzing water samples for ambient levels of  $^{14}\text{C}$  and perhaps  $^3\text{H}$ .

#### **CRUISE TRACK:**

The actual track will depend on the position of the STC, and associated eddy fields as determined by satellite imagery just before the cruise departs. The general area of operation will be between  $38^\circ\text{S}$  and  $50^\circ\text{S}$ , and  $150^\circ\text{E}$  and  $160^\circ\text{E}$ . It is anticipated that a transect between  $38^\circ\text{S}$  and  $50^\circ\text{S}$  along  $152^\circ\text{E}$ , with stations at 30 nautical mile intervals will be occupied first. Transects across selected features will then be made followed by very detailed physical, chemical and biological mapping in time and space of some of the selected features will then be carried out.

#### **ORV EQUIPMENT REQUIRED:**

CTD with Variosens or SeaTech fluorometer, pH sensor, submersible light meter.  
Underway pH, fluorescence, surface light intensity and particle size logged simultaneously with the thermosalinograph, time and position.  
Biological container for  $^{14}\text{C}$  productivity work.  
Acoustic doppler current profiler.  
AutoAnalyzer measuring  $\text{NO}_3$ ,  $\text{NO}_2$ ,  $\text{SiO}_3$ ,  $\text{PO}_4$  and  $\text{NH}_3$ . Note the AA will be used for continuous underway measurements of nutrients in surface waters only.  $\text{NO}_3$ ,  $\text{NO}_2$ , and  $\text{PO}_4$  from bottles on the CTD rosette will be measured by L. Clementson after the cruise when she measures total nitrogen and phosphorus in the samples.  $\text{SiO}_3$  and  $\text{NH}_3$  from the CTD niskins will be measured on board using the FIA system.  
Salinometer, DO, Milli-Q and Milli-Ro systems.  
Thermosalinograph.  
"Clean" niskins for tracer  $^{14}\text{C}$  and  $^3\text{H}$  sampling.  
"Normal" niskins for  $^{14}\text{C}$  productivity work and salinities, oxygens, and nutrients.  
Scintillation counter  
EZ net plus fine mesh (338  $\mu\text{m}$ ) nets.  
Particle size analyzer.


#### **EQUIPMENT PROVIDED BY USERS:**

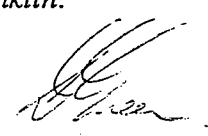
Incubation tanks, etc for  $^{14}\text{C}$  experiments.  
Sediment traps, drifters, drogues, surface bouys, etc for free-floating sediment traps.  
Flow injection analysis system (for nutrients and ammonia analyses).  
Multi-channel spectral radiometer.  
COSSA F 27 aircraft plus ocean colour scanner.  
 $\text{CO}_2$  measuring system (Division of Atmospheric Research).  
Particle size analyzers.  
Zooplankton drop nets.  
Miscellaneous filtration apparatus for preparing samples to allow measurements of chlorophyll, total nitrogen and phosphorus, dissolved and particulate carbon, etc.  
Zooplankton and phytoplankton fixatives and containers.

**PERSONNEL:**

Brian Griffiths	(Division of Fisheries, Chief Scientist)
John Parslow	"
Vincent Lyne	"
Lesley Clementson	"
Pru Bonham	"
Don MacKenzie	"
Michael Hayes	Division of Atmospheric Research
Jeff Dunn	(Division of Oceanography, Cruise Manager)
Phil Adams	"
Mark Rayner	"
Valerie Latham	"
Janet O'Sullivan	"

This research plan is in accordance with the directions of the National Facility Steering Committee for the Oceanographic research vessel *Franklin*.

  
A.D. McEwan  
CSIRO Division of Oceanography

  
D.H. Green  
National Facility Steering Committee  
December 1989