

# FRANKLIN

## National Facility Oceanographic Research Vessel

### RESEARCH PLAN

#### CRUISE FR 7/91

Sail Townsville	0800	Saturday	31 August 1991
Arrive Townsville	1200	Thursday	12 September 1991
Sail Townsville	0800	Friday	13 September 1991
Arrive Cairns	1000	Monday	23 September 1991

Drs Derek Burrage and David Williams  
Australian Institute of Marine Science

Dr Lance Bode  
James Cook University

### BOUNDARY FLOWS AND FRONTAL CONVERGENCE IN THE CORAL SEA

Drs Ian Barton & Fred Prata  
CSIRO Division of Atmospheric Research

### VALIDATION OF ERS-1 SCANNING RADIOMETER

regional  
University

### OF OSTRACODS

Bernadette Heaney

CSIRO Division of Oceanography

HOBART

29 July 1991

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ed and operated by CSIRO

**Research Plan  
R.V. Franklin  
FR07/91**

**Itinerary:**

Depart Townsville	0800 Hrs	(Sat) 31 Aug., 1991
Arrive Townsville	1200 Hrs	(Thu) 12 Sept., 1991
Depart Townsville	0800 Hrs	(Fri) 13 Sept., 1991
Arrive Cairns	1000 Hrs	(Mon) 23 Sept., 1991

**Project Title: Boundary Flows and Frontal Convergence in the Coral Sea.**

**Scientific Program:**

This cruise continues the work of FR03/85, FR05/88 and FR06/90 in investigating the circulation of the Coral Sea including volume transports of the South Equatorial Current (SEC), East Australian Current (EAC) and the associated Australian and PNG boundary currents. This cruise will focus on the inflow from the SEC and its bifurcation against the Australian continent and will also investigate details of the mesoscale circulation of the southern branch of the bifurcation (the EAC), and associated frontal features. The resulting data will be used to validate numerical circulation models of the Coral Sea and for correlation with the distribution of commercial fisheries and associated fishing effort.

The cruise will acquire data to be used in validating radar altimeter (RA), synthetic aperture radar (SAR) and along-track scanning radiometer (ATSR) data from the ERS-1 spacecraft. The cruise will provide hydrographic and acoustic doppler current profiler data on large-scale circulation features for comparison with the altimeter and ATSR. Ship-board infra-red radiometers will be employed for AVHRR and ATSR ground-truthing. The SAR data will allow investigation of small-scale circulation features in the southern and central GBR and detection of wind and wave conditions relevant to Sea surface temperature detection using ATSR, NOAA AVHRR and shipboard infra-red radiometers.

The proposed cruise track is shown in the attached figure. The cruise track has been revised from the original proposal to reduce the transit time required for longer legs and take full advantage of the unique opportunity to acquire and verify relevant ERS-1 data, consistent with the original objectives. Due to present uncertainties in the phasing of the ERS-1 sensors minor adjustments to the location or sequence of the proposed cruise track might be needed as new orbital information comes to hand.

Piggy-back projects include a small number of grab casts to obtain benthic samples from the Queensland Trough for ostracod studies (Mr. Thierry Correge, ANU) and ground truthing of the ERS1 ATSR using a ship-mounted infra red radiometer, throughout the cruise domain (Dr. I. Barton, CSIRO DAR).

**Principal Investigators:**

Dr. Derek Burrage,  
Australian Institute of Marine Science (AIMS),  
PMB no 3, Townsville MC Q4810.  
Phone (077) 789211

Dr. David Williams (AIMS)

Dr. Lance Bode,  
Dept. of Civil and Systems Engineering,  
James Cook University of North Queensland.

**Co-investigators:**

Mr W. Skirving AIMS and  
Dept. of Geography,  
James Cook University of North Queensland.

Dr. C. Nilsson,  
CSIRO, Division of Oceanography

**Piggy-back cruise investigators:**

Dr. Ian Barton,  
CSIRO, Division of Atmospheric Research  
GPO Box 1, Aspendale, Vic  
Phone (03) 5867666

Mr. Thierre Correge  
Dept. of Geology  
The Australian National University  
Phone (062) 495111

### **Cruise Objectives:**

1. To observe the volumetric transport from surface to bottom of the SEC inflow in the Coral Sea and to map its subsequent trajectory and bifurcation.
2. To define the hydrographic and current structure of the Frontal Convergence zone of the EAC seaward of the southern GBR and to investigate associated mesoscale fronts and interactions with the topography of the southern GBR, prior to its exit from the Southern Coral Sea into the Tasman.
3. To measure the surface currents associated with the Coral Sea current system using hydrographic and Acoustic Doppler current data and Lagrangian satellite-tracked buoys deployed in the bifurcation and frontal convergence region and to measure sea surface temperatures along-track using ship-mounted infra-red radiometers.
4. To correlate the physical properties of the large-scale and meso-scale circulation features in the SEC bifurcation and its southern branch, the EAC, with the distribution of major fisheries and associated fishing effort.

### **Cruise Track:**

The proposed cruise track is shown plotted in Figure 1. Estimated time includes accumulated transit time 18.0 days and science time 6 days including contingencies for a total of 24 days.

### **ORV Equipment Required:**

GPS/SATNAV navigation computers  
CTD Profiling System including 12 bottle rosette  
12 (plus spares) Niskin bottles  
Starboard A-frame and oceanographic winch  
Reversing thermometers (deep sea) and Niskin bottle mounts  
Acoustic Doppler Profiler System  
XBT System including launcher and probes to 750 m. (type T7).  
Underway Thermosalinograph  
Precision Depth Recorder  
VAX 11/750 Mainframe computer and data logging minicomputers  
Meteorological station and logger  
Reference Irradiance sensor (as part of met station)  
Dissolved Oxygen Analysis  
Auto-analyzer (NO<sub>3</sub>, NO<sub>2</sub>, Si(OH)<sub>4</sub>, PO<sub>4</sub>)  
Inductive Salinometer  
INMARSAT Data Link  
Clean Freezer for Nutrient samples

**User Supplied Equipment:**

Receiver for radio-tracked drifters  
Antenna for radio-direction finder  
(to be fitted as for FR06/90)

**AIMS:**

HP7475A plotter  
AT4 EPSON AX2 Graphics Computer  
LT7 TOSHIBA Lap Top Computer with hard disk  
AD4 XT transportable  
AD7 XT transportable  
Everest Radiometer System comprising  
Radiometer heads (to be fitted above bridge as for FR0690,  
Ian Barton's radiometer (configuration to be determined)  
Field and Lab Datataker.  
DEC Compatible Terminals (1).  
5 ARGOS Drifters and drogues (Type MR-109)

**CSIRO DAR:**

Infra red radiometer system (Barton)

**Personnel:**

**AIMS/JCUNQ/CSIRO**

A = Leg 1: 31 Aug.-12 Sept. B = Leg 2: 13-23 Sept. AB = Both

AB. Derek Burrage (Chief Scientist, PI, AIMS)  
AB. Craig Steinberg (AIMS)  
AB. Rowan Hughes (JCUNQ)  
AB. Ian Barton (CSIRO, DAR, Piggy back Investigator)

A. David Williams (Co-PI, AIMS)  
A. Carl Nilsson (CSIRO, DAR)  
A. William Skirving (AIMS/JCUNQ)

B. Lance Bode (Co-PI, JCUNQ)  
B. Steven Blake (JCUNQ)  
B. Thierry Corregge (ANU, Piggy back Investigator)


**CSIRO/ORV**

Jeff Dunn (Cruise Manager)  
Eric Madsen (Electronics)  
Gary Critchley (Chemical Analysis)  
Val Latham (Chemical Analysis)

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



A.D. McEwan.  
CSIRO Division of Oceanography

  
for G.W. Paltridge  
National Facility Steering  
Committee

FR0891 Proposed Cruise Track (solid) and ERS-1  
Ground Tracks (dashed) for Radar Altimeter (ALT)  
and Synthetic Aperture Radar (SAR).

