

FRANKLIN

National Facility
Oceanographic Research Vessel

RESEARCH PLAN

CRUISE FR 9/91

Sail Townsville 0900 Tuesday 5 November 1991
Arrive Sydney 1200 Thursday 14 November 1991

Principal Investigators

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CSIRO Division of Oceanography

MAPPING OF THE EAST AUSTRALIAN CURRENT WITH THE ERS-1, SYNTHETIC APERTURE RADAR

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Drs Ian Barton & Fred Prata
CSIRO Division of Atmospheric Research

VALIDATION OF ERS-1, SCANNING RADIOMETER

28 August 1991

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RESEARCH PLAN

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FR 9/91

Itinerary

Townsville	Depart	0900 hrs	Tuesday 5 November 1991
Sydney	Arrive	1200 hrs	Thursday 14 November 1991

Scientific Objectives

- (1) To obtain surface truth for the synthetic aperture radar (SAR) on board the European Remote Sensing Satellite (ERS-1); specifically to observe the East Australian Current (EAC) off the mid-N.S.W coast under varying conditions of wind and sea.
- (2) To determine the conditions under which the SAR can effectively 'see' the main stream of the EAC and the extent to which the SAR shows the major shear zones within the EAC system.
- (3) To measure wave and swell spectra within the EAC and to seaward.
- (4) To obtain a topographic map of part of the EAC. The cruise will take place in conjunction with an Air Expendable Bathythermograph (AXBT) survey provided by RAAF Orion.
- (5) To relate changes in SAR backscatter to wind shifts across atmospheric fronts.
- (6) To investigate the possibility of eddies forming north of the Taupo Seamount if the EAC is flowing northward over that area (33°15'S, 156°12'E)
- (7) To provide surface truth data for the Along-Track Scanning Radiometer on ERS-1 and the Advanced Very High Resolution Radiometer (AVHRR) on NOAA-11. (Opportunities for surface truth data for ATSR will depend on actual SAR coverage scheduled. Surface truth for SAR will take priority.)

Cruise Objectives

- (1) Deploy SEASOAR in the depth range 0-250m for STD data.
- (2) Conduct CTD and XBT stations complementary to both the SEASOAR operations and AXBT survey to map the EAC between 32°S and 37°S.
- (3) Obtain vertical profiles of current shear across oceanographic fronts by using the Global Positioning System (GPS) and Acoustic Doppler Current Profiler (ADCP).
- (4) Collect and analyse underway surface temperature and salinity data.

- (5) Deploy and retrieve a free-floating Datawell Waverider buoy and a DSTO/Curtin University wavebuoy during SAR overpasses.
- (6) Obtain sea glitter pictures from the Research Aircraft F27 in the neighbourhood of a SAR swath.
- (7) Operate an Active Radar Calibrator (ARC) to provide a strong calibrated return to the ERS-1 SAR.
- (8) Deploy the Surface temperature Profiler (known as the 'Flying Fish') to obtain a temperature profile of the first two metres of the atmosphere and the top metre of ocean, if weather conditions are favourable.
- (9) Operate an infrared radiometer to measure sea surface temperature at the time of NOAA and ERS-1 overpasses.
- (10) Deploy radiosonde balloons to measure atmospheric profiles.

ERS-1 Coverage.

Fig. 1 shows the ship's track and ERS-1 SAR coverage during the cruise. During this time the satellite ground tracks repeat over a three day cycle. The SAR swaths are offset to the right of each satellite ground track. Thus, the most important SAR swath for this study is that from an ascending pass (at night) on day 2 of the cycle for which the SAR swath crosses the NSW coast over Sugarloaf Point (32°27'S, 152°33'E). The satellite ground track for this pass is labelled 'a'. The swath segment is along 'DF'.

The only day (descending) pass for which SAR data could be obtained in this area is that running parallel to the coast through 35°S, 155°E, along 'DE'. The corresponding ground track is labelled 'd'. This is barely within the 3° operating horizon from Alice Springs.

Cruise Track.

The proposed cruise track will endeavour to obtain maximum surface truth for the SAR passes. It will only be possible to be under one descending SAR swath (at about 0830 EST on 11 Nov) and two ascending swaths (at about 2250 EST on 9 and 12 Nov). The descending SAR swath south of Townsville is on 7 Nov and there is not sufficient time in the cruise to remain under that pass.

Time Estimate

Leg	Track distance (nm)	Steaming (hr) @11 kn
AB	527	48
BC	470	42
CD	234	21
DE	180	16
EC	156	14
CF	120	11
FG	138	13
Total	1825	166

This totals 6.9 days @11 knots thus allowing for slower travel when SEASOAR is deployed and time for CTD and waverider buoy deployments.

Equipment

ORV Equipment

CTD
ADCP
GPS
Rosette
Hydrology
Thermosalinograph
Underway pH and Fluorometer
XBT
Radiosonde

User Equipment

SEASOAR
Surface Temperature Profiler ('Flying Fish')
'Datawell' Waverider Buoy
Portable 27 Mhz RDF
DSTO Wavebuoys (2)
Active Radar Calibrator (DSTO)
Infrared Radiometer (DAR)

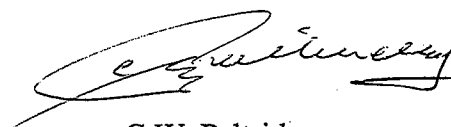
Personnel

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Ian Helmond	"	
Lindsay Pender	"	
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This Cruise 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



G.W. Paltridge
National Facility Steering Committee

29 August 1991

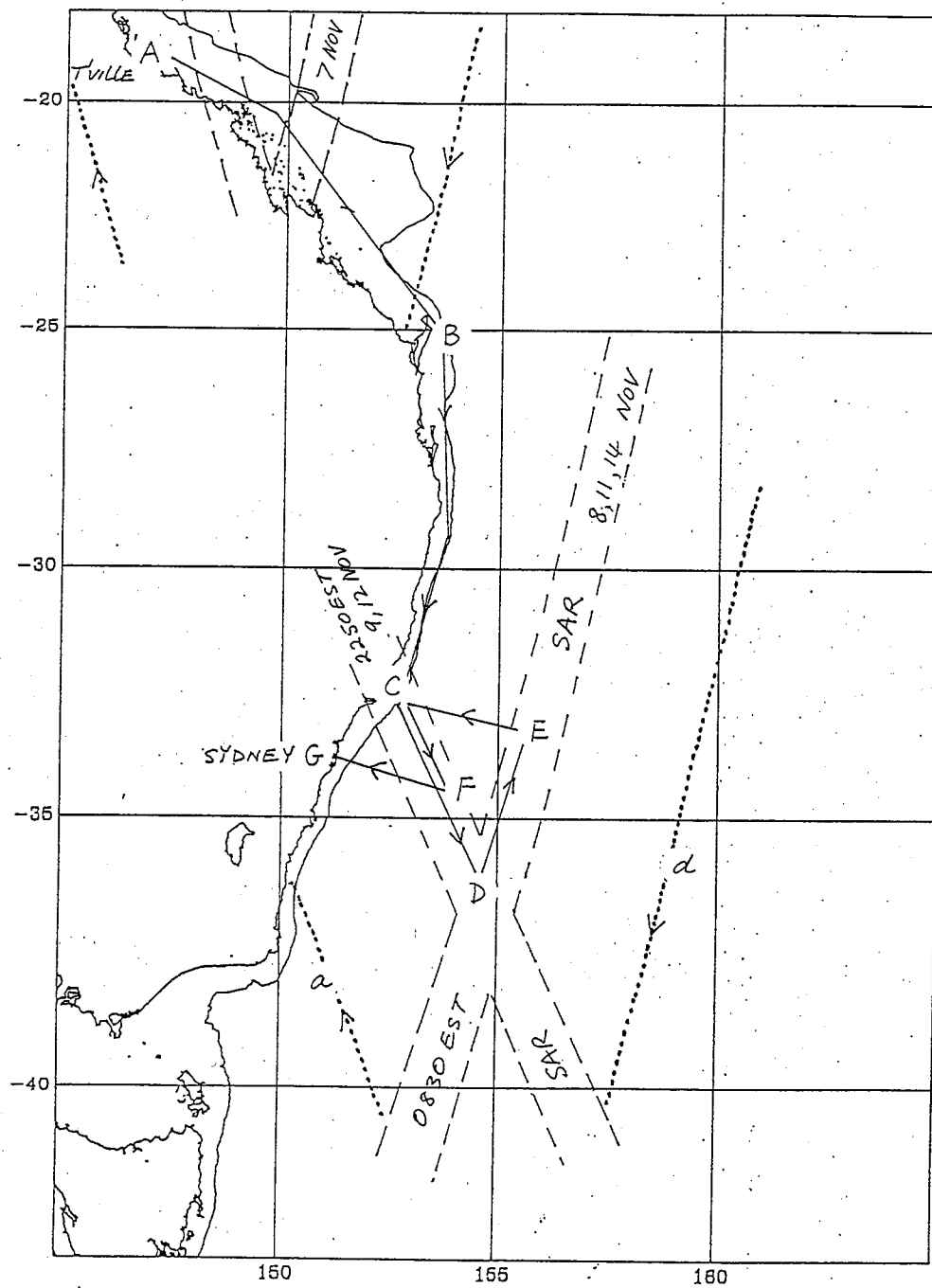


Fig.1: Proposed cruise track and ERS-1 Synthetic Aperture Radar (SAR) swaths over SE Australia during 5-14 Nov 1991.