

Voyage Plan

IN2015_E01



Title

Cold Water Trial voyage (including Atmospherics)
Group 6 Phase 6

Itinerary

Depart Hobart 0800, Thursday 29 January, 2015
Arrive Hobart , 0800, Saturday 21 February 2015 and demobilise

Voyage Manager

Don McKenzie
Science Operations Manager
CSIRO Marine National Facility

Equipment Champion

Zoran Ristovski
Queensland University of Technology (QUT)

Voyage Objectives

1. Introduce key stakeholders and science teams to *Investigator*, MNF and ASP operations
2. Safely undertake cold water and atmospheric operations and familiarise MNF staff and visiting science teams
3. Develop and implement procedures and JHAs for scientific operations
4. Identify any problems, issues and conflicts and include these in a voyage report
5. Collect and process data and samples as for a research voyage to test laboratories, facilities and on board systems
6. Undertake specific testing and checks of aerosol sampling mast, aerosol laboratory and air-chemistry laboratory
7. Test vessel and systems under cold conditions
 - Operation in water temperatures of -2°C to +32°C;
 - Operations in air temperatures of -30°C to +45°C; and
 - Sufficient reserve stability to withstand 'freezing spray' conditions for a minimum of 12 hours, as per the IMO Intact Stability Code 2008-2009.
 - The Vessel shall be capable of efficiently conducting marine science, oceanographic and marine geophysical operations in the Pacific, Indian and Southern Oceans between the latitudes of 0° and 70°S.
 - Test ice-edge operational systems including Polar Code requirements as appropriate
 - Provide ice-edge experience for marine crew, technical and scientific contingent.
8. Geophysical Survey and Mapping (GSM):
 - Heading calibration of EM710 and EM122
 - Bathymetry transit into and out of Storm Bay, on way to and from 140 E line.
 - Monitoring and testing of acoustic systems in cold water (EM710, EM122, EK60, ME70)
 - Monitoring and testing of Gravity Meter
 - Regular deployment of XBTs
9. Data Acquisition
 - Integration and test of underway instruments, underway data acquisition and display systems (TECHSAS, SDIV, VISAGE)

- Integration and test of new atmospheric instruments (MAAP, Nephelometer, Aerodyne, Picarro, NOX, O3, air sampling inlet sensor)
- Integration and test of drop keel instrumentation with acquisition and display systems (depth sounders, TSG/seawater systems, USBL, ADCPs)
- Assist with integration of voyage specific atmospheric instruments with ships network

10. Communications

- Test performance of VSAT, FBB and Iridium at high latitudes
- Test operation of VSAT, FBB and Iridium in cold temperatures (in particular the VSAT dome heating units)

11. Seagoing Instrumentation:

- Gravity meter & SST radiometer will be monitored during the trial voyage
- Set up and check light duty, medium duty & heavy duty electronic balances for performance at sea
- Underway water analysis instruments will be monitored (SFR 402.1 and 402.2) in terms of: any freezing of the science seawater lines and temperature change of the seawater to be within the SFR limit of $\pm 0.5^{\circ}\text{C}$ (no freezing issues).
- Lab and workspace temperatures (HVAC) SFR 139.2. The SI team will assist in monitoring the temperatures in laboratories, particularly spaces such as the Aerosol lab for HVAC operation within specified limits.

12. Other:

- Hazmat, Radioisotope, clean containers and deck incubator final testing to be undertaken as per contract.
- Test cold water clothing arrangements
- Trial new medical arrangements for remote voyages, including integration of medical practitioner and equipment on the voyage,
- During first 48 hours, representatives from Kongsberg and L-3 onboard to diagnose and make electrical adjustments. Ship is required to be manoeuvring at 12 knots with two generators on line. On completion, representatives will be transferred to shore by boat in the Derwent River.
- Ship to conduct manoeuvring trials enroute to test track keeping, ship performance at various headings, stabilising system performance as well as Dynamic Positioning (DP) performance. These trials are to be conducted at various sea states and results are to be recorded and correlated with the attached *Investigator* Commissioning Year Functional Requirements.

Opportunistic Voyage Objectives – Science party

To observe and model the aerosol composition, growth and activation to cloud nuclei over the southern ocean and to determine the oxidative capacity of the surface atmosphere over the southern ocean. More specifically:

- To become familiar with the balloon launching facility, testing the possibility of tethering sondes to provide surface boundary layer profiles of temperature and pressure
- To model the gas to particle and growth of aerosols to cloud condensation nuclei and compared to observations (work will continue after voyage).
- Determine the profiles of the atmospheric temperature, and humidity structure using radiosondes and the vertical aerosol/ice structure of the troposphere and stratosphere using polarsondes
- Determine engineering plans for AIR-BOX in consultation with aerosol scientists and ship engineers

- To test the suitability of operation of instruments (nephelometer, MAAP, ozone analyser, NOX monitor SMPS, CCN, CN, NAIS) in the Aerosol Laboratory
- To test the suitability of operation of the greenhouse gas analyzers, ACSM, PTRMS, VH-TDMA, Nanoaerosol sampler and VOC sequencer in the Air Chemistry lab
- To develop standard operating procedures for the above instruments
- To collect data on aerosol size distributions, VOC and other reactive gas concentrations, aerosol number concentrations, aerosol chemical composition and CCN concentrations to determine the relative importance of biological-derived and sea salt aerosols as sources of CCN.
- To collect data on greenhouse gases in the Southern Ocean to add to the database used to address the question of the role of the SO as a source or sink of atmospheric CO₂

Permits

Australian Antarctic Treaty (AAT) permit issued 6 January 2015 has been issued.

No deployments of any equipment, including weather balloons or argo floats will take place above 60°S without AAT permit.

CASA is to be notified one day prior to the release of any weather balloons.

User-supplied Equipment

NAIS (QUT) Aerosol Lab
nanoSMPS (QUT) Aerosol Lab
SMPS (CSIRO) Aerosol Lab
CCN (CSIRO) Aerosol Lab

CPC (aerosol lab)
VH-TDMA (QUT) Atmospheric Chem Lab
Nanoaerosol Sampler (QUT) Atmospheric Chem Lab
PTR-MS (CSIRO) Atmospheric Chem Lab
ACSM (CSIRO) Atmospheric Chem Lab
VOC Sequencer (CSIRO) Atmospheric Chem Lab
FTIR (Uow) Atmospheric Chem Lab

Voyage Track

The first 48 hours will be dedicated to the electrical investigations outlined at Objective 12 and the ship will generally remain in the Storm Bay area.

On completion of trials, the ship will enter the Derwent River and disembark the contractor representatives by Fast Rescue Craft (FRC) in the vicinity of the John Garrow Beacon. The representatives will be landed to the CSIRO wharf and on completion the ship will recover the FRC, depart the Derwent River and follow the route detailed under.

Direct route down to 140⁰ E to water temperatures around -2⁰ C “the ice edge” according to prevailing conditions at the Master’s discretion.

The GSM group requests a heading calibration manoeuvre on the way out of Storm Bay. We have updated offsets from the recent Gyrocal measurement and will need to check those. This will require the investment of roughly one hour of time. We will incorporate this in to the requested ship’s track into and out of Storm Bay.

6 - 12 hours night to calibrate the EM710, and also of the EM122 at selected locations further out (2,000m depth, possibly off Matsuuyer Island)

Argo float deployment sites:

ARGO FLOAT No.	Latitude
6381	45° 00' S
7254	45° 00' S
7255	47° 00' S
7256	47° 00' S

Time Estimates

Travel distances are as follows:

The ship will steam at 12 knots or lesser speed as agreed with the contractor representatives for the first 48 hours in the general Storm Bay area.

Ship time requirement for the atmospheric teams is 24 – 48 hours on station at 140⁰ E, and preferably close to the “ice edge”, to undertake testing and sampling of the site

Cruising speed of 12knts where appropriate.

Personnel List

Don McKenzie	Voyage Manager	CSIRO MNF
Max McGuire	Operations Officer	CSIRO MNF
Lisa Woodward	Operations Officer	CSIRO MNF
Tegan Sime	Operations Officer	CSIRO MNF
Hugh Barker	DAP Support	CSIRO MNF
Stewart Wilde	DAP Support	CSIRO MNF
Anoosh Sarraf	DAP Support	CSIRO MNF
Brett Muir	SIT Support	CSIRO MNF
Nicole Morgan	SIT Support	CSIRO MNF
Will Ponsonby	SIT Support	CSIRO MNF
Ian McRobert	SIT Support	CSIRO MNF
Tara Martin	GSM Support	CSIRO MNF
Bernadette Heaney	GSM Support	CSIRO MNF
Stuart Edwards	GSM Support	CSIRO MNF
Zoran Ristovski	Equipment Champion	QUT
Joel Alroe	PhD student	QUT
Luke Cravigan	PhD student	QUT
Robyn Schofield	Scientist	Uni of Melb
Suzie Molloy	Scientist	CSIRO
Marcel van der Schoot	Scientist	CSIRO
Stefanie Kremser	Scientist	Bodeker Scientific
Dagmar Kubistin	Research Fellow	UoW
Dougal Squires	Student	Uni of Melb
Dr Doug McKenzie	Doctor	Aspen Medical