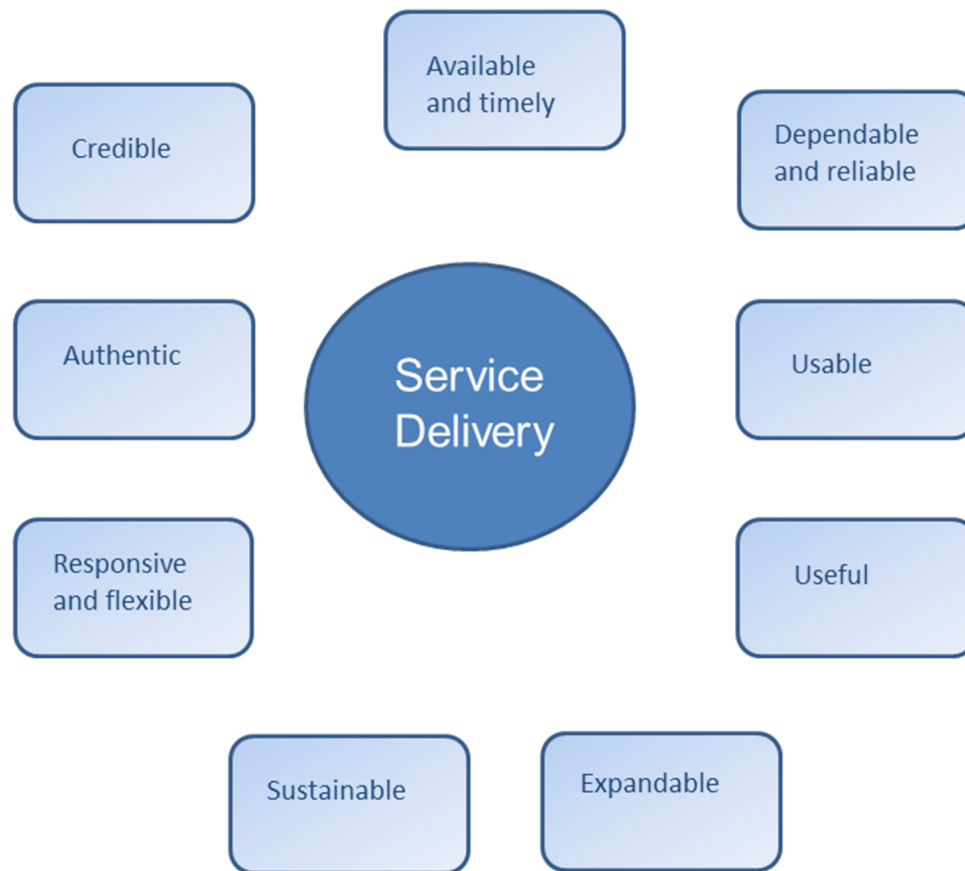




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Antarctic weather service delivery towards best practice and sustainability



The WMO strategy for Service Delivery and it's implementation



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Talk outline

- Overview of current Bureau services
- Some issues
- The WMO model for service delivery as presented at the COMNAP Sea Ice Challenges workshop in Hobart 2015
- Feedback and discussion



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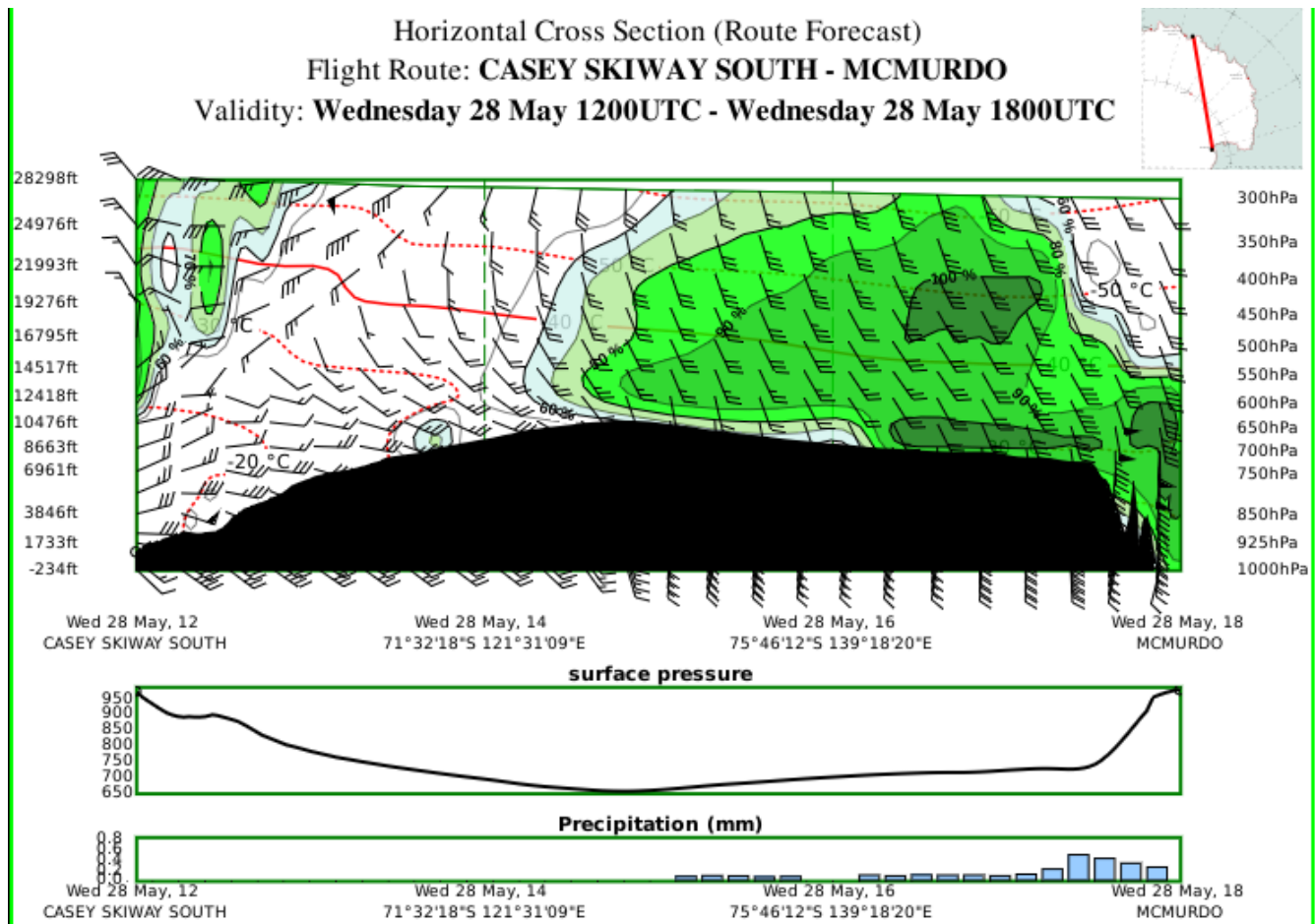
Australian Bureau of Meteorology services





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Aviation forecasts graphical





Aviation Outlooks

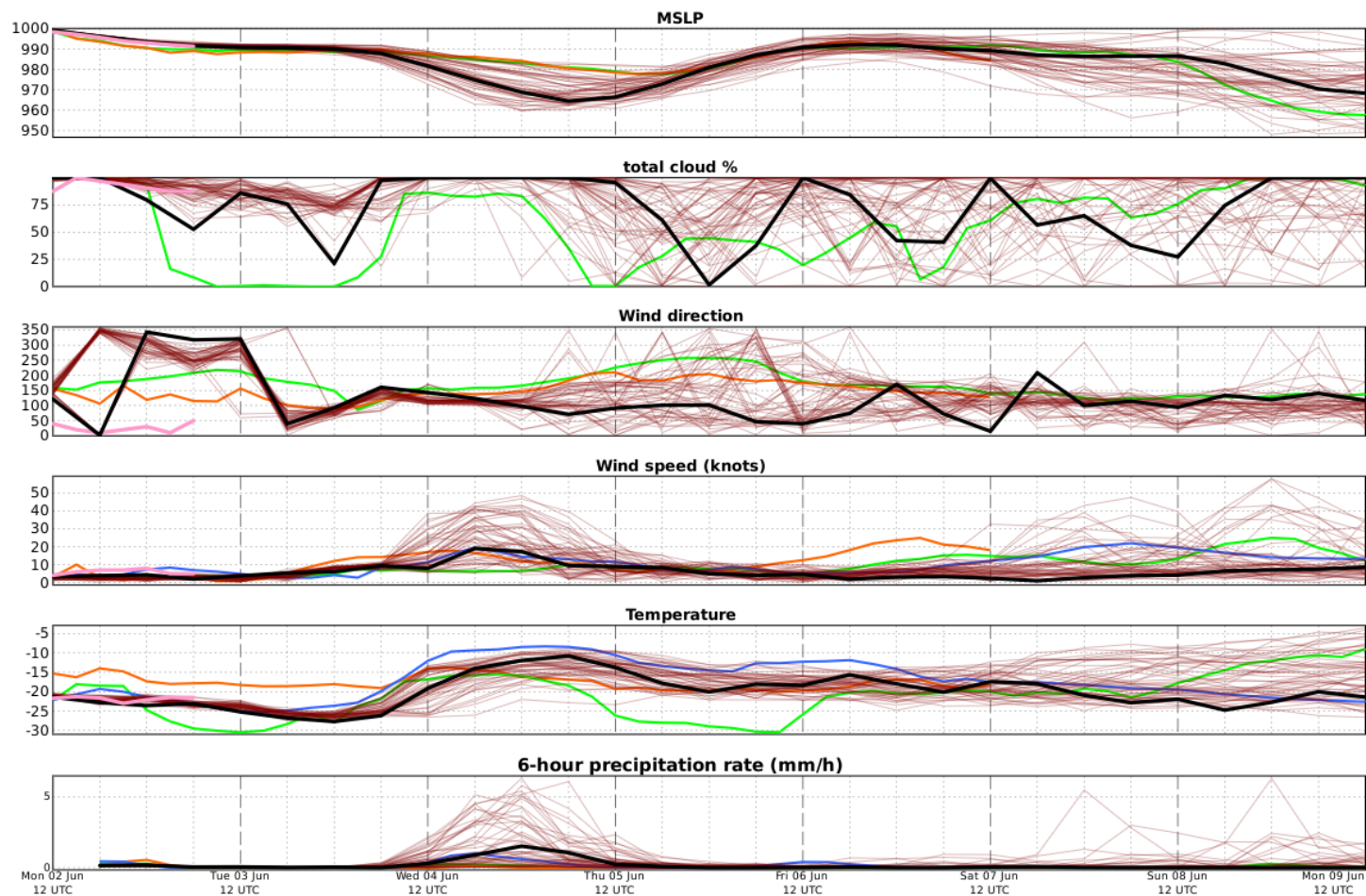
Casey Operational Aviation Planning Brief.			Issued at: 0330Z Monday 2015/01/19 Valid for: Tuesday 20 th to Friday 23 rd	
	Tuesday 20 th	Wednesday 21 st	Thursday 22 nd	Friday 23 rd
Weather Situation: Casey	Trough developing between Casey and Bunger Hills, developing meso-low in Vincennes Bay, Moist easterlies arrive overnight.	Low approaches, increasing wind strengths and developing snow. Gale force winds likely. NOTE: SIGNIFICANT MODEL DIVERGENCE	Deep trough to the west, moving offshore during the day NOTE: AGAIN dependent on Model divergence	Trough offshore. Bit of a S'y burst, clearing cloud from Dome.
Weather Situation: Bunger Hills	Trough developing between Casey and Bunger Hills	Ridge in the morning, giving way to moist easterly flow with stronger winds.	Moderate E'y flow becoming increasingly moist as trough develops.	Trough over the area with continental outflow clearing cloud.
Aerodromes:				
Casey Skiway	ABOVE until 09Z. PROB30 FOG after 09Z as meso-low develops	BELOW: TURB, Winds 35/45KT BKN 030/100	BELOW: TURB, Winds 35/45 easing later, BKN 040/120, SHSN	ABOVE
Mitchell Peninsula	Unserviceable	Unserviceable	Unserviceable	Unserviceable
A19	ABOVE until 10Z, then PROB40 FOG	BELOW: TURB, Winds 40/50 knots, BLSN	BELOW: TURB, winds 35/45 knots, BLSN NIL HD/SD	MARGINAL: winds 20/30 knots. DRSN, Clear skies.
Bunger Hills	ABOVE: (just need to make sure the cloud clears as predicted)	MARGINAL: OVC 015/045	MARGINAL: SHEAR/TURB	ABOVE
Routes:				
WPWP-YCSK via BNGR (8 hours)	ABOVE: Depart no later than 00Z for lowest fog risk at Casey Skiway	BELOW: BNGR Cloud/SHSN, Strong winds at Casey	BELOW: BNGR SHSN, Cloud SFC/105 around BNGR	MARGINAL: 30/40 knot Tail winds about 80% route.
YCSK-WPWP via BNGR (8 hours)	N/A	BELOW: OVC SFC/050 Casey to Bunger.	BELOW: OVC SFC/150 50% route	ABOVE
WPWP-YCSK DIRECT (5 hours)	ABOVE: Depart no later than 02Z for lowest risk	MARGINAL: 30 knot headwinds, and TURB/Strong winds likely at Casey	BELOW: Winds 30/40KT headwind enroute, cloud BKN SFC/140FT for about 50% route.	MARGINAL: Enroute headwinds of 30/45 knots entire route.
YCSK- WPWP DIRECT (5 hours)	N/A	MARGINAL: 30 knot tailwinds, and TURB/Strong winds likely at Casey (Downslope wind event??)	BELOW: BKN SFC/140FT for about 50% route.	ABOVE: Tail winds 30/45 KT whole route. Potential for cloud issues at WPWP
Best AVBL Wx Opt:				
NOTES: This document is issued daily by 1600 (Casey time) for planning purposes and includes only the routes that are operationally significant at the time of issue. The forecasts will not be updated or Amended. Specific route forecasts, LAF/TAF and briefs will be provided for flights at the briefing as arranged by the operations coordinator.			Legend: BELOW: conditions are below alternate minimum MARGINAL: conditions near Operational Limits ABOVE: all conditions are above Operational Limits.	



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Ensemble Forecasting

EC deterministic, EC ensemble, ACCESS-G, US GFS, AMPS/WRF and Observed timeseries for CASEY

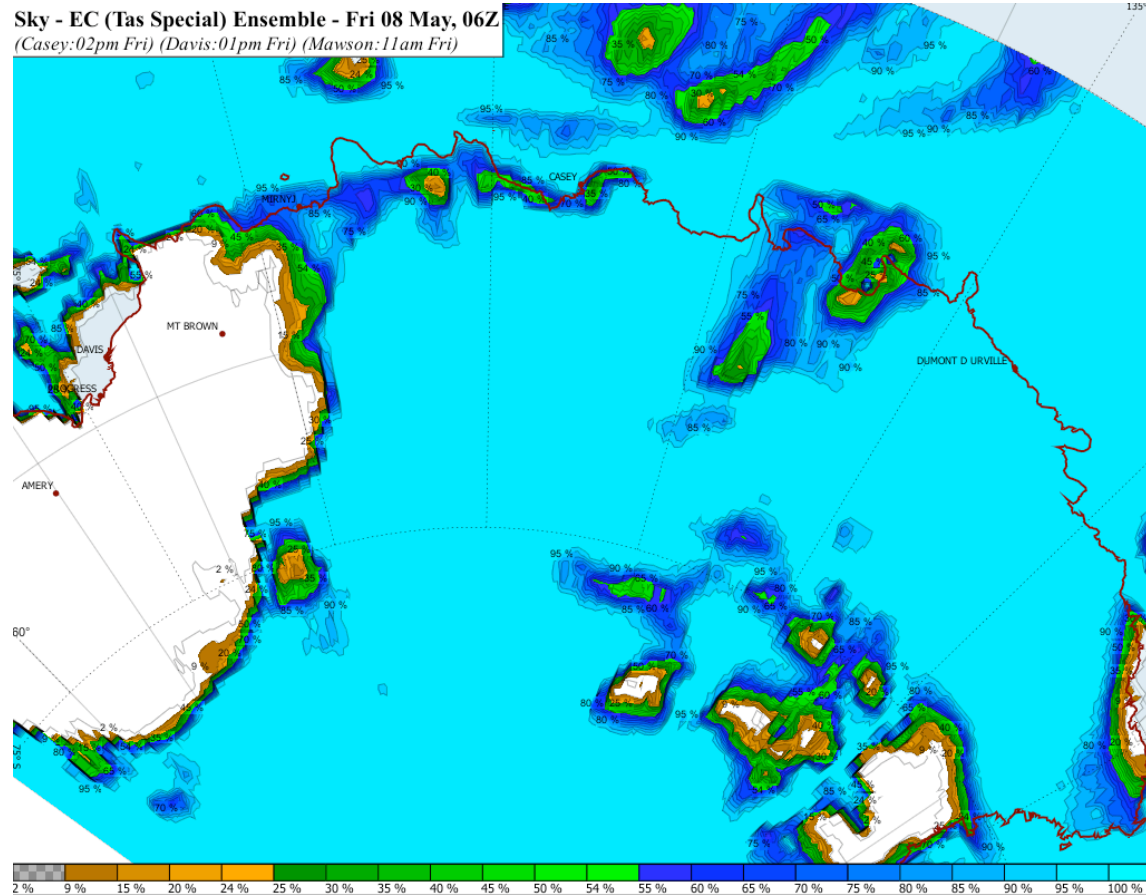




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Risk of Whiteout

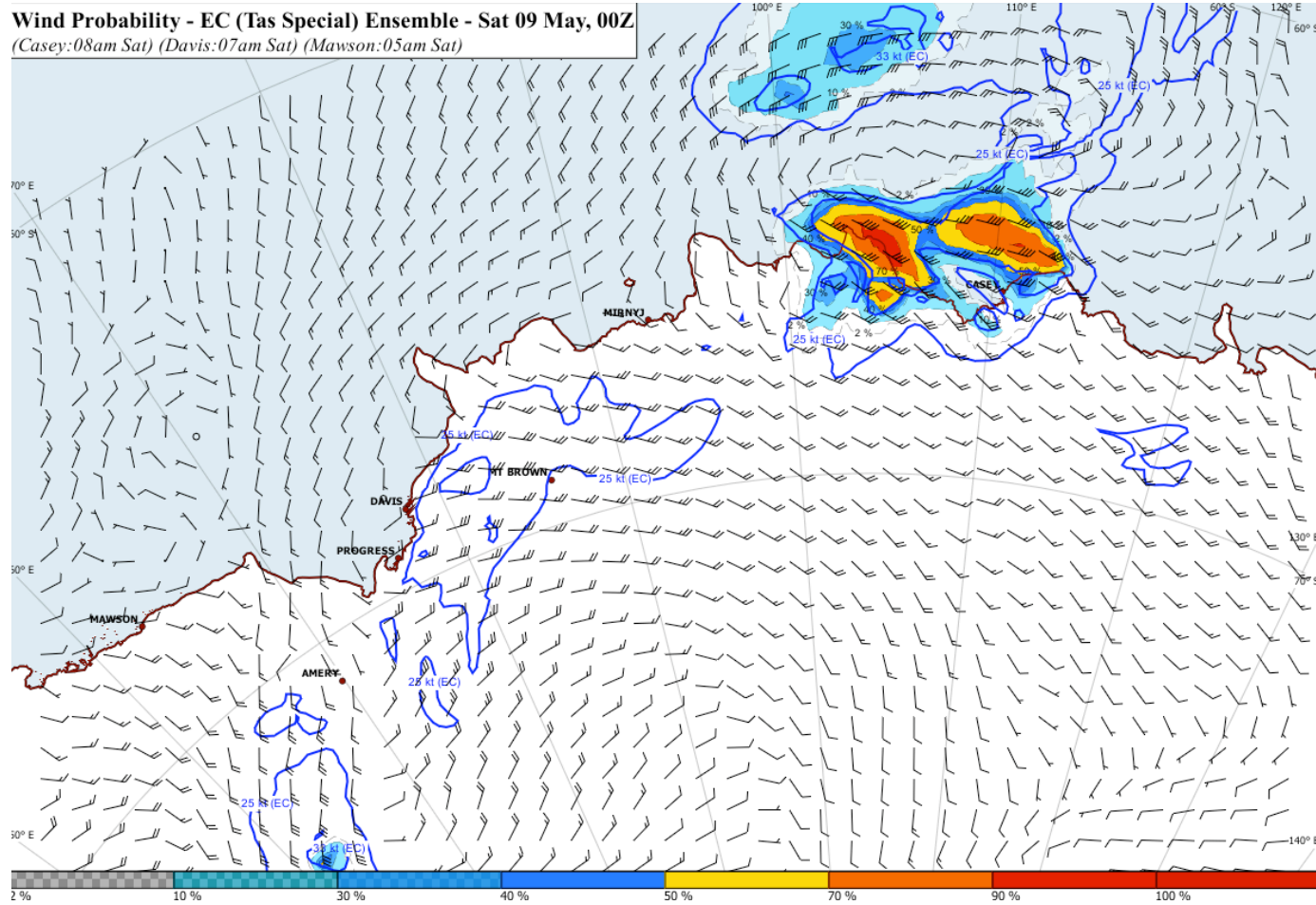
probability of >5 okta cloud cover





Risk of Gale

Probability of exceeding 33 knots





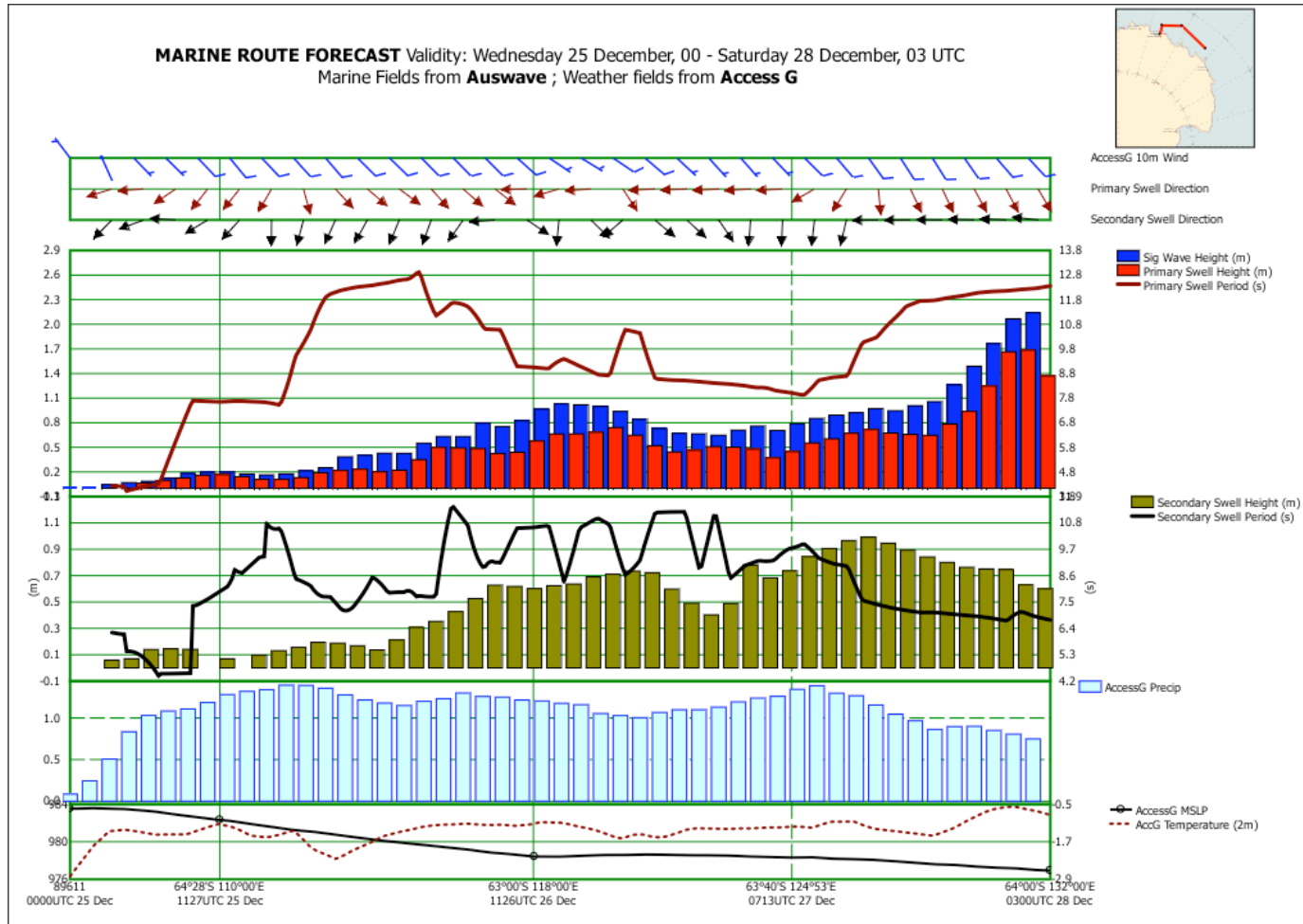
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The Shipboard "Met Office"





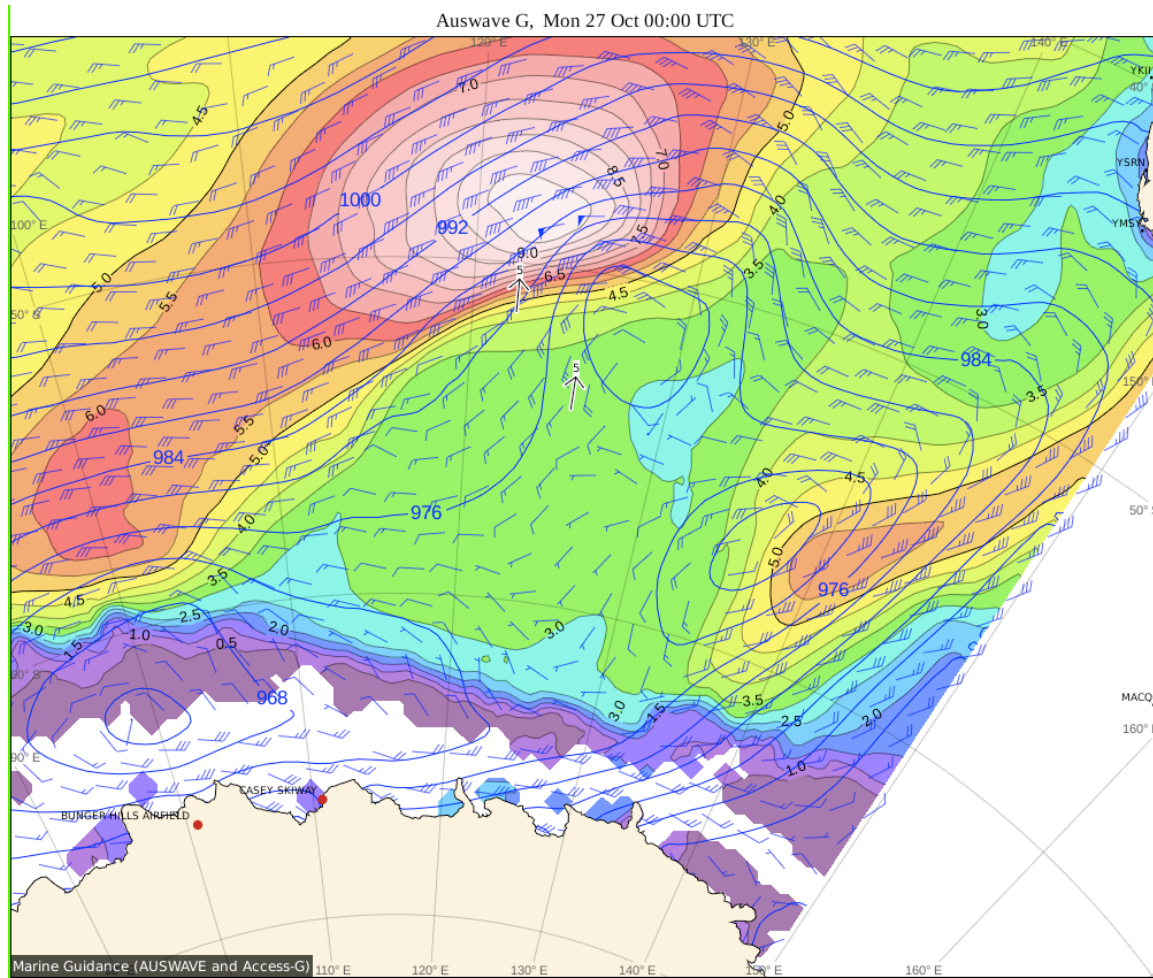
Marine route forecasts graphical





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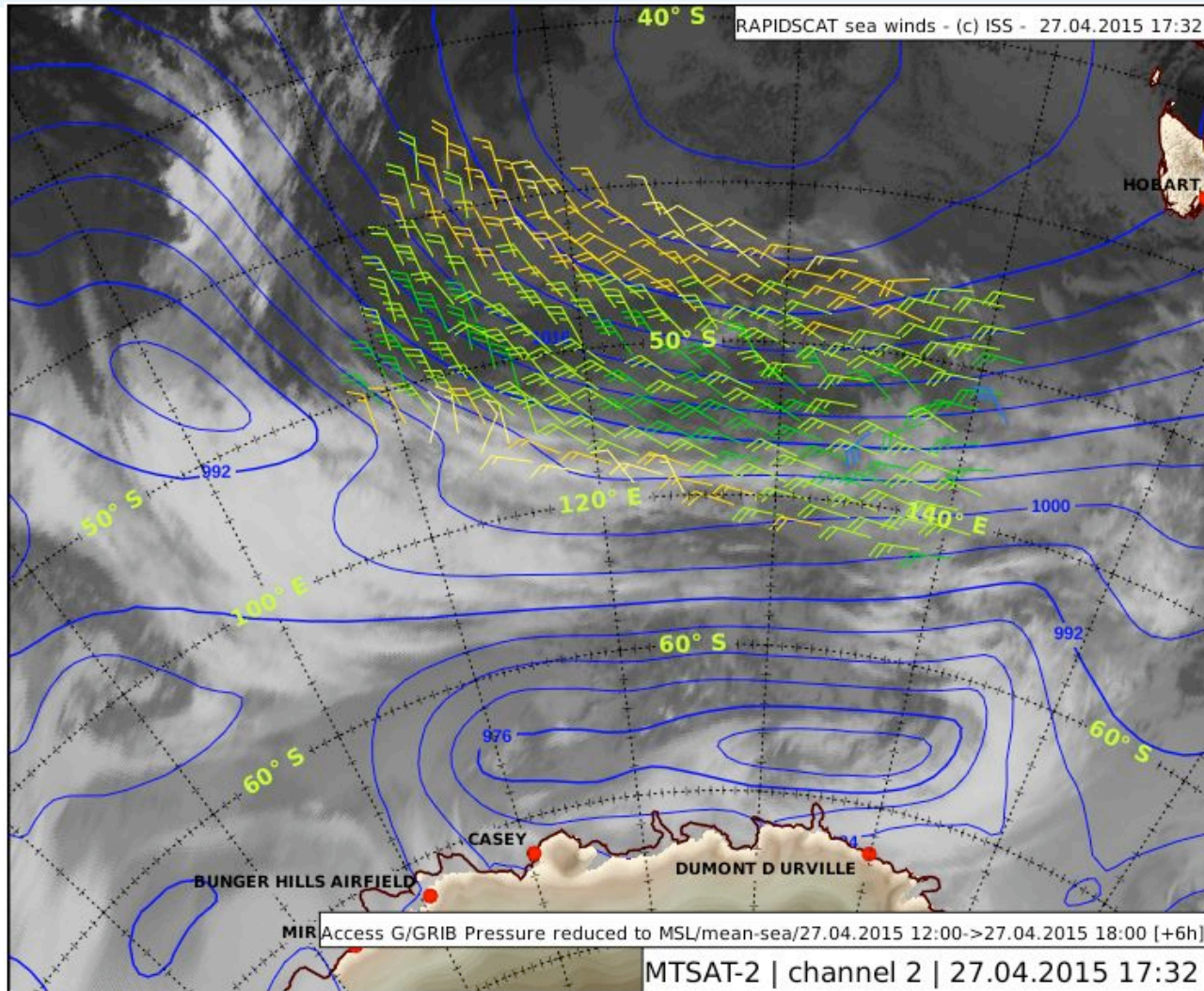
Ship diversion to avoid "very high" seas





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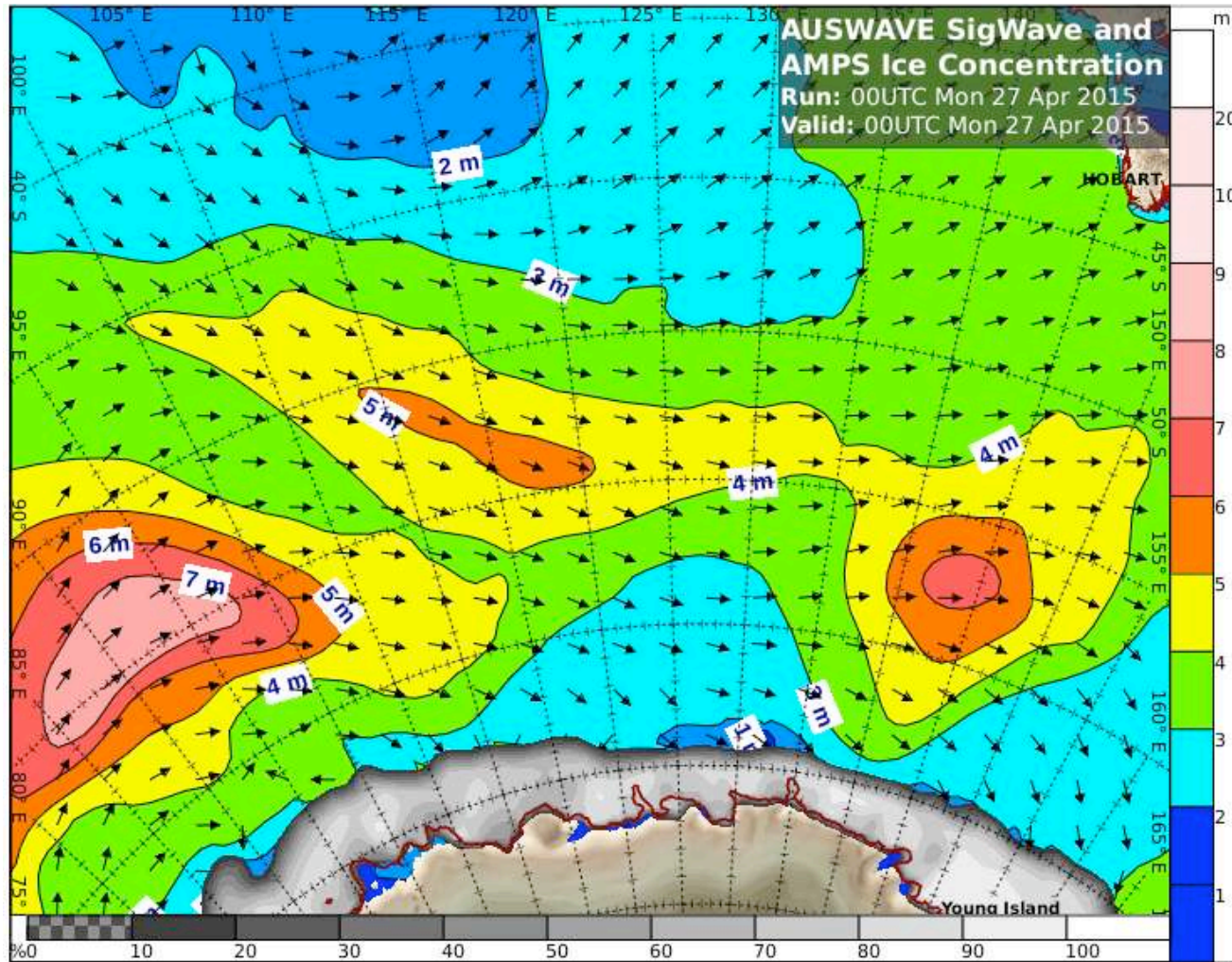
Automated email to ships 137kB





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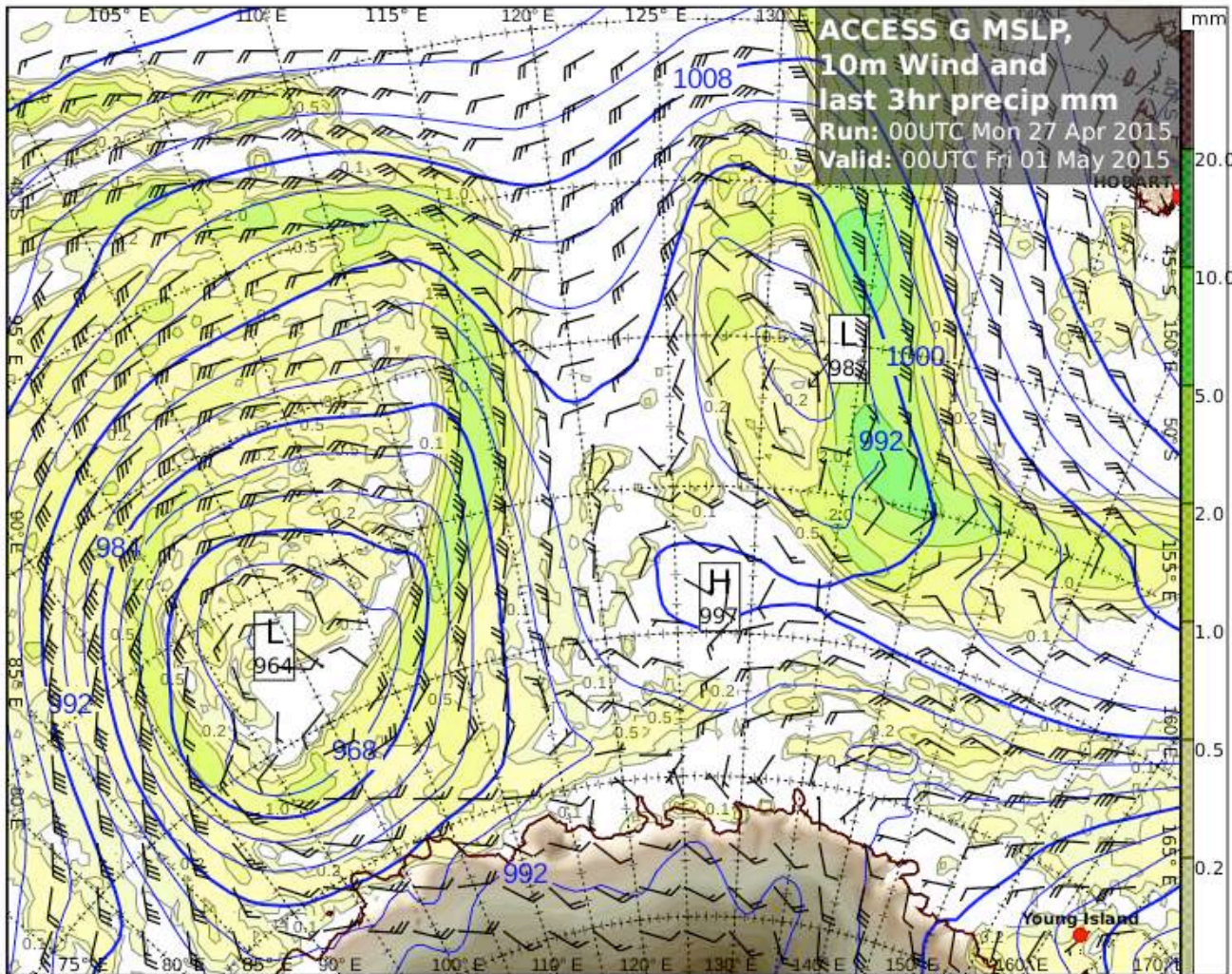
Automated email to ships 111kB





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Automated email to ships 150kB





Pre-departure training ~4 weeks

Weather

- [Station climatologies](#)
- [Aviation weather](#)
- [Marine weather](#)
- [Antarctic Clouds and Precipitation](#)
- [Extratropical cyclone climatology](#)
- [Antarctic Ice](#)
- [Antarctic Wind field](#)
- [Flow interaction with topography](#)
- [Large scale processes \(Polar Cell, SAO, Planetary Rossby waves, katabatic wind, SAM etc\)](#)
- [Other Sig wx events \(Fog, blizzards, cold snaps, white out, horizon and surface deformation, rain\)](#)

Forecast Preparation

- [Forecast preparation and products](#) (Aviation, station and marine)
- [Comms and observation networks](#)
- [Synoptic decode](#)
- [Qantas scenic flights](#)
- [NWP use and assessment](#)
- [Client profiles](#)
- [Office management, rostering principles and fatigue](#)

Computing

[Operating System procedures](#)
[NCEP grib file display script](#)
[Majordomo lists](#)
[idl notes](#)

Satellite

- [McIDAS basics](#)
- [Casey x-band](#)
- [HRPT system \(Casey and Davis\)](#)
- [TeraScan satellite reception \(Aurora Australis\)](#)
- [Notes on satellites and orbital prediction](#)
- [Identification of cloud and ice features](#)
- [Assessment of cyclogenesis potential](#)

[Bookmarks](#)

[Case studies and Season reports](#)

[References](#)

[Training timetable](#)

Photo background: Scott Carpentier 2004 "peering u



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The success of our program

- Relies on meeting user needs:
 - We have their confidence (and must maintain)
 - We are reliable;
 - We are the authority;
 - We help transform weather information into operational knowledge for the safety and efficiency in the running of the Australian Antarctic program.



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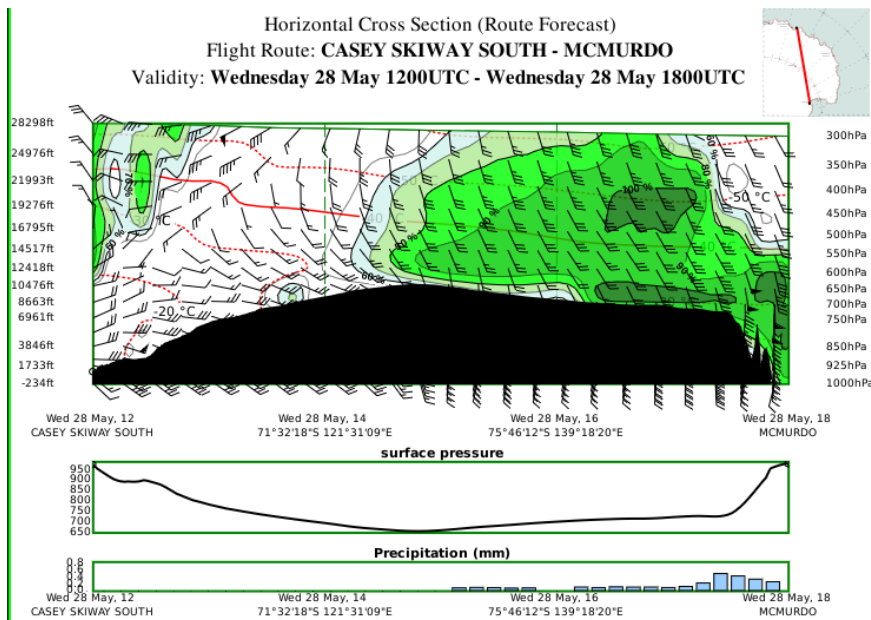
Some Issues

- Resourcing Services
 - Sufficient staff for weather watch
 - Critical systems support
(eg. AMRC talks yesterday, ensemble spaghetti plots...)
- Information versus Knowledge
 - Forecaster training
 - User education

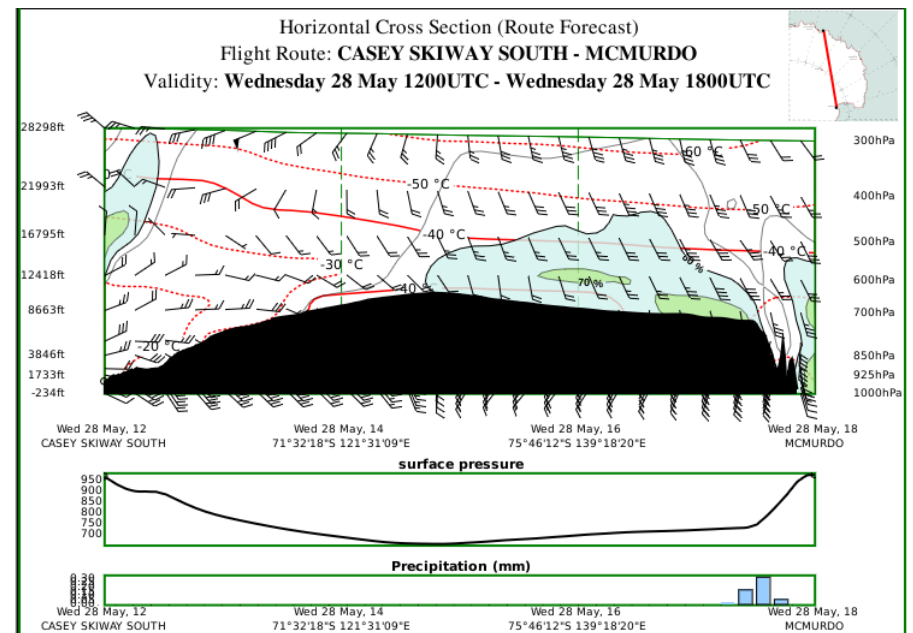


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Interpreting Aviation graphical forecasts



ACCESS G



AMPS WRF



Polar Forecaster Competence Standards

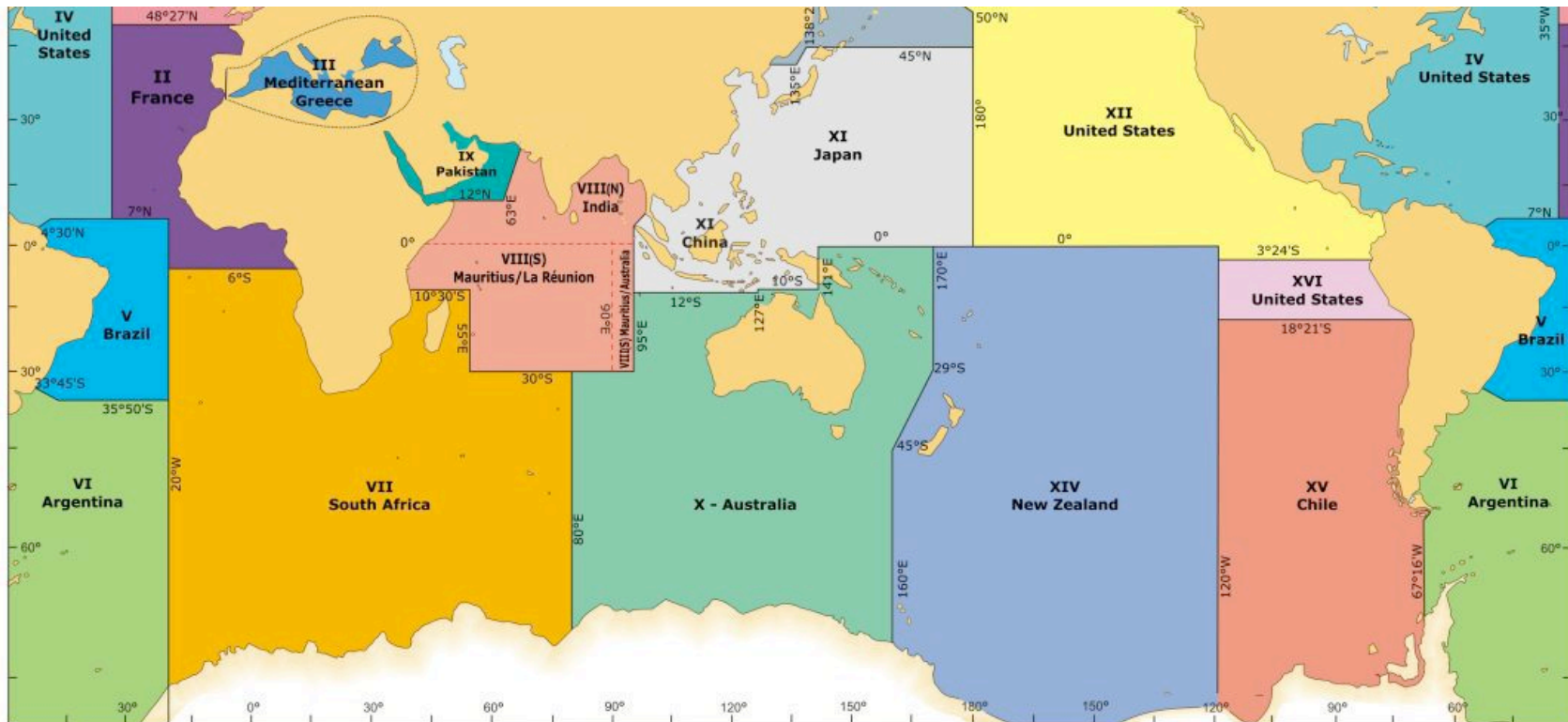
- be able to:
 1. *Analyse and monitor continuously the weather situation;*
 2. *Forecast aeronautical, marine, and public weather meteorological phenomena and parameters;*
 3. *Warn of hazardous phenomena;*
 4. *Ensure the quality of meteorological information and services; and*
 5. *Communicate meteorological information to internal and external users.*
- -----
- **2. Forecast aeronautical, marine and public weather meteorological phenomena and parameters**
- *Description: Forecasts of meteorological parameters and phenomena are prepared and issued in accordance with documented requirements, priorities and deadlines.*
- **Performance Criteria:**
 1. Forecast weather phenomena and parameters pertinent to polar operations as documented in SOP's.
 2. Ensure that timely and accurate forecasts are prepared and issued in accordance with relevant regulations and procedures including but not limited to:
 - a. ICAO Annex 3,
 - b. WMO Standards (Technical Regulations),
 - c. Regional and national formats, codes and technical regulations on content, accuracy and timeliness.
 - d. Standard Operating Procedures of the service, Forecasting Service handbooks and procedures.



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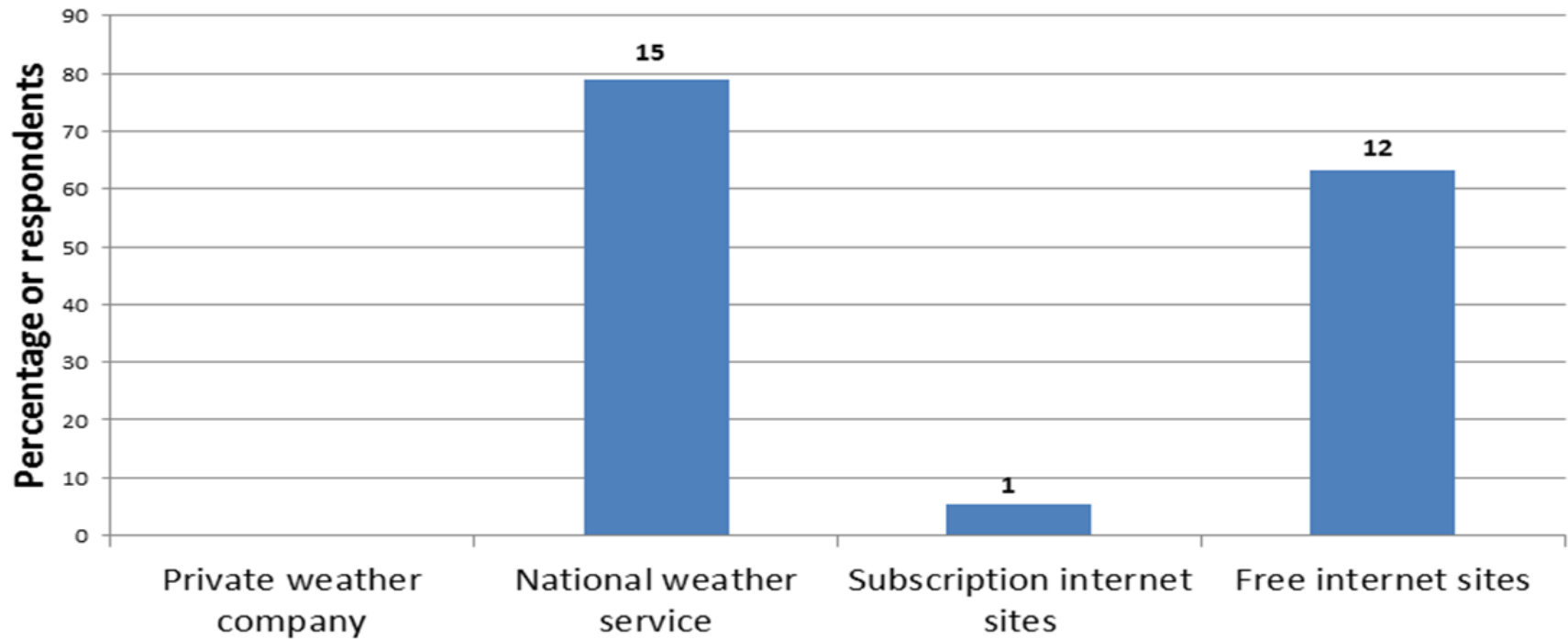
METAREAS and FIR regions around Antarctica

Countries with a responsibility for marine and aviation services





WMO survey 2015: *"Where is CONMAP sourcing their weather knowledge?"*

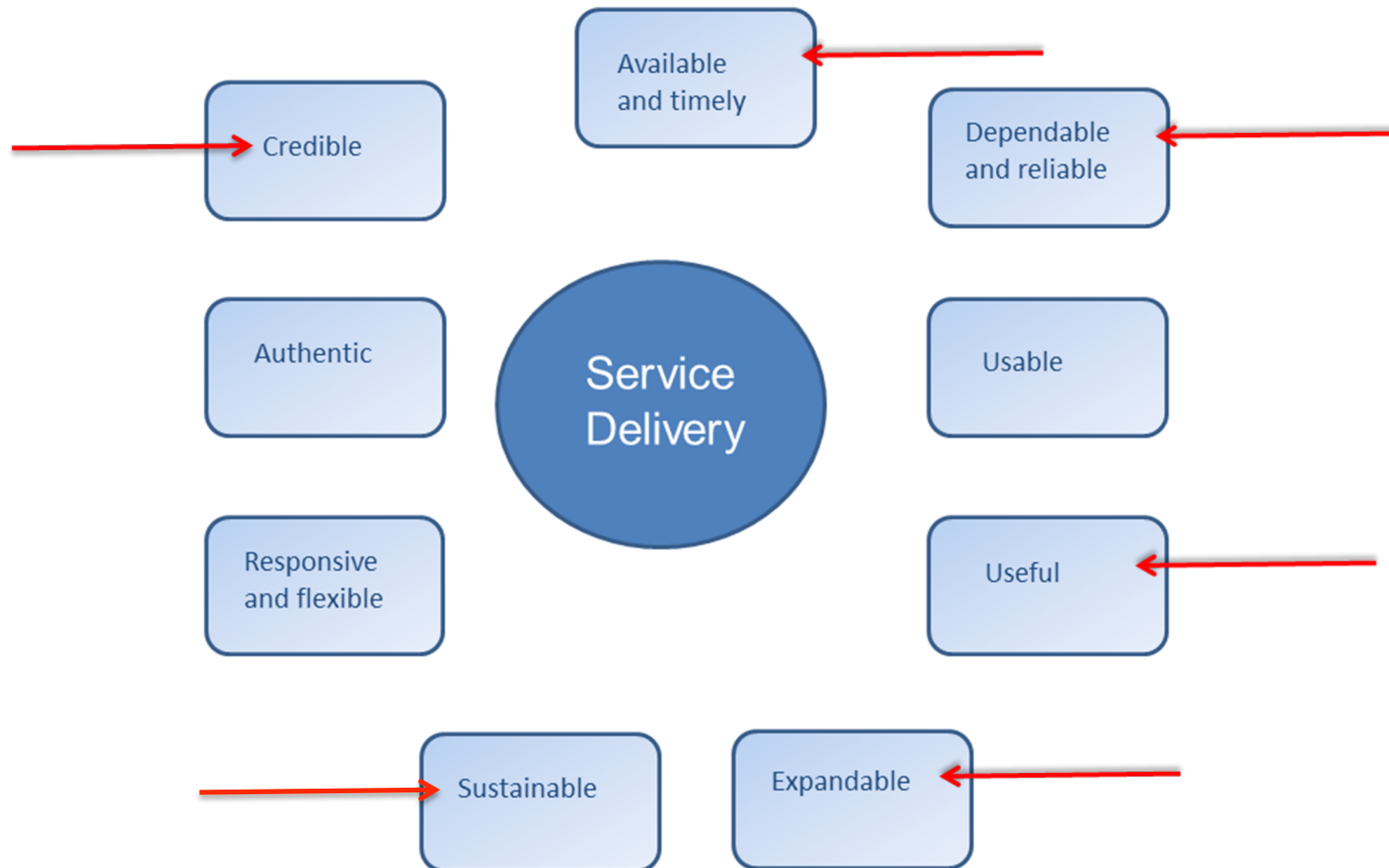


An Issue of interpretation arises



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Asked at the COMNAP Sea Ice Challenges Workshop: *"Does your service provider meet these criteria?"*



The WMO strategy for Service Delivery and it's implementation



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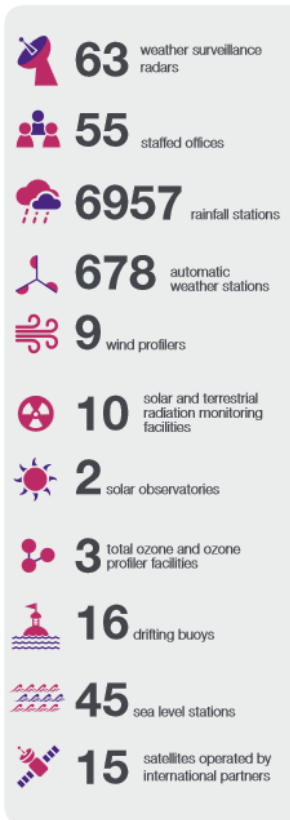
Running a robust service

The Australian Bureau of Meteorology *example*

Antarctic programs of National Met Services are often peripheral (Chile Argentina, NZ, Australia, South Africa...)

2013–14 snapshot

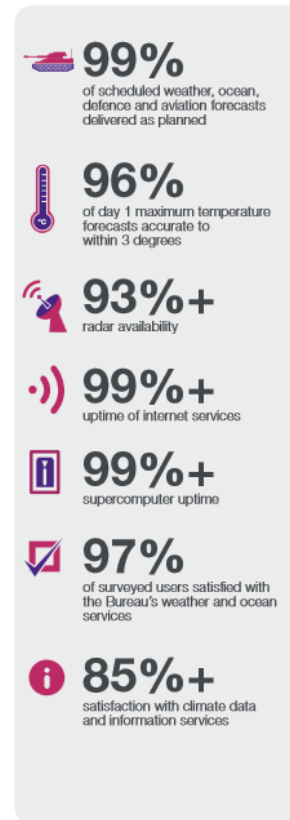
Our eye on the environment:



What we delivered:



How we performed:

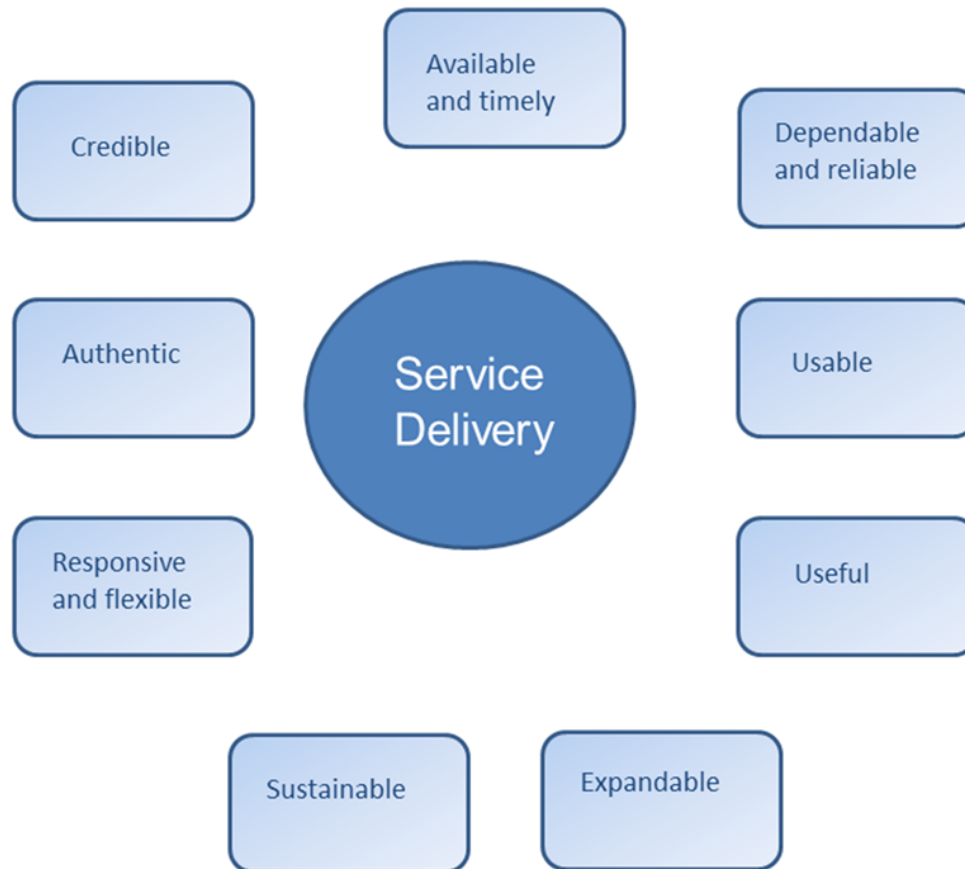


The reach of our services:





Implementing the WMO model for service delivery





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All COMNAP and IAATO members are operating under a similar model

That is are either supported by a distant service, a lean service or no service at all.

- Multiple overlap of service in high density areas;
- Inconsistent service levels;
- Why does this service model continue when we are operating under a framework for collaborative science?

the Antarctic Treaty System



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A proposed action plan to develop sustainable new practices (Sea Ice charting and seasonal forecasts)

- **There are 25 sea ice service in the Arctic!**
- **The Australian Aviation Service model:**
 - Operators fund a dedicated workforce;
 - Requirement of best practice:
 - Quality management systems
 - Training and competency assessment
 - Educational material for users
 - Tailor Made products
 - Consistent, Reliable, Useful, Expandable, Sustainable





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A new model for Antarctic Weather Services?

- Interested COMNAP members could consider co-funding a southern hemisphere sea ice service at a pro-rata based on shipping days?
 - Funding augmented by commercial services?



Benefits

- Tailor made services support safer and more efficient running of all Antarctic operations;
- Shared with the wider community: Mitigate Search and Rescue- A risk that COMNAP members are particularly exposed to;
- Simplify communication pathways;
- Insurers and governments expect best practice;
- Leverage off an organisations infrastructure, QMS's, MOU's and SLA's;
- Would access the satellite and modelling resources of all member nations.



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And it's expandable

- Aviation?
- overland traverses?
- Station Forecasts?
- Seasonal prediction?



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Thank you

Scott Carpentier
Regional Manager Antarctic Meteorology



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