



OCEAN RACING CLUB OF VICTORIA

WEATHER FOR SAILORS

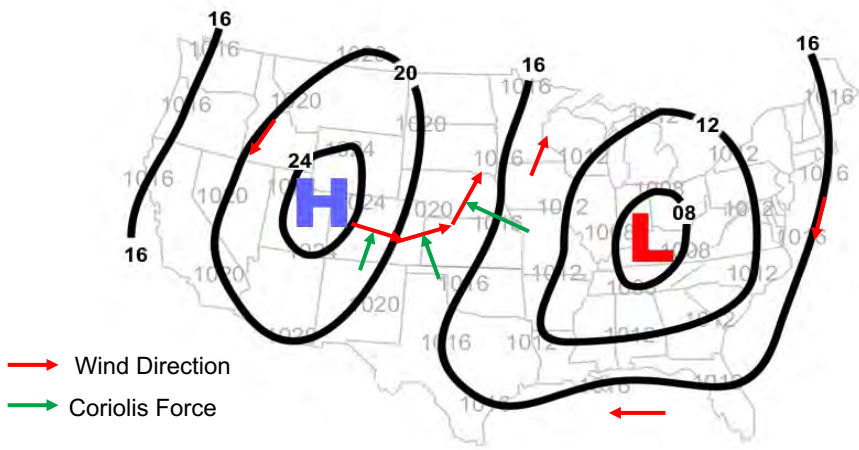
FUNDAMENTALS & PLANNING FOR A 3+ DAY PASSAGE





1


Isobar Spacing, Latitude and Wind Speed



→ Wind Direction
→ Coriolis Force

The balance condition is called the Geostrophic balance

- Closer isobars mean higher pressure force which means higher wind speed
- The Coriolis Force always acts at right angles to the direction of motion
- The magnitude of the Coriolis force is proportional to the wind speed
- The Coriolis force is also proportional to the angle of Latitude (actually the sine of the angle!)
- The atmosphere is in balance when the pressure force equals the Coriolis force



2

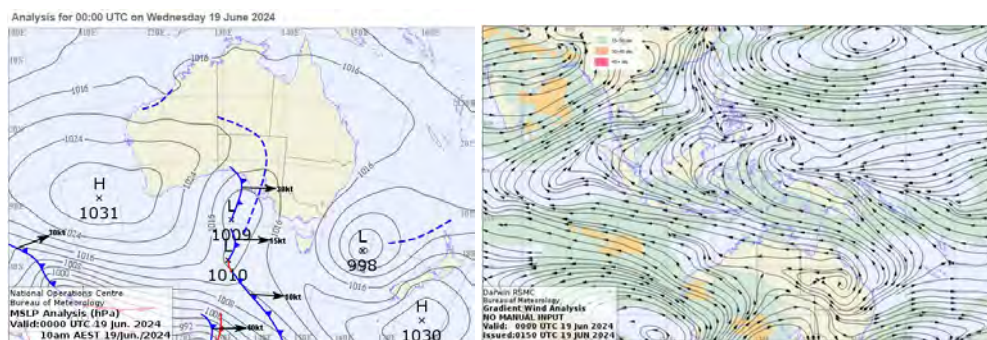
Isobar Spacing, Latitude and Wind Speed



| City | Latitude | Coriolis Factor |
|------------|----------|-----------------|
| Melbourne | 37.8 | 1.00 |
| Townsville | 19.3 | 0.54 |
| Darwin | 12.4 | 0.35 |

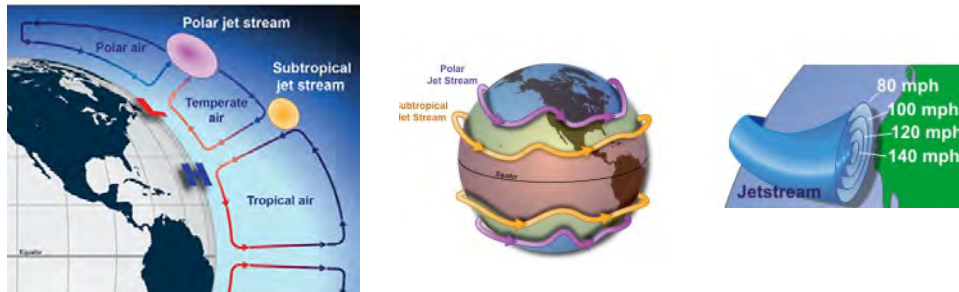
- The Coriolis Force at Darwin is a third of that at Melbourne
- This means that for the same isobar spacing, that is same pressure force, the wind at Darwin has to be three times as high to achieve the balance of pressure force and Coriolis Force
- This means that using isobar spacing as a measure of wind speed becomes problematic at lower latitudes

Isobar Spacing, Latitude and Wind Speed

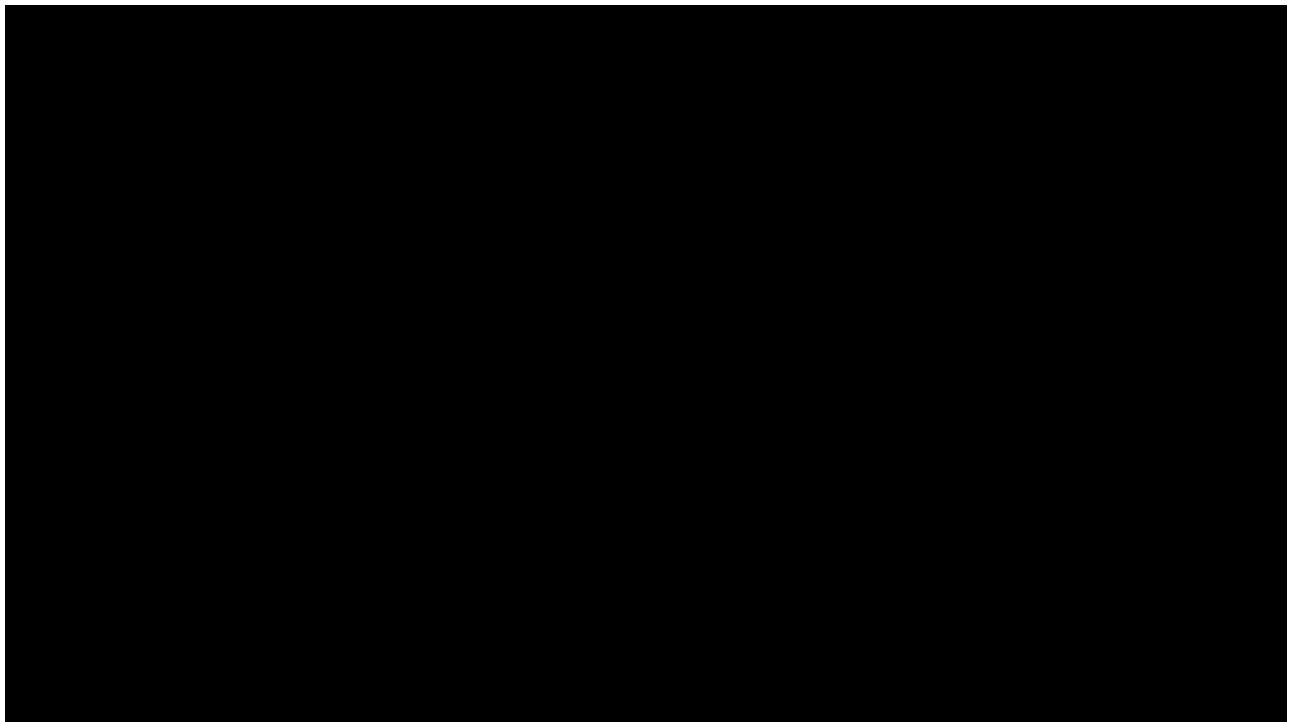


- Gradient wind maps show streamlines showing the wind direction at 1000m altitude
- At that height, friction, and local effects (sea breezes, land effects) are minimal
- Gradient wind maps much more useful at lower latitudes to predict winds

Jetstream



- High level (8000-1000km) narrow bands of high-speed air (up to 200 knots) circulating the globe
- Caused by the global temperature differences and the Earth's rotation
- More dominant in winter when the temperature differences are greater
- The faster moving air can draw air out of the rising in a low-pressure system intensifying the low producing more unsettled conditions, stronger winds
- A slower, more meandering Jetstream can strengthen high-pressure system giving more stable conditions



Waves

Sea Waves

Wave height

It is normal for waves to vary in height from one to the next. To give you an idea of the range of waves to expect at a given time, the Bureau provides the significant wave height in its marine forecasts.

| Most frequent waves | Significant waves | Maximum waves |
|---|---|--|
| The most frequent wave height will be about half the height of the significant wave | About 14% of waves will be higher than the significant wave height (about 1 in every 7 waves) | It is normal to expect a wave of twice the height of the significant wave about 3 times in 24 hours. <i>This means you need to be prepared for a wave of this height before heading out on the water.</i> |

© Bureau of Meteorology www.bom.gov.au

- Generated by the prevailing wind
- Height depends on wind strength, fetch and time the wind has been blowing
- Reported wave height is the average of the highest third of the waves, so-called significant wave height
- A few times a day, waves will be twice that height
- Will break when the water depth approaches the water depth

Waves

Swell



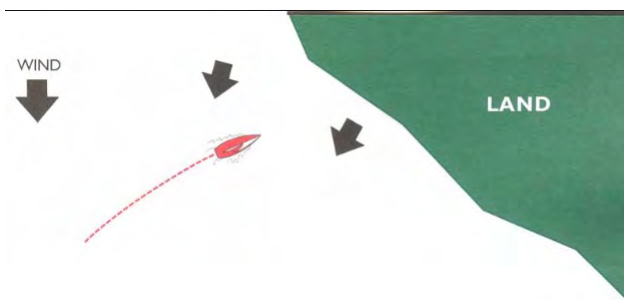
- Regular, longer period waves generated by distant weather systems
- Can travel thousands of kilometres
- Can be present even in calm wind conditions
- Can have swell from different directions giving more confused sea
- Sea state is the total of wind wave plus swell height

Coastal Fog



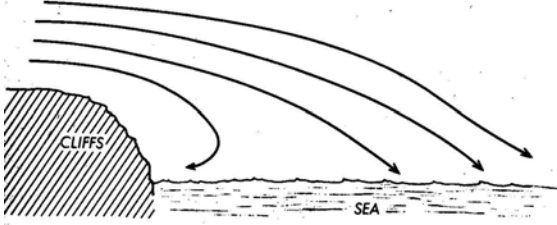
- Forms when warmer, moist air passes over a cooler surface, land or water
- The warmer near the ground cools and its water vapour condenses to form water droplets or fog
- In San Francisco, the warmer air rising inland “sucks” the fog through the only coastal opening at the Golden Gate, enveloping the city in fog

Land Effects



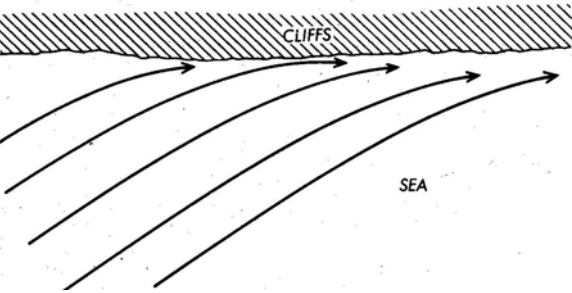
- Wind slows down over the land
- Coriolis causes the wind direction to shift to be more perpendicular to the coast
- Boat steadily headed as it approaches the land

Land Effects




CLIFFS
SEA

- Off-shore breeze and hilly coastline

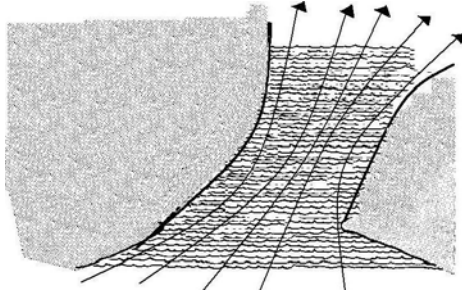


CLIFFS
SEA

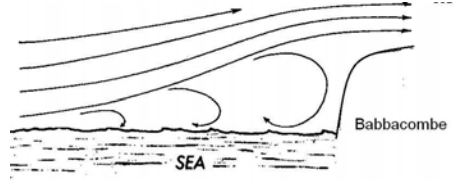
- On-shore breeze and hilly coastline



Land Effects




- Wind funnelling through a narrow opening

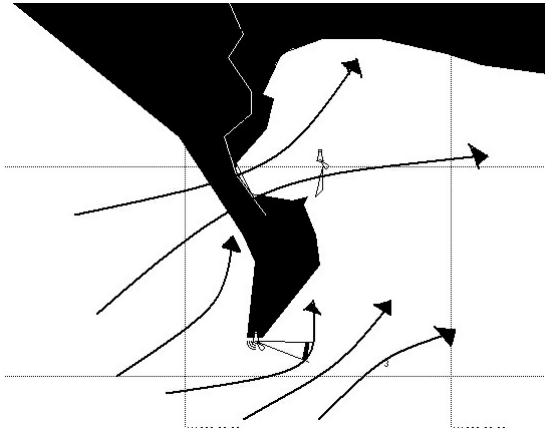


Babbacombe
SEA

- Wind eddies close to the coast



Land Effects



- Wind effects around a headland or promontory

Break/Questions

Weather for Sailors

The Fundamentals-Enclosed Waters

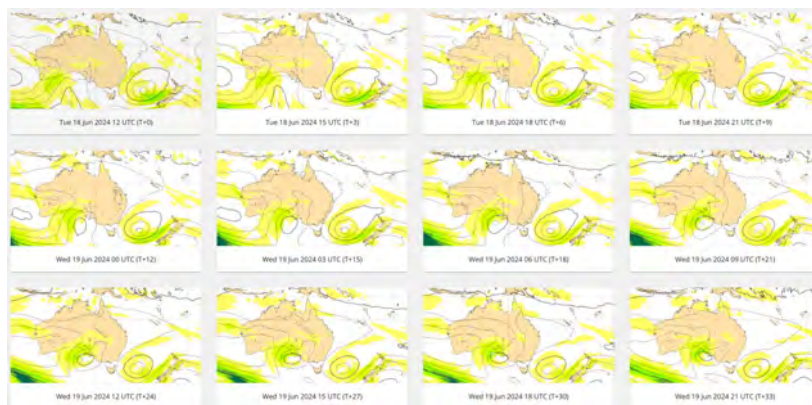
Long Range Weather forecasting 12 days

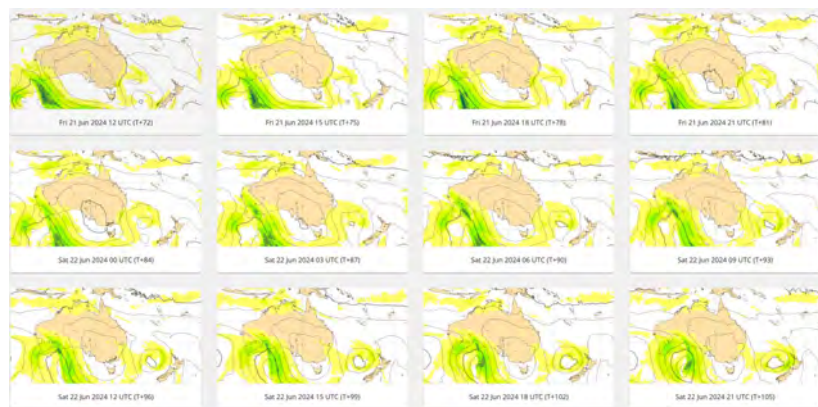
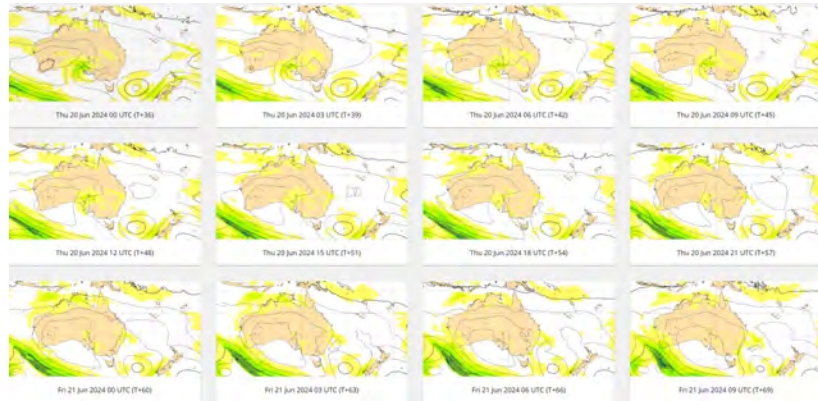
ECMWF (European Centre for Medium-Range Weather Forecasts) Long Range forecast

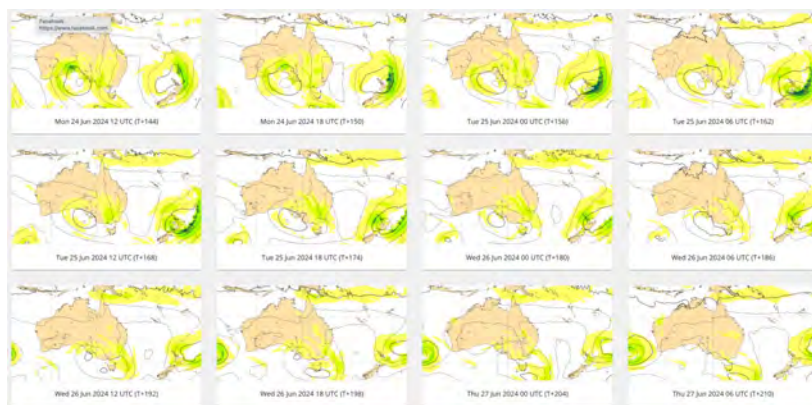
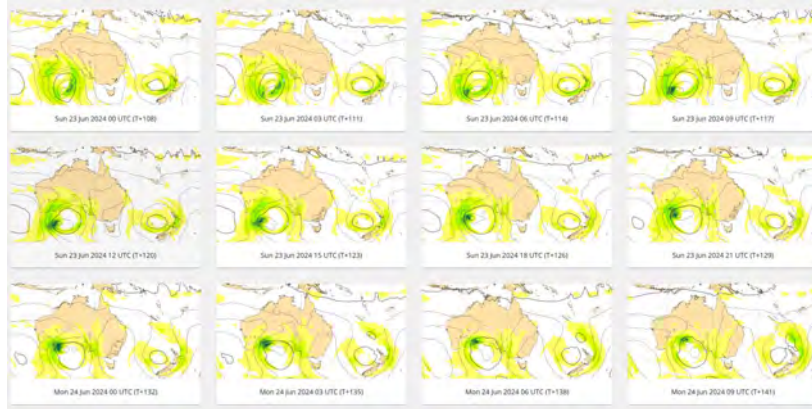
15 days ECMWF's operational forecasts aim to show how the weather is most likely to evolve. To do this, the Centre produces an ensemble of predictions.

Predictwind

Windy



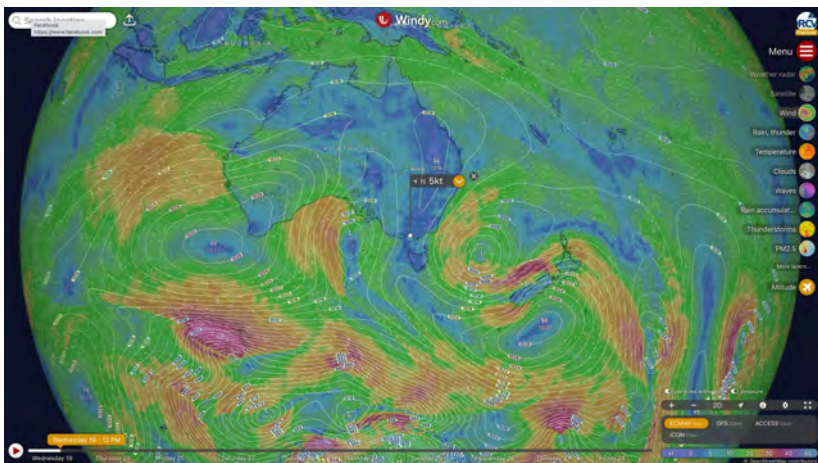






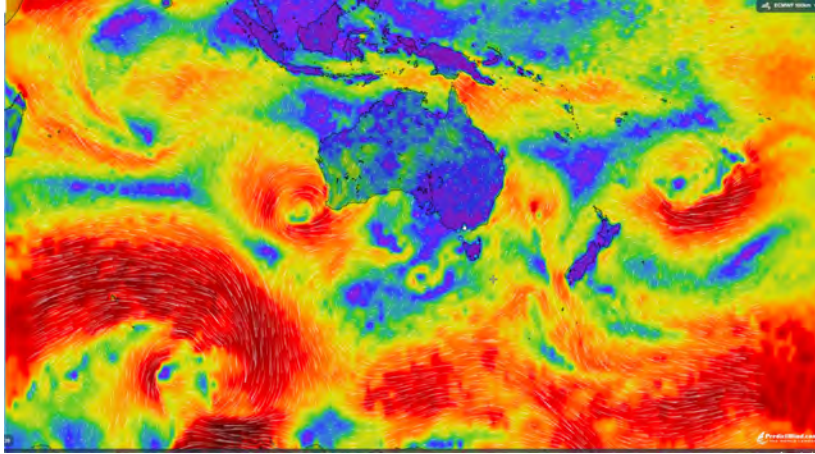
21

Windy 9 Day

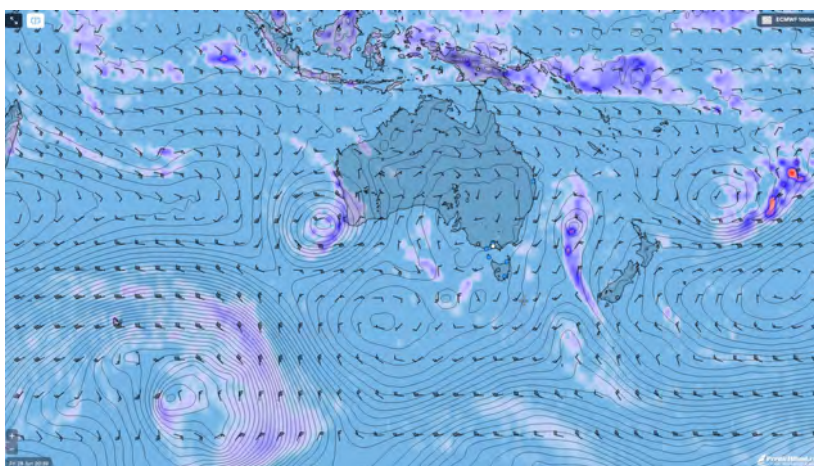


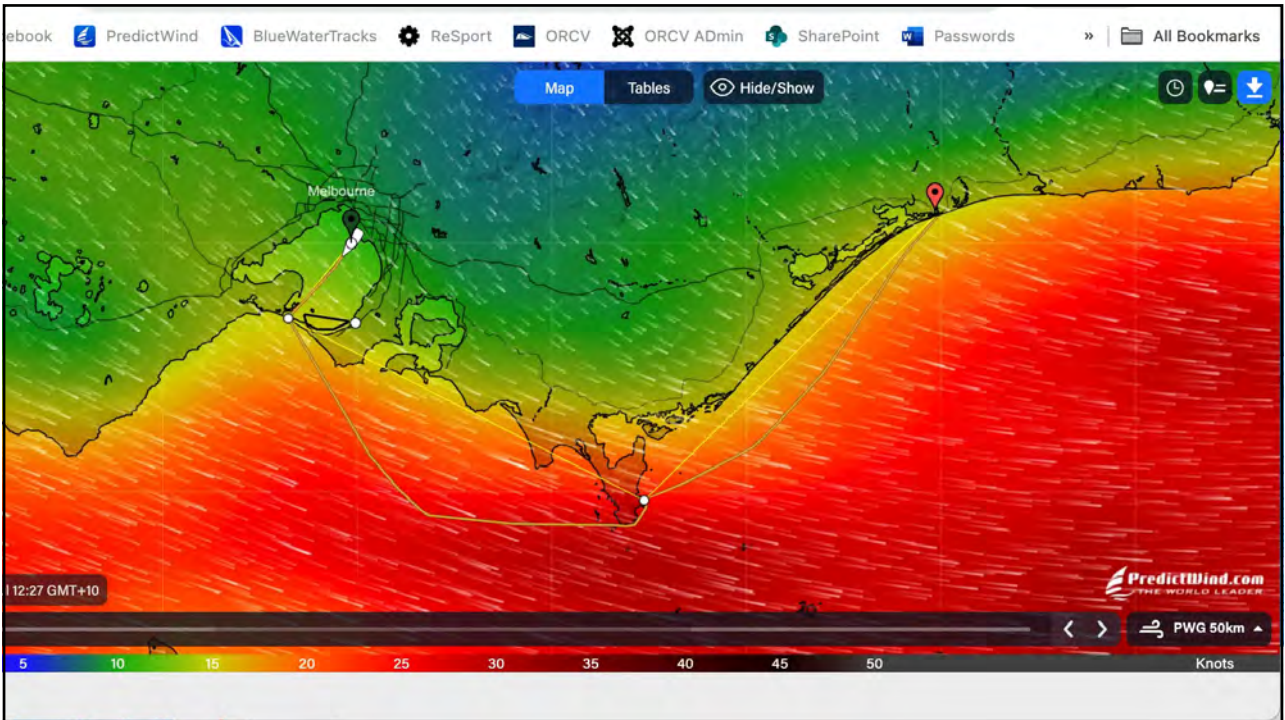
22

PredictWind ECMWF 9 days

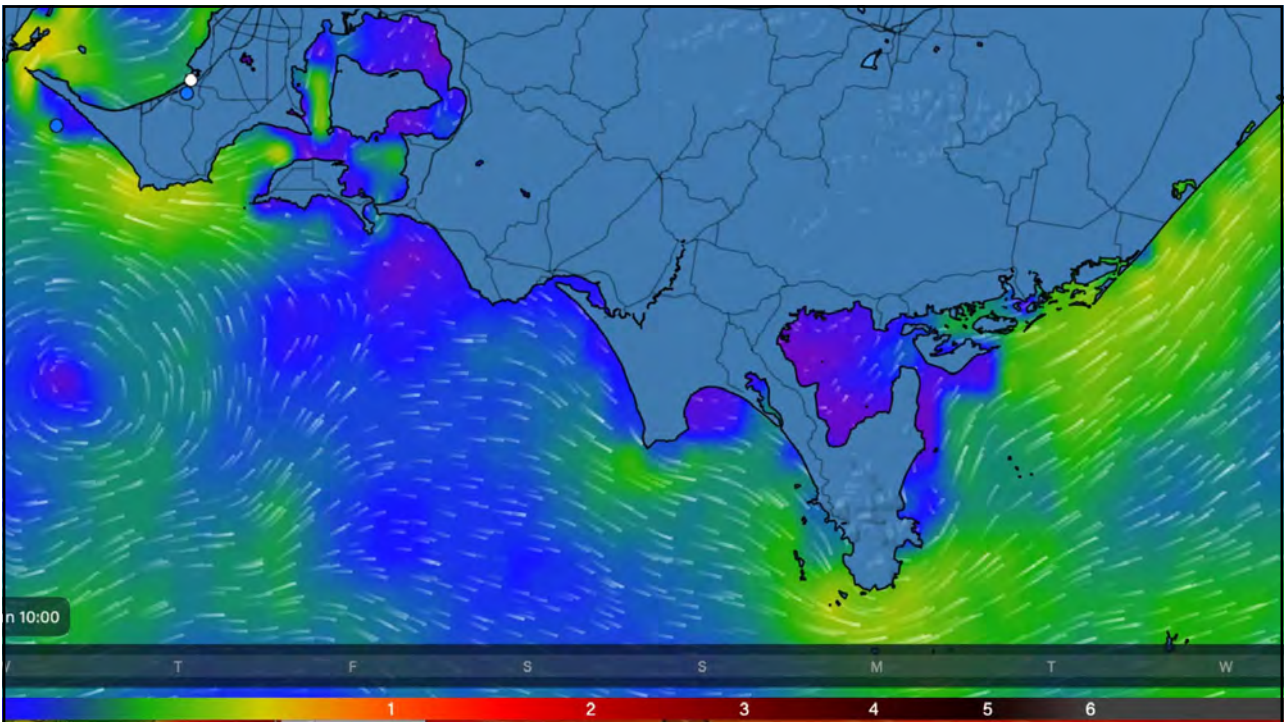


PredictWind Isobar Map 100km resolution





25



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7 Day forecasting

Bom

Access Model 3 to 6km

Windy

Access 12km, GFS 22km, ECmWF 9km, ICON 18km

Predictwind

1, 8, 50 and 100km resolution models

PWG, PWE, ECMWF, GFS, SPIRE, UKMO

Weather Gribbs for the computer specialists

Saildocs:

•Saildocs provides GRIB files via email requests. You send an email request with specific parameters, and they send back the GRIB file.

NOAA (National Oceanic and Atmospheric Administration):

•NOAA provides free access to GFS model GRIB files among other data. You can download these directly from their servers or use tools to fetch the data.

ZYGRIB:

•ZYGRIB offers a user-friendly way to download GRIB files through their software. It's popular among sailors and provides access to multiple weather models.

Australian Government
Bureau of Meteorology

- > Rain radars
- > Satellite images
- > Weather maps
- > MetEye

Marine and Ocean

Marine Wind Maps

Tide Predictions

Sea Temperature & Currents

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WED THU FRI SAT SUN MON TUE

13 16 19 22

Forecast for 13:00 AEST on Wednesday 19 June 2024

Wind Forecast for: 01:00 pm AEST 19/06/2024 Data from 18/06/2024

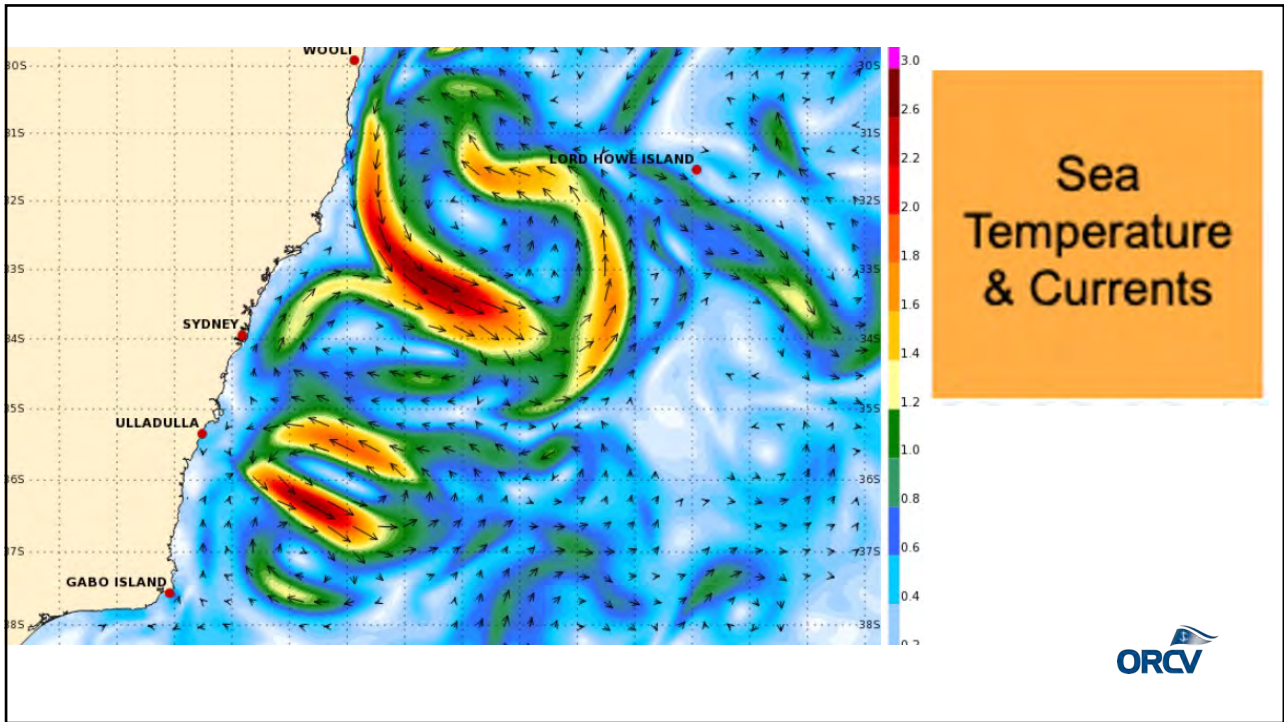
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Direction
↑ from South


Speed Knots 0 5 10 15 20 25 30 35 45

Marine Wind Maps

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Australian Government
Bureau of Meteorology


> Rain radars

> Satellite images


> Weather maps

> MetEye


Numerical Weather and Ocean Prediction Maps


-  [Interactive Weather and Wave Forecast Maps](#)

Australian Region

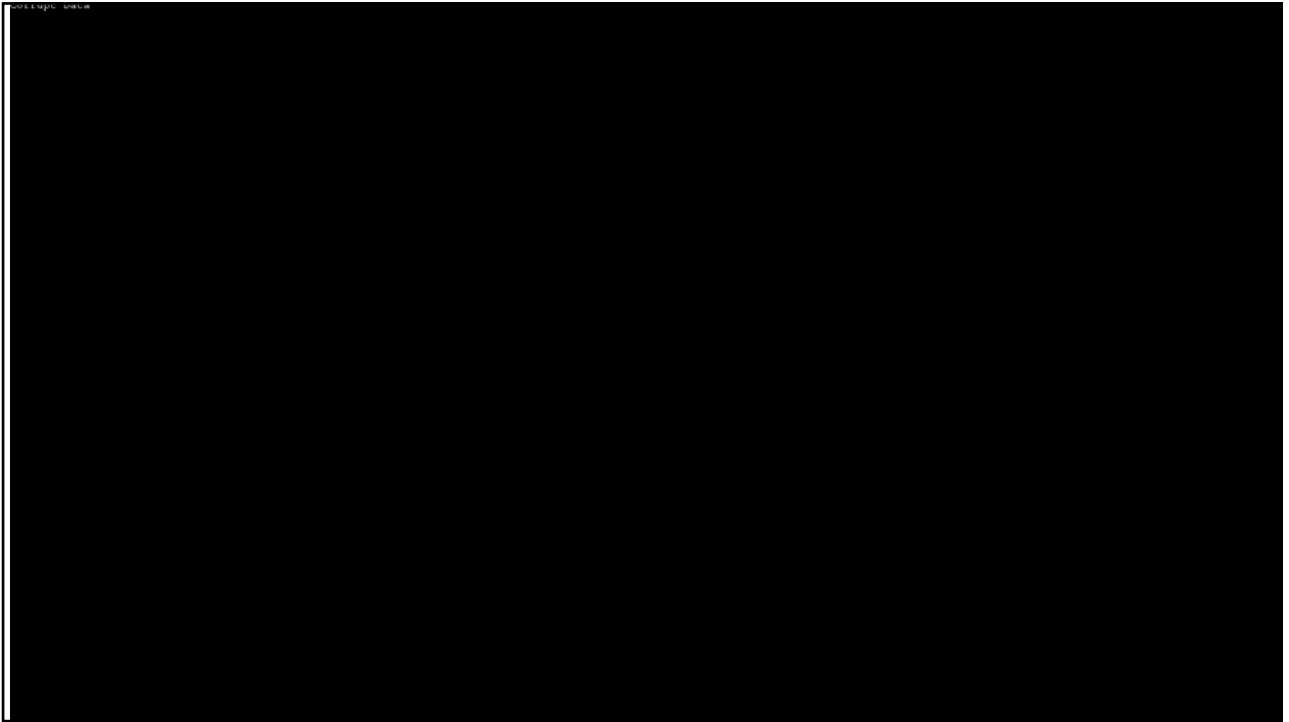
-  [Mean Sea Level Pressure \(MSLP\) map](#)
- [Latest Colour Mean Sea-Level Pressure Analysis and Infrared Greyscale Satellite](#)
- [Short-term forecast](#)
- [Forecast map for next 4 days](#)
- [UV Forecast](#)

Tropical Region

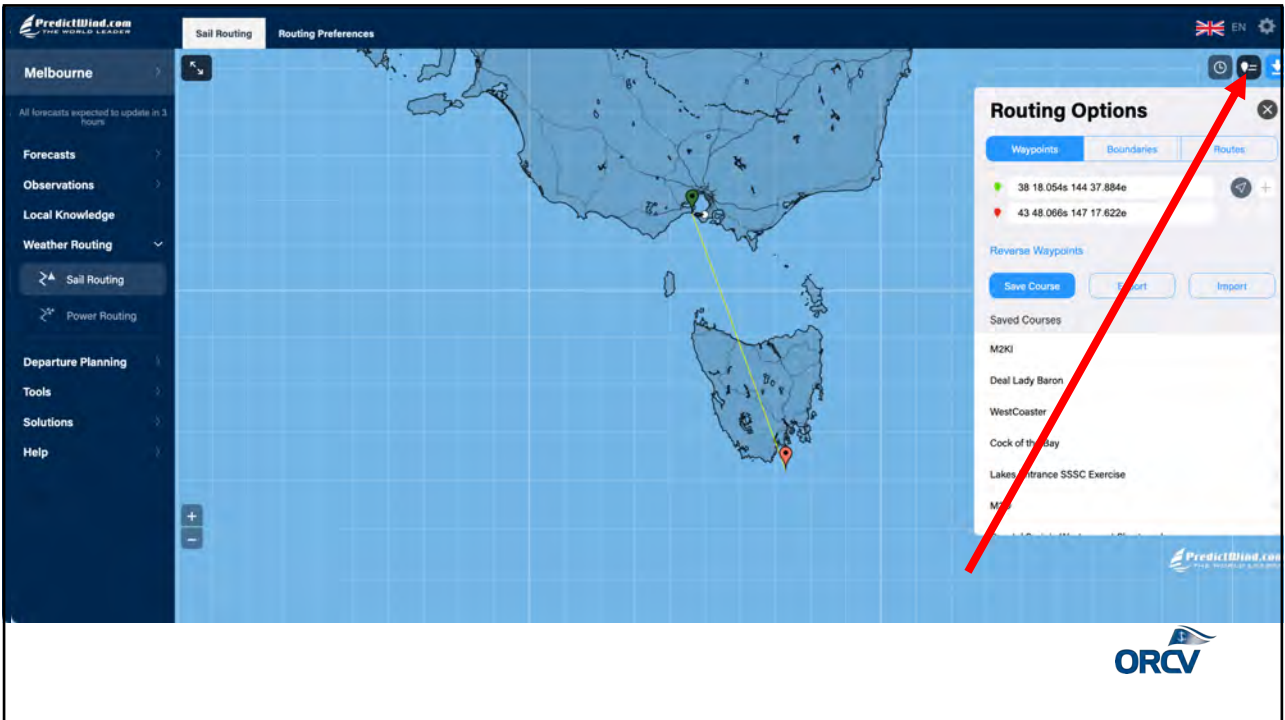
-  **Mean Sea Level Pressure (MSLP)**
 - [Asia MSLP Analysis 00 UTC](#)
- Gradient Level Wind (GLW)**
 - [Gradient Level Wind Analysis: 00 UTC or 12 UTC](#)
 - [Pacific Ocean GLW \(A\): 00 UTC or 12 UTC](#)
 - [Indian Ocean GLW \(B\): 00 UTC or 12 UTC](#)



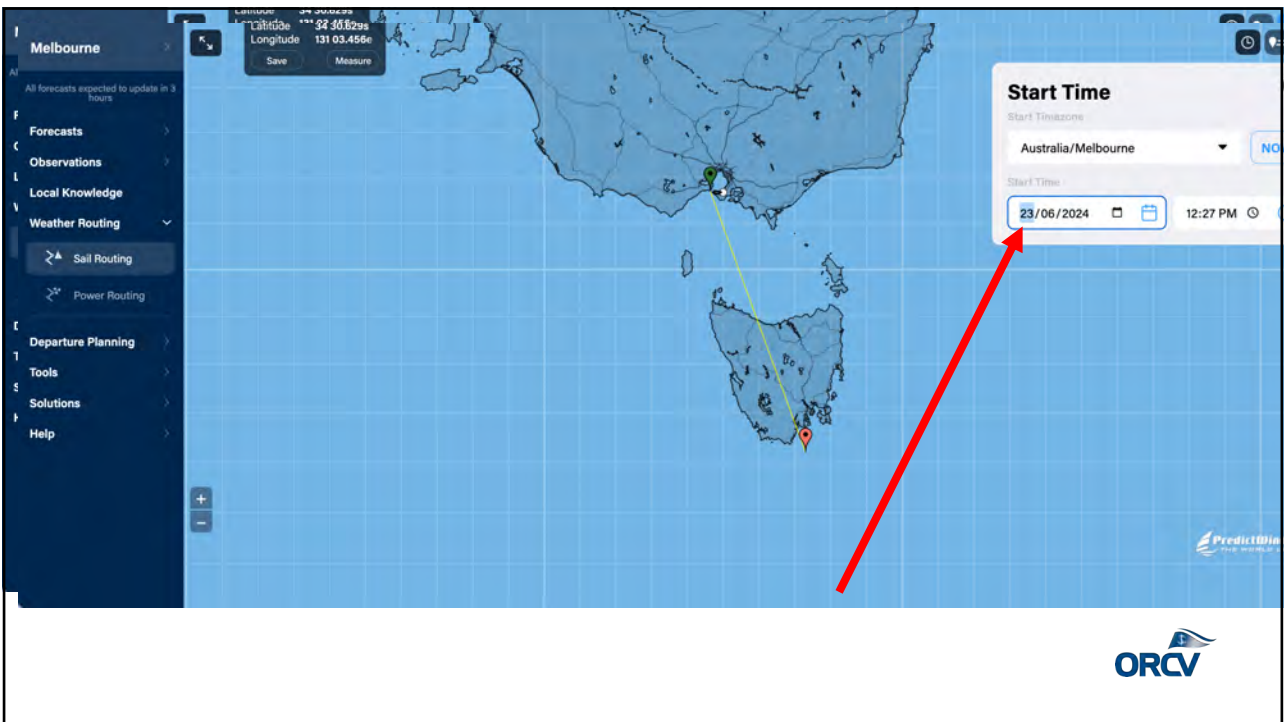
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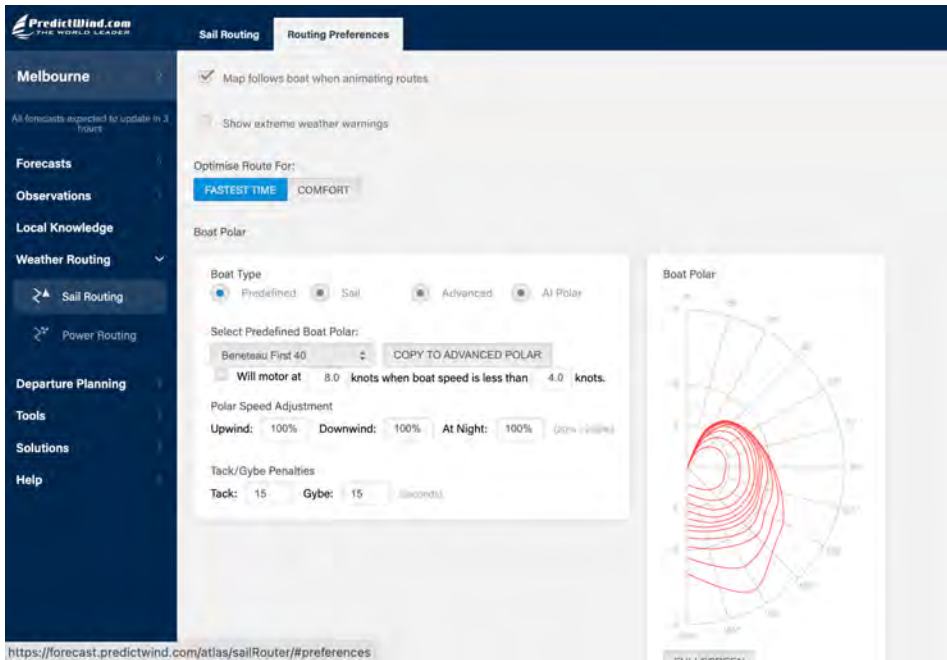
Predictwind



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PredictWind.com THE WORLD LEADER

Sail Routing | Routing Preferences

Melbourne

All forecasts expected to update in 3 hours

Forecasts
Observations
Local Knowledge
Weather Routing
Sail Routing
Power Routing

Departure Planning
Tools
Solutions
Help

Map follows boat when animating routes

Show extreme weather warnings

Optimise Route For:
FASTEST TIME | COMFORT

Boat Polar

Boat Type
 Predefined Sail Advanced AI Polar

Select Predefined Boat Polar:
Beneteau First 40 | COPY TO ADVANCED POLAR


Will motor at 8.0 knots when boat speed is less than 4.0 knots.

Polar Speed Adjustment
Upwind: 100% | Downwind: 100% | At Night: 100% (Open | Values)

Tack/Gybe Penalties
Tack: 15 | Gybe: 15 (seconds)

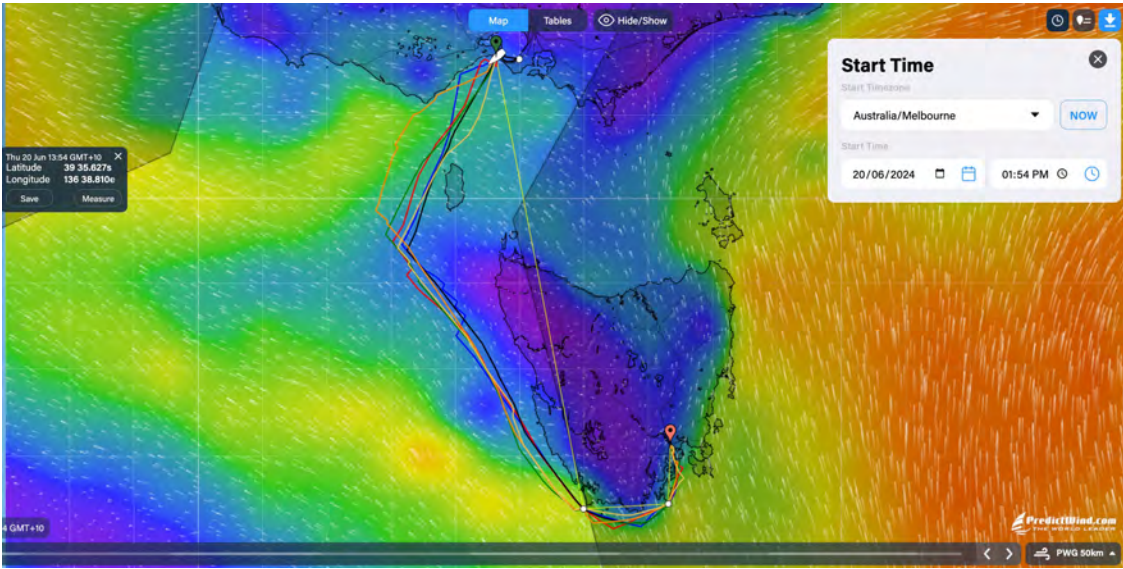
Boat Polar

<https://forecast.predictwind.com/atlas/sailRouter/#preferences>



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Four Models



Map | Tables | Hide/Show

Start Time
Start Timezone: Australia/Melbourne | NOW


Start Time
20/06/2024 | 01:54 PM

Thu 20 Jun 13:54 GMT+10
Latitude 39.356272
Longitude 136.38.810e
Save | Measure

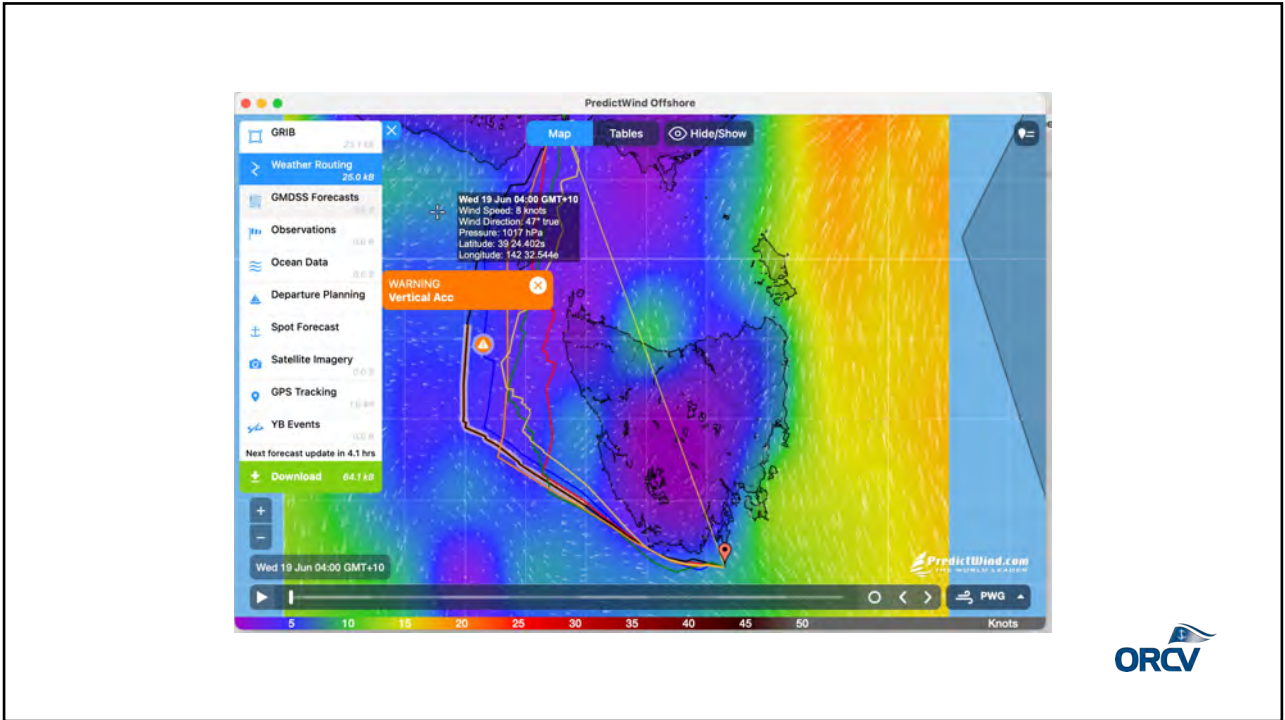
GMT+10

PredictWind.com THE WORLD LEADER

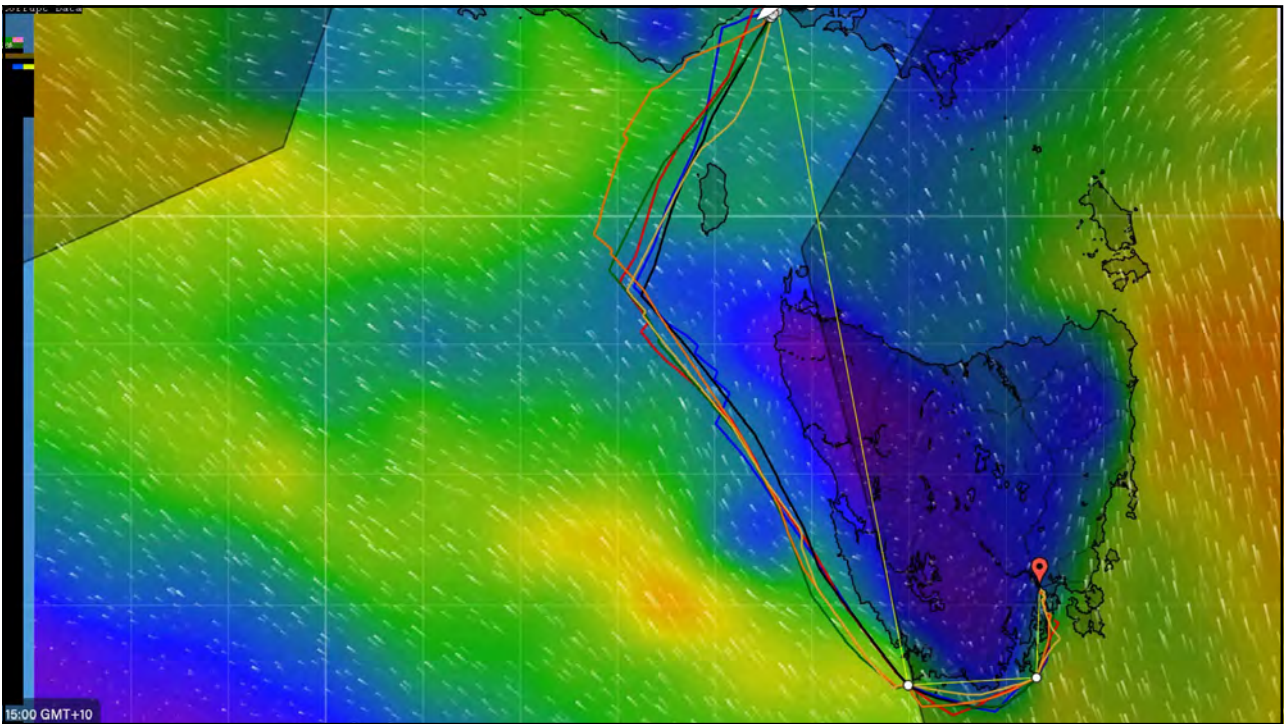
PWG 50km



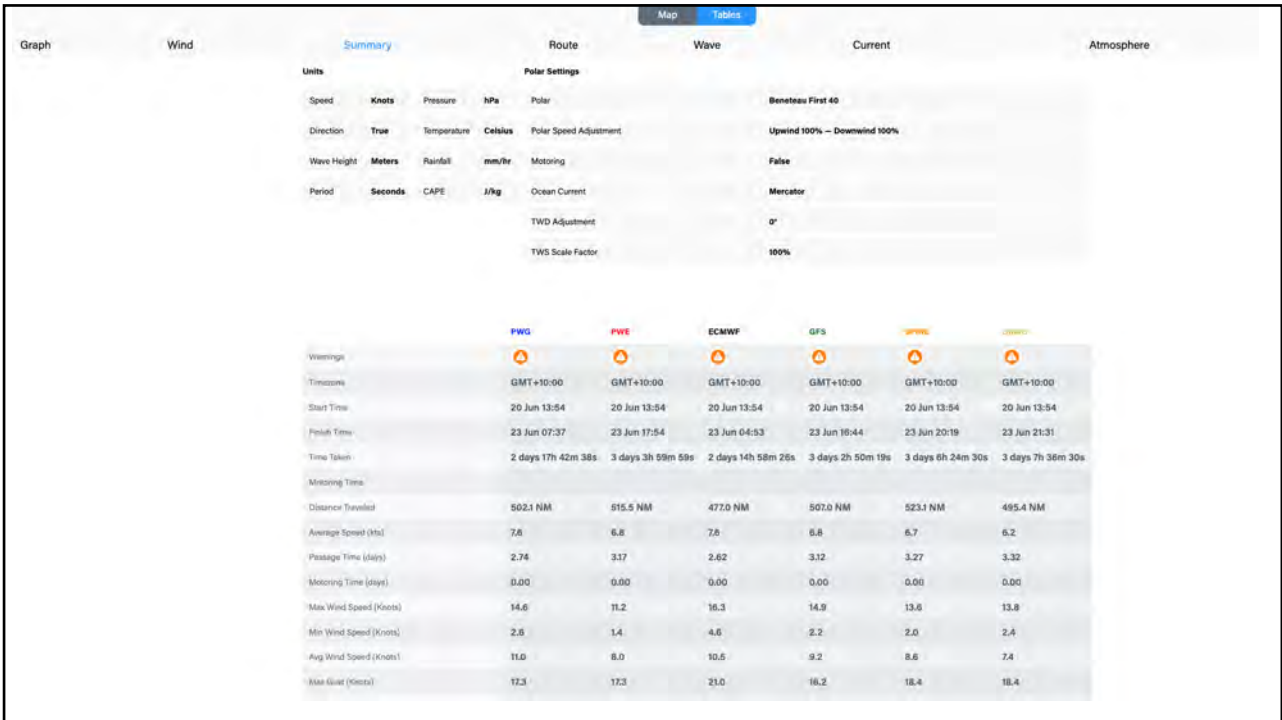
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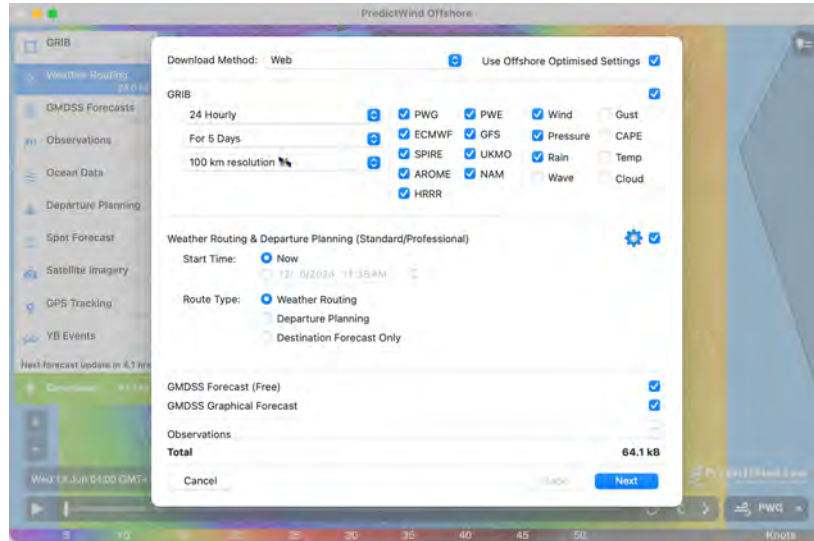


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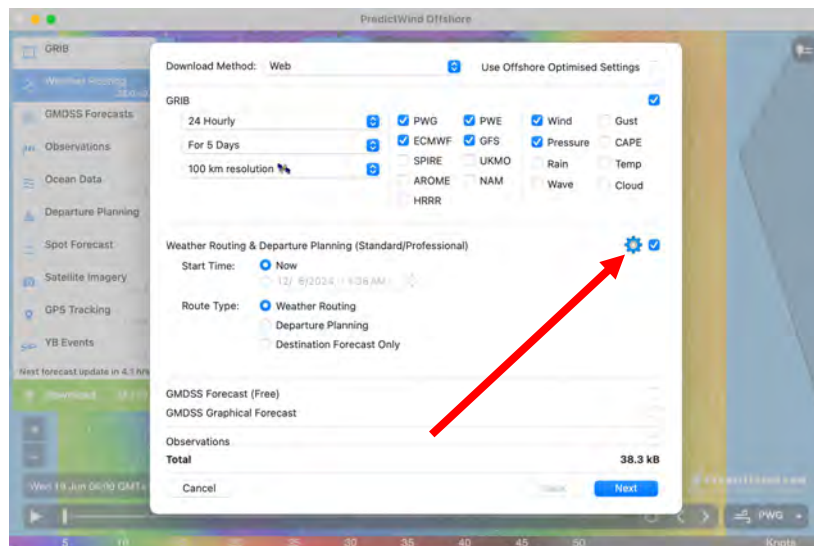
PredictWind Offshore App



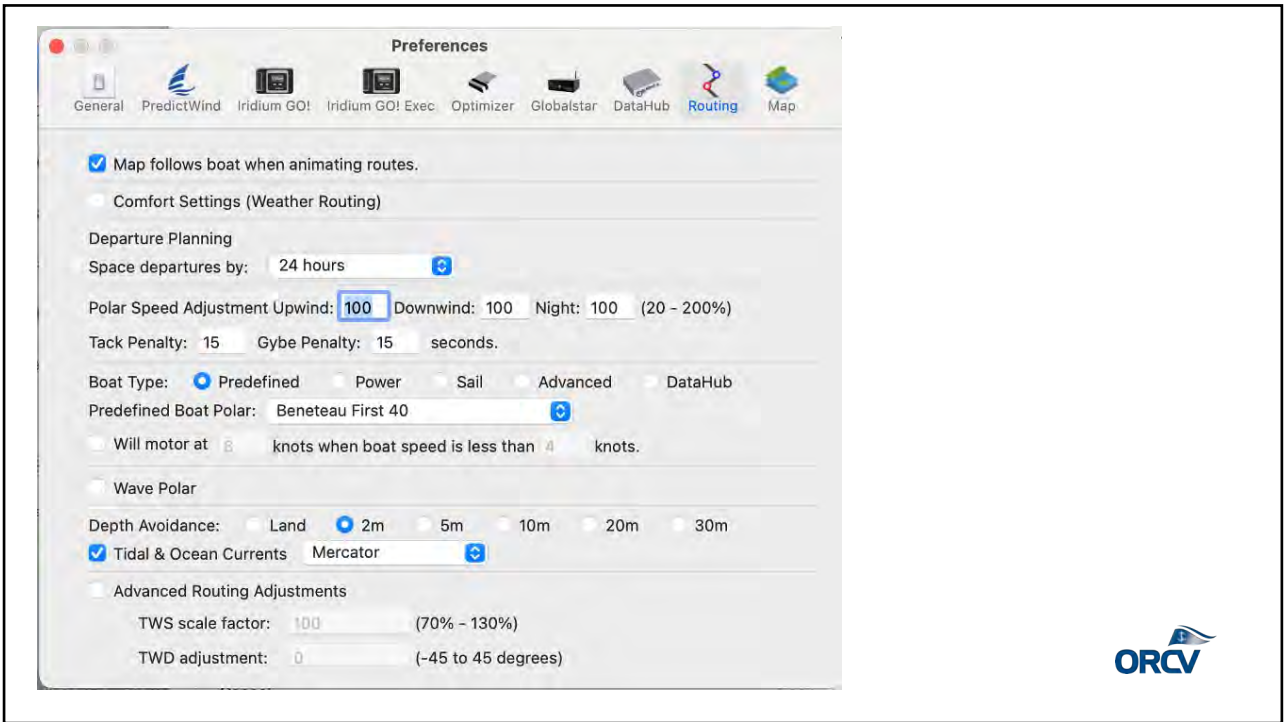
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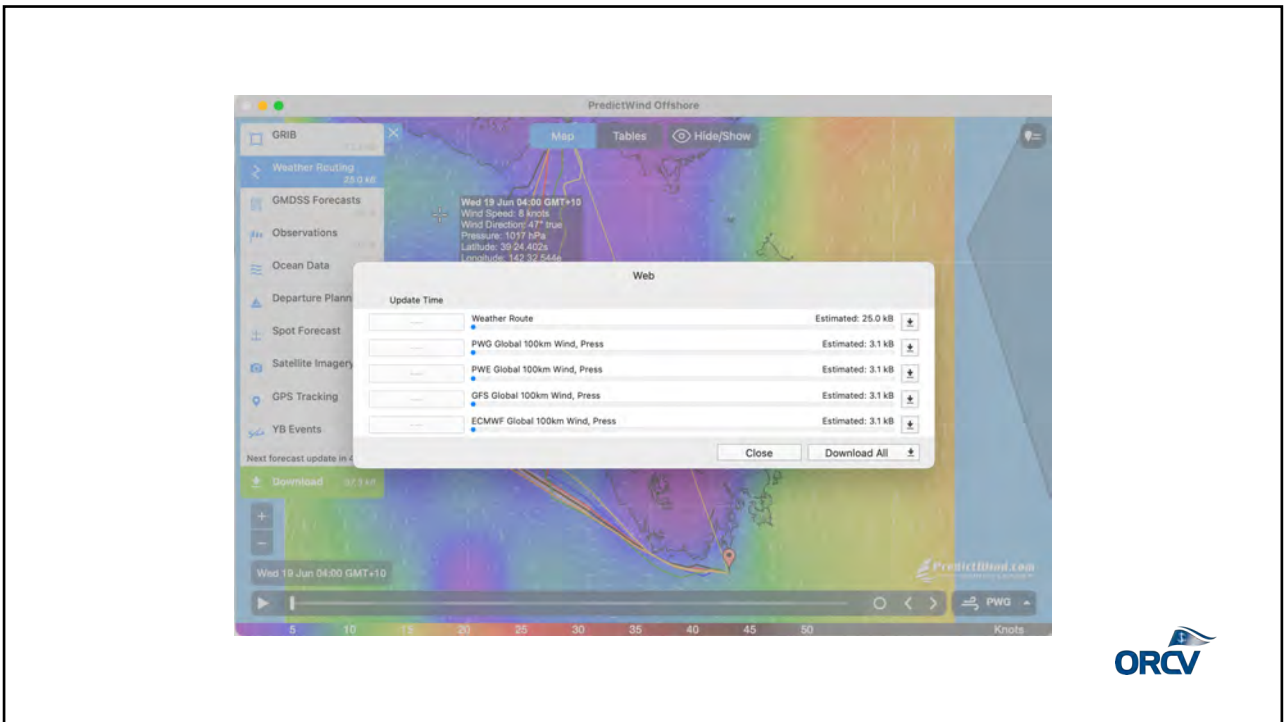
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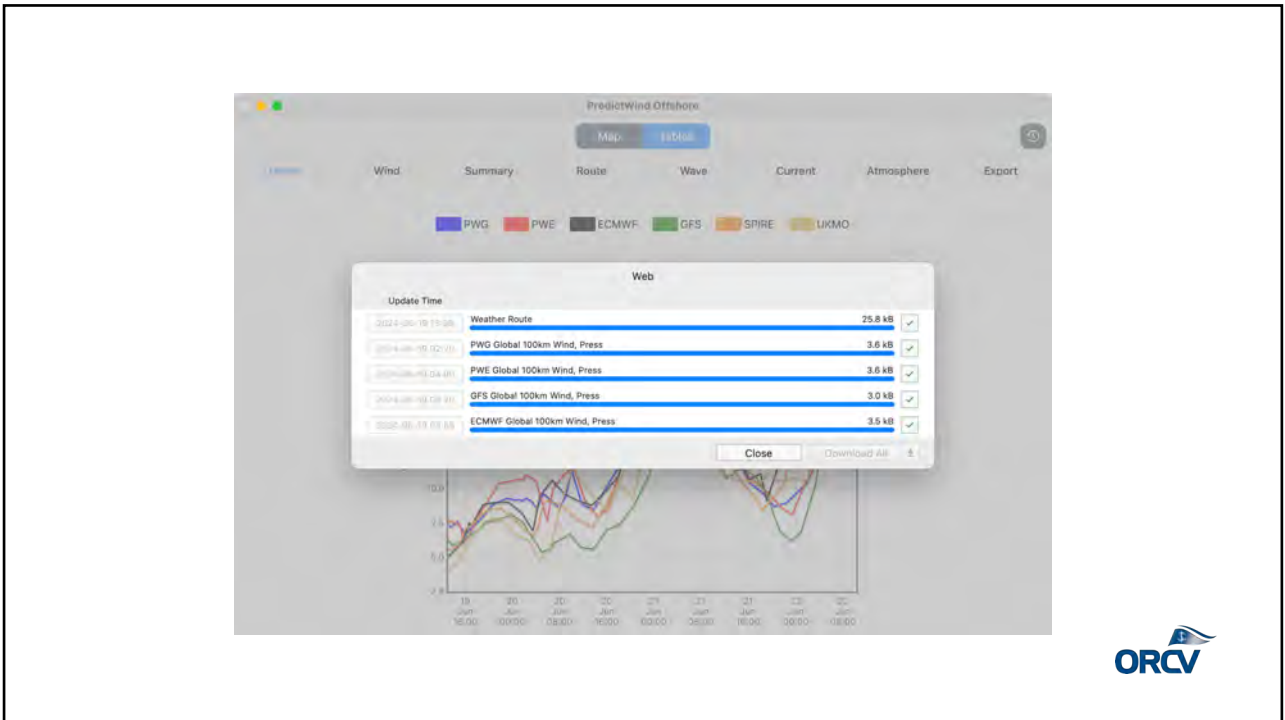
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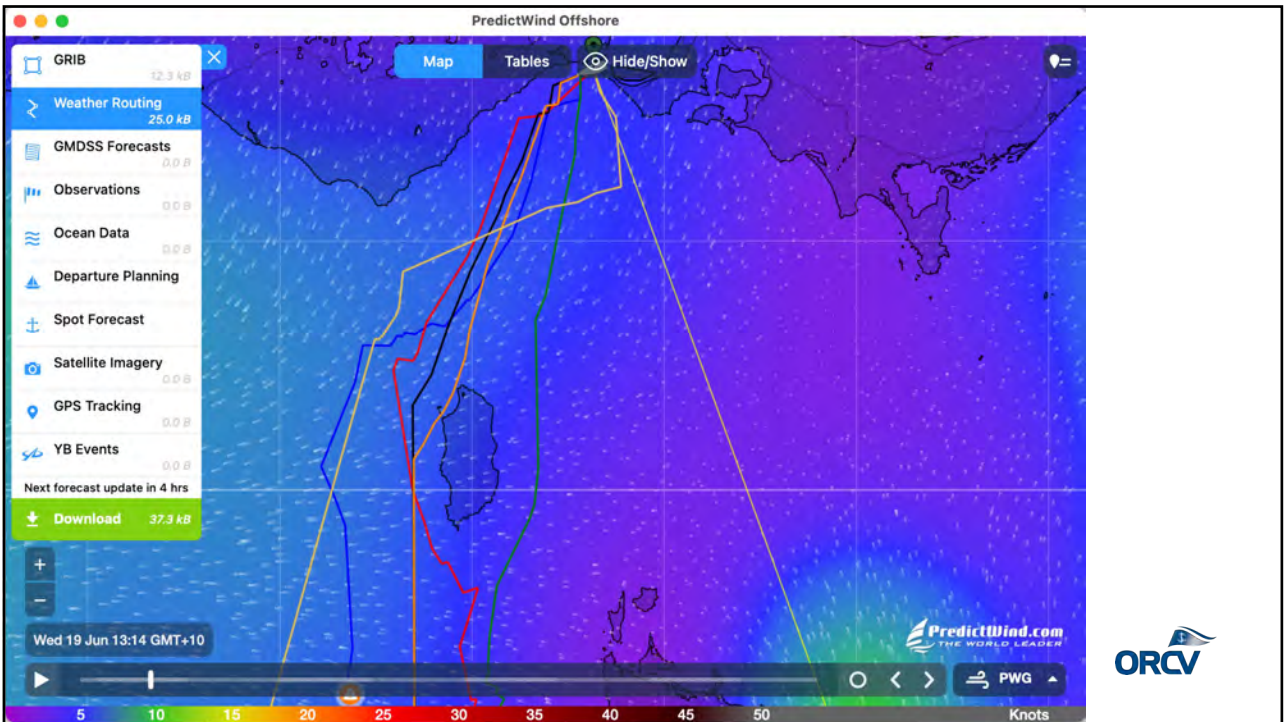
45



46



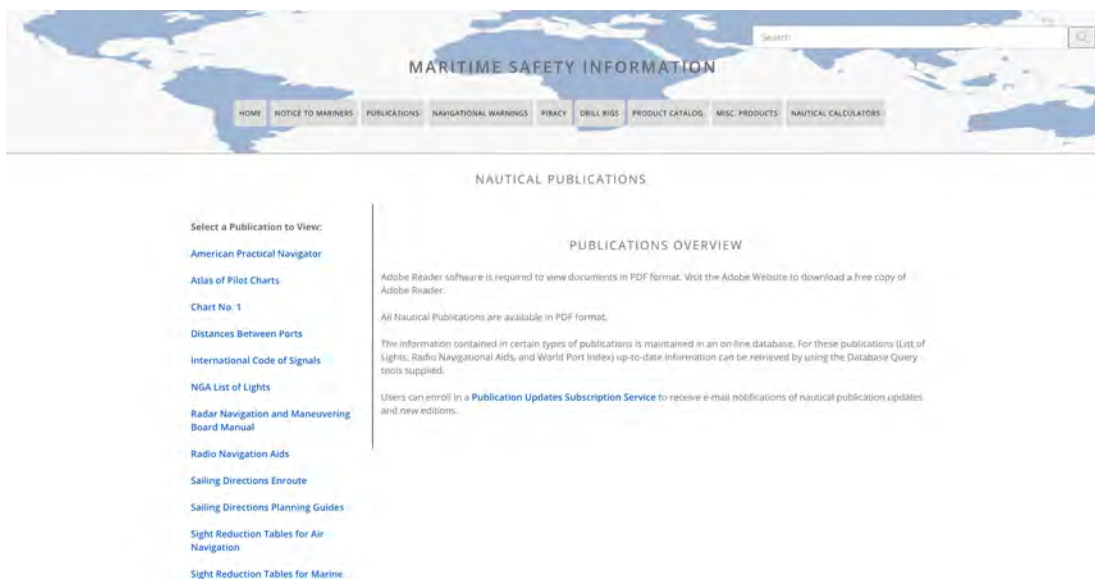
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Weather Planning things to Remember

- Advance weather planning will make a safer trip
- Your Weather journey has just started
- Pick the tools that are right for you level of interest
- Get to know the tools that you choose
- When delivering or cruising always choose a window rather than a date
- Make sure that you have the ability to constantly update your weather while you are on the move
- In closing we have given you a lot
- Please maximize the benefit of this course by making your own weather bible



The screenshot shows the 'MARITIME SAFETY INFORMATION' website. At the top, there is a navigation menu with links: HOME, NOTICE TO MARINERS, PUBLICATIONS, NAVIGATIONAL WARNINGS, PIRACY, DRILL RIGS, PRODUCT CATALOG, MISC. PRODUCTS, and NAUTICAL CALCULATORS. Below the menu is a 'NAUTICAL PUBLICATIONS' section. On the left, there is a list of publications to view, including 'American Practical Navigator', 'Atlas of Pilot Charts', 'Chart No. 1', 'Distances Between Ports', 'International Code of Signals', 'NGA List of Lights', 'Radar Navigation and Maneuvering Board Manual', 'Radio Navigation Aids', 'Sailing Directions Enroute', 'Sailing Directions Planning Guides', 'Sight Reduction Tables for Air Navigation', and 'Sight Reduction Tables for Marine'. On the right, there is a 'PUBLICATIONS OVERVIEW' section with text about Adobe Reader software and a subscription service for updates.

Questions



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Thank you

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ORCV is dedicated to promoting ocean sailing, growing its participation, providing sea safety programs and value to our members.

Support the ORCV by joining as a member
www.orcv.org.au/join

Learn more about the ORCV Programs

[Racing Calendar](#)

[Safety & Sea Survival Courses](#)

[Weather Courses](#)

[Navigation Courses](#)

[Foredeck Essentials](#)

[Other Courses](#)

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