



OCEAN RACING CLUB OF VICTORIA


WEATHER FOR SAILORS

MODULE 1 - THE FUNDAMENTALS (COURSE NOTES)





Weather Course Enclosed Waters

1



Session 1 Weather Definitions and Fundamentals


2



Getting Underway....

- Introductions
- Presenter 1
- Presenter 2 etc
- Attendees
 - Racing, Cruising

Housekeeping
Emergency exits etc



3

Quick Poll



Hand up as we call each for most in importance to you on a typical race/cruise on the Bay.

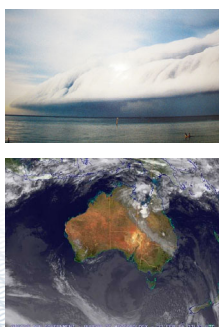
- Current/tide
- Barometric Pressure
- Rainfall
- Wind Direction
- Temperature
- Wind Speed
- What if you were on a Bay Cruise for , say, a week? Same as the poll result? Yes/No

4

Definitions



- Weather
- Climate
- Pressure
(Temp/Pressure/Volume)
- Temperature
- Relative Humidity
- Wind
- Gusts
- Squalls
- Waves and Swell

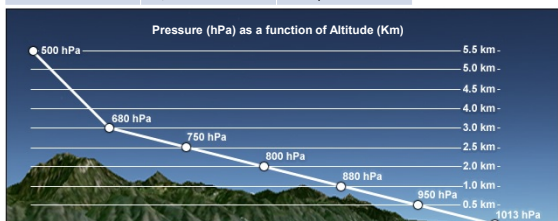


5

Altitude and Pressure



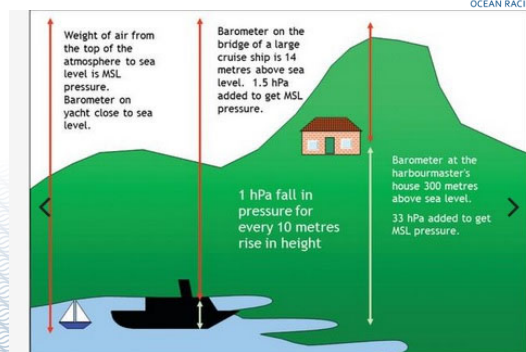
12,192m	40,000 ft	187 hpa
10,608m	35,000 ft	238 hpa
10,000m	32,800 ft	264hpa
Mt. Everest	30,000ft	307 hpa



©The COMET Program

6

Air Pressure Illustrations



7

The Aneroid Barometer

American video – observe millibar scale



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Vectors



•**Scalars** – only require a number to define their magnitude

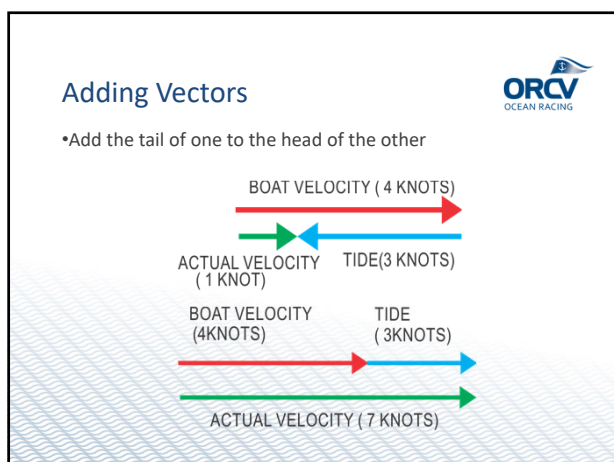
•Eg: distance, speed, temperature, relative humidity, cloud cover

•**Vectors** – require a direction as well as a number to define them

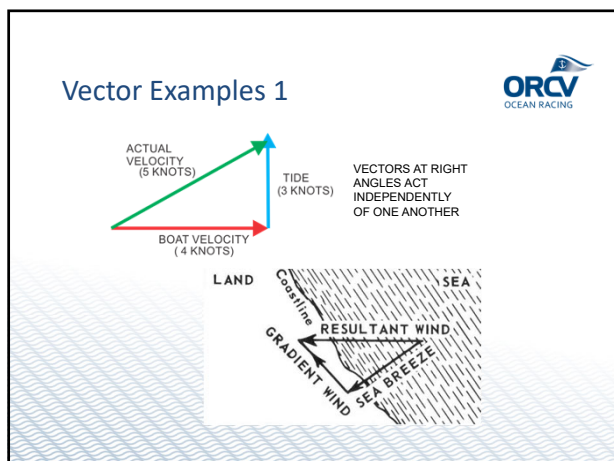
•Eg: velocity, acceleration, force, friction

•Sailing – wind, tide, current vectors

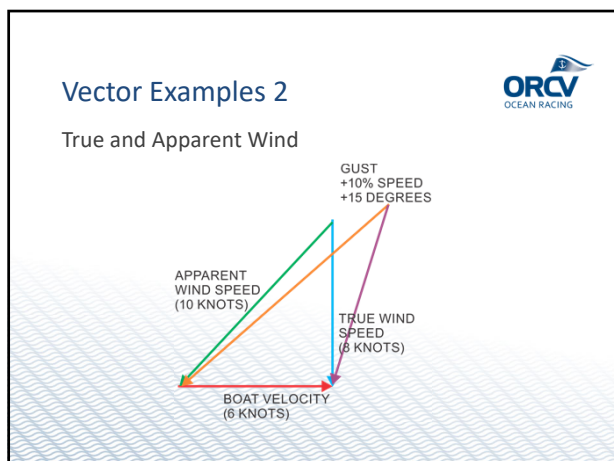
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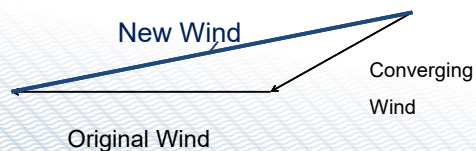


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Convergence



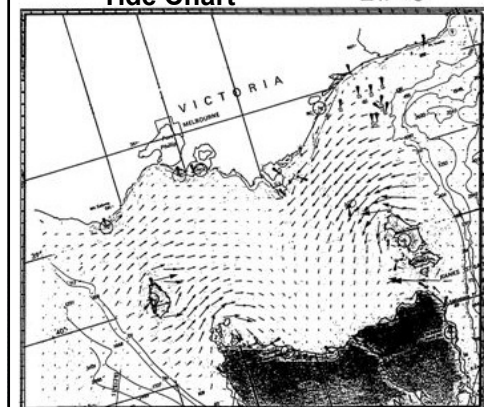
Length of vector = wind strength
 Direction of vector = wind direction
 New wind vector = strength and direction



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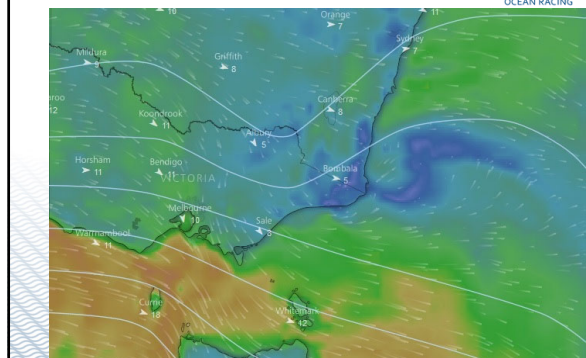
Tide Chart

LW +5



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Particle Animation/Density



15

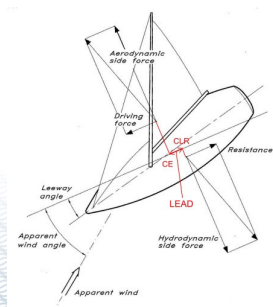
Basic Laws of Motion



- A body stays at rest or at constant velocity (speed and direction) unless acted on by a force
- A net force acting on a body accelerates it constantly (increases its velocity)
- All forces are equal and opposite at constant velocity (Equilibrium)

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Forces on a Yacht



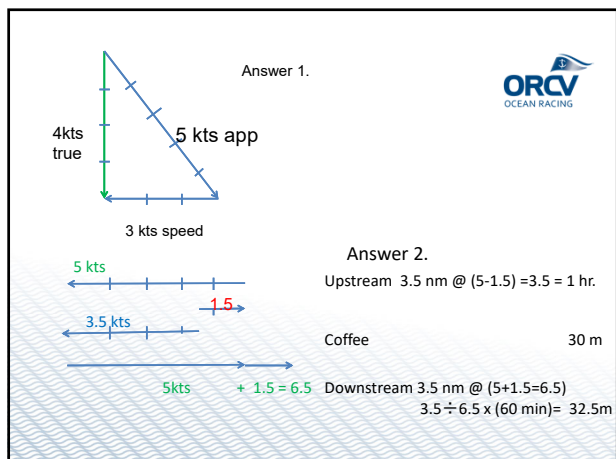
17

Vector exercises

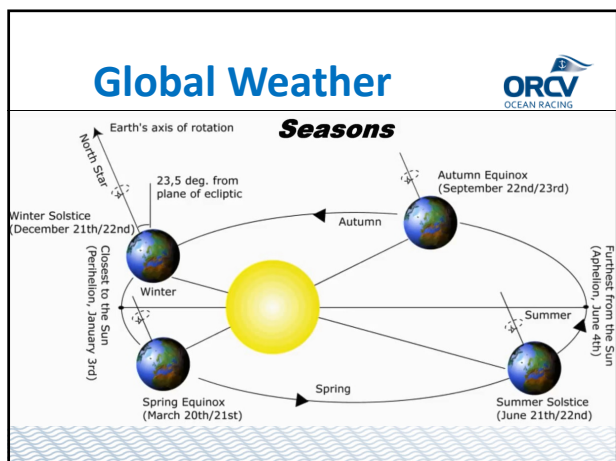


1. You are about to round a mark and the next leg will have the wind of 4 kts true on your starboard beam. You expect your speed will be 3 kts.
What will the apparent wind and direction be?
2. 'Imagine' makes 5 kts under power and the Yarra has a stream of 1.5 kts after heavy rain. It is 3½ miles to get to Docklands and ½ hour for coffee. Your guests must be back by 4pm.
What time must you begin?

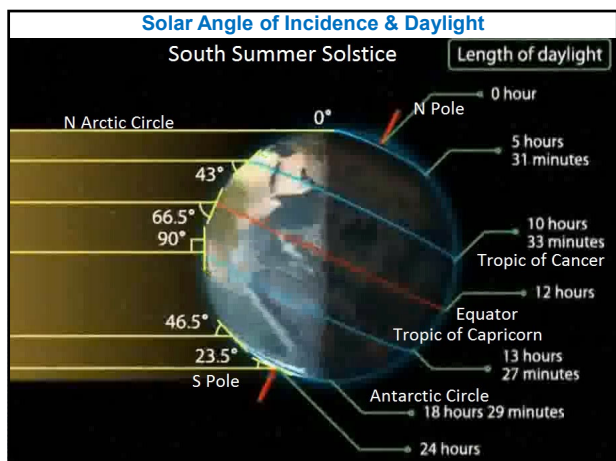
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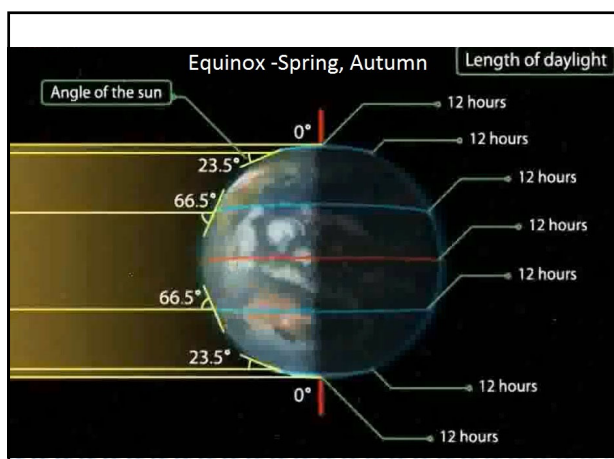
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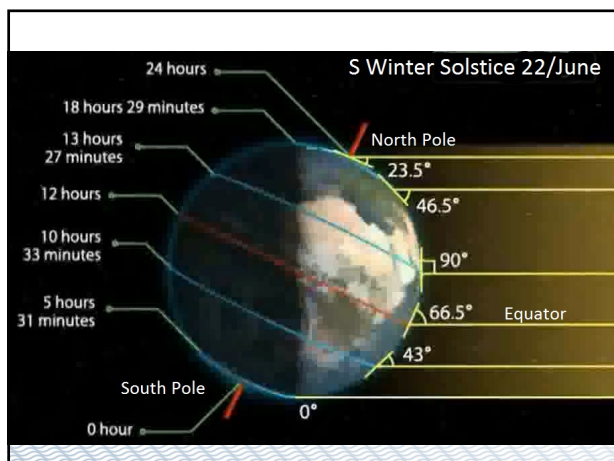
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Global Weather – Coriolis Effect




Rotating Bodies

- The Earth is rotating
- To explain the curved trajectory on the merry-go-round, to someone on the merry-go-round, there must be something pushing the ball!
- Called the Coriolis Force
- Effects the motion of wind

Merry go round – MIT Department of Physics Video 3 mins

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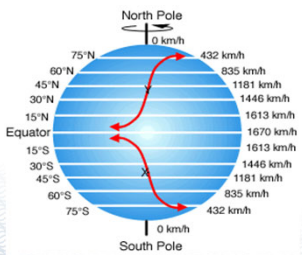
The Coriolis Effect

MIT Department of Physics
Technical Services Group

25

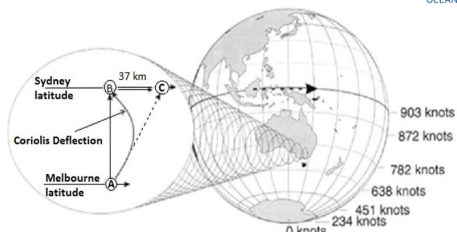
Coriolis Effect

- Rotating earth - speed relative to latitude
- NE trades in North hemisphere, SE trades in South, Westerlies in both
- Strongest at poles, zero at equator



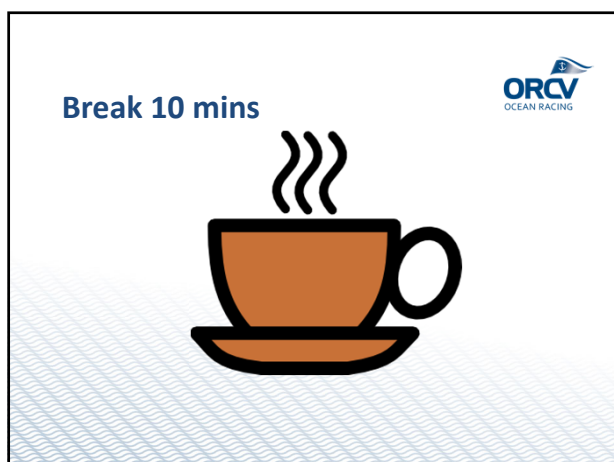
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Coriolis Effect

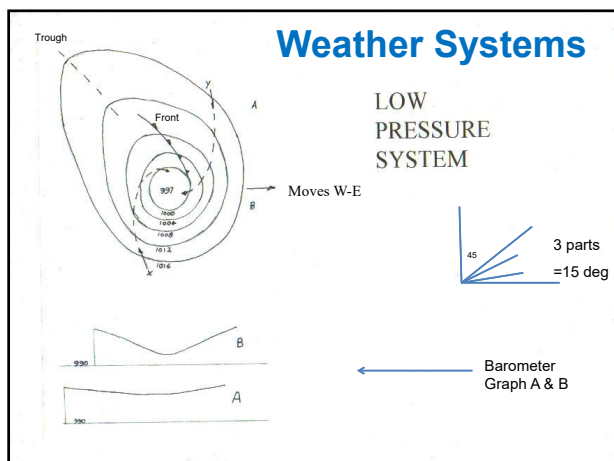


Variation in earth's surface speed and the Coriolis deflection between Melbourne and Sydney Latitudes. To fly a plane from A directly North to B, the plane would have to be aimed to the right at C. This is because the earth's surface is rotating much faster North of the starting point. By the time the plane has travelled 1 hr northwards to Sydney latitude, the original destination has shifted 37 km to the right at C.

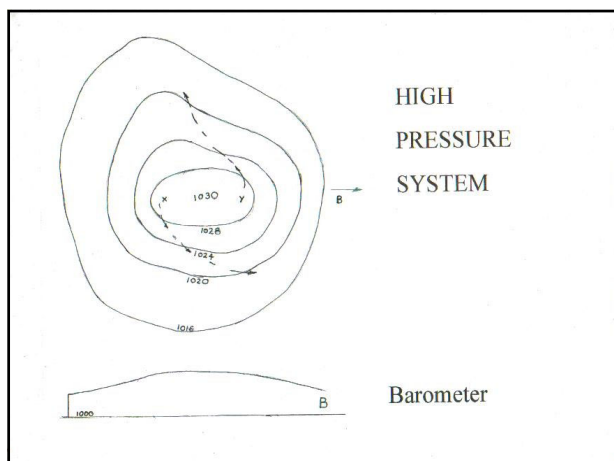
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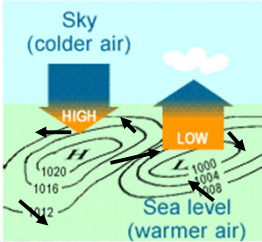


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Highs and Lows

•High – High Pressure System.
Descending, colder air (heavier), dome shape, outward air flow. Higher pressure at surface

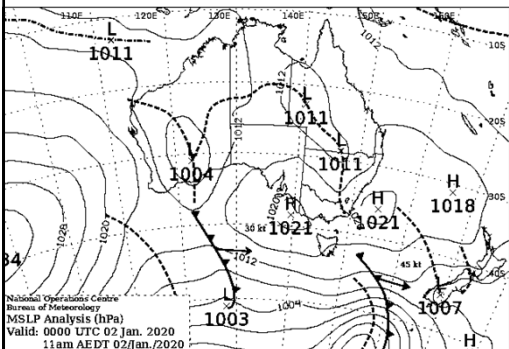
•Low – Low Pressure System.
Rising, warmer air (lighter), cone shape, inward air flow. Lower pressure at surface



ORCV OCEAN RACING

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Determine Wind Example



National Operational Centre
Bureau of Meteorology
MSLP Analysis (hPa)
Valid: 0000 UTC 02 Jan. 2020
11am AEDT 02 Jan. 2020

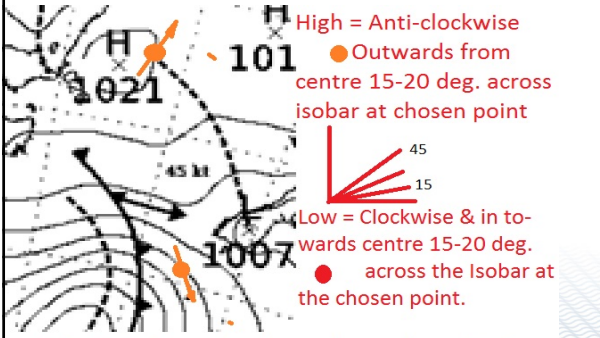
ORCV OCEAN RACING

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Wind Direction-How to draw it detail

High = Anti-clockwise
● Outwards from centre 15-20 deg. across isobar at chosen point

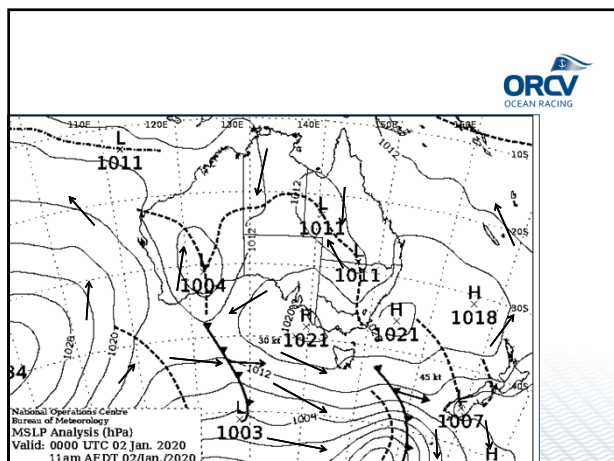
Low = Clockwise & in towards centre 15-20 deg. across the Isobar at the chosen point.



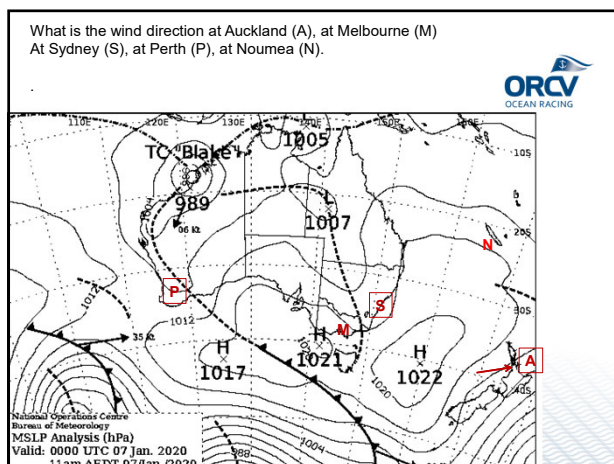
Look for the Isobar values, increasing or decreasing?

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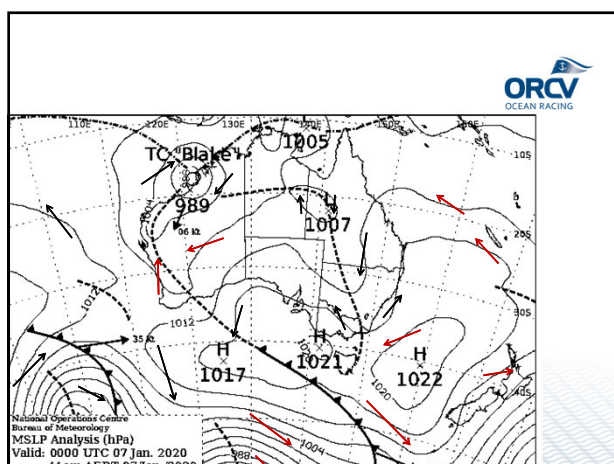
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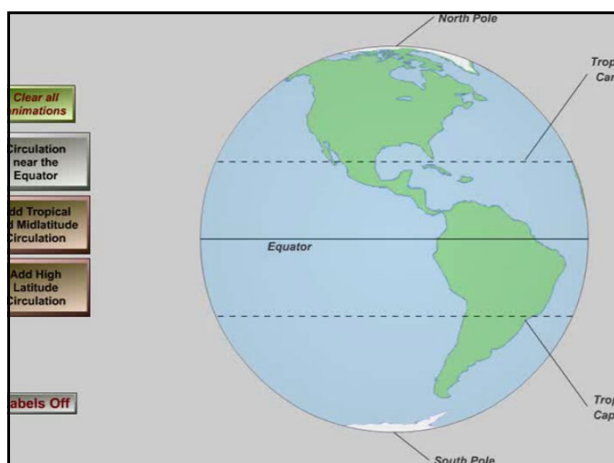
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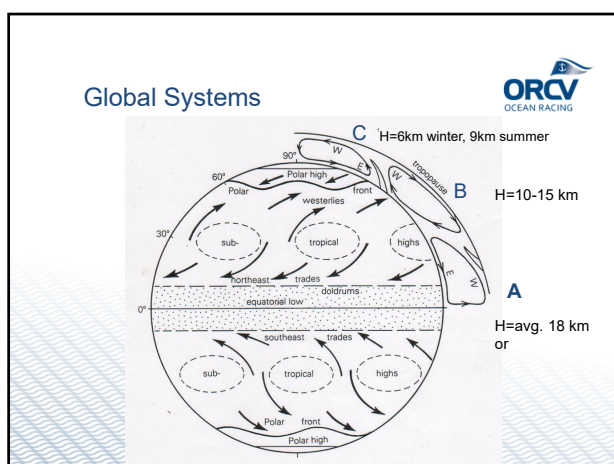
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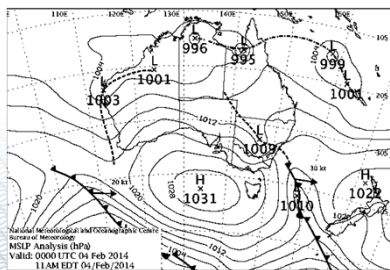
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National Weather



Australian Synoptic Charts – main features include the Subtropical High, Westerlies, Monsoon Trough

Typical Summer



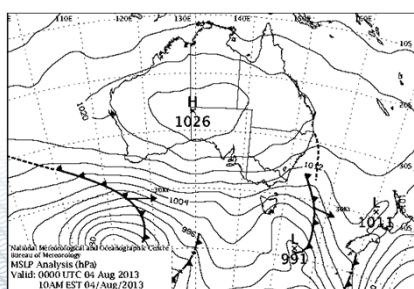
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National Weather



Interpreting Synoptic Charts

Typical Winter



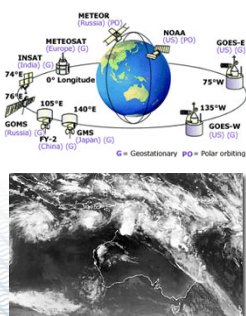
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Weather Forecasting



The forecasting process

- Data Collection
- New satellite technologies
- Eg Japan Himawari 8, 9
- Remote sensing



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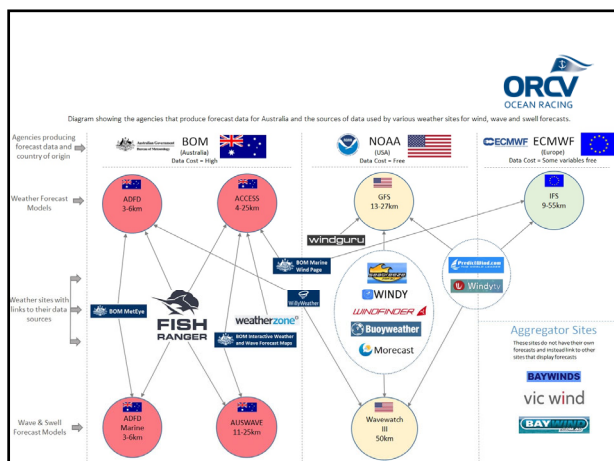
Weather Forecasting



Analysis

- Models – Fluid Dynamics – Supercomputers
- BoM ACCESS Model (Based on UK Met model)
- ACCESS-G global, 10 day, 6 hr steps, 25 km resolution
- ACCESS-R Regional, 3 day, 3 hr, 12 km resolution
- ACCESS-C+ Capitals, Vic, Tas, 1.5 days, 1 hr, 4 km resolution
- ACCESS-TC Relocateable, 3 days, 1 Hr, 12 km resolution
- ACCESS-S Climate modelling, 60 km resolution
- Overseas Models (i.e. GFS, EC, JMA, CMC,)

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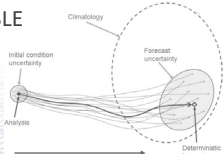
Weather Forecasting



Forecasters Review

- Local forecasters tweak according to empirical data and local knowledge – reality check

•ENSEMBLE



Sailors need always to consider that forecasts are dependent on data density, model selection, interpolation and local effects. A forecast should be viewed as background information.

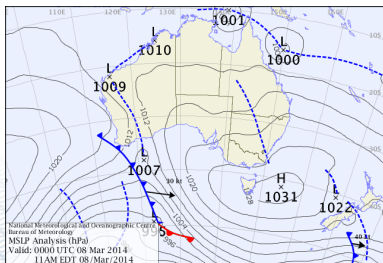
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The Weather Map



Mean Sea Level Pressure (MSLP) Analysis

- Synoptic – “View together” or “View at common point”
- Immediately becomes out of date



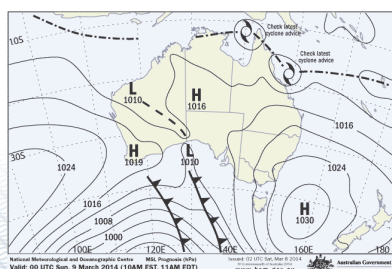
46

The Weather Map

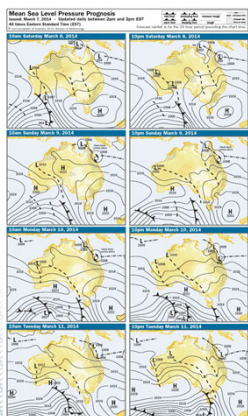


MSLP Prognosis

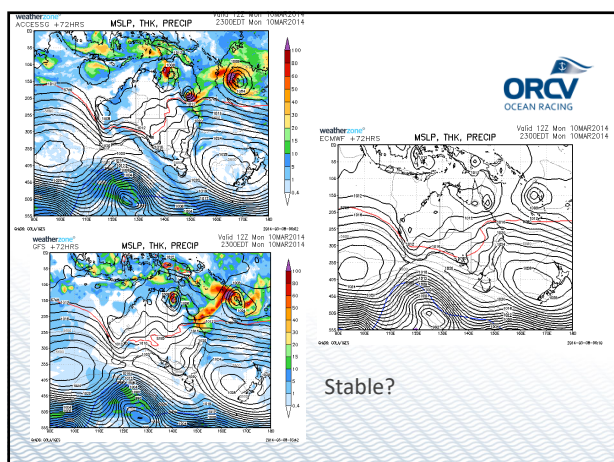
- “Foreseeing”
- Future Prediction



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Forecast Weather Stability

Consider:

- Prognosis changes with time
- Model agreement at same time
- Example – 72 hours ahead – how reliable is the prognosis? How stable is the weather?



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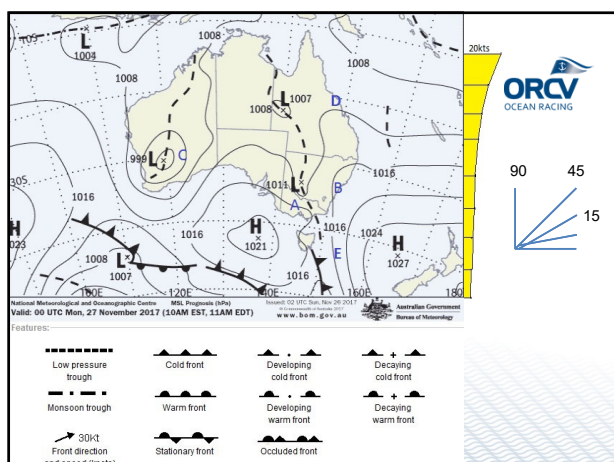
Exercise

Synoptic Chart Interpretation

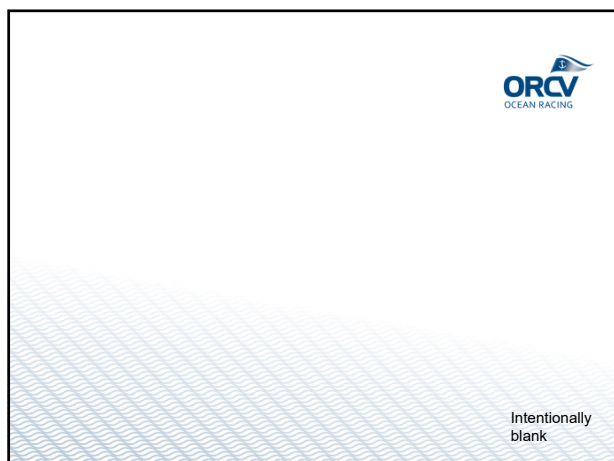
- Identify features and add wind vectors
- Predict wind strength and direction at A, B, C, D, E



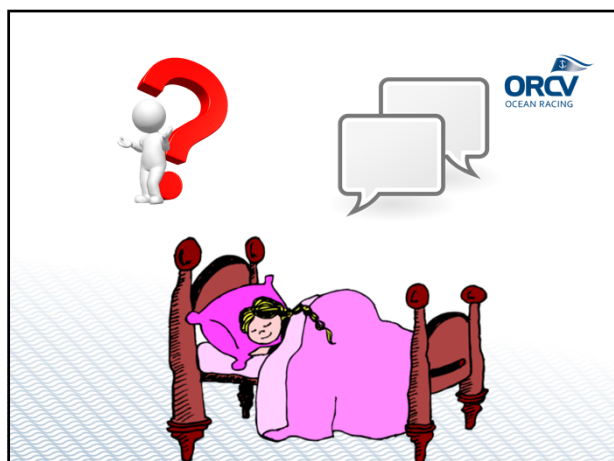
51



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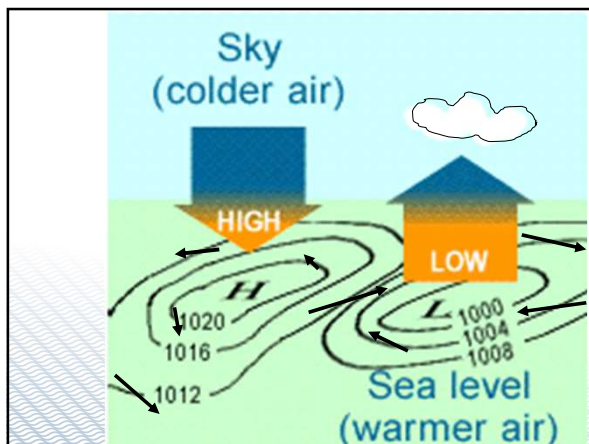


Module 1-Session 2

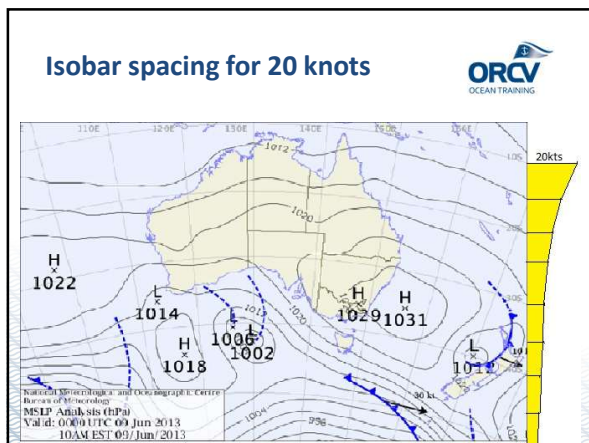
Weather Information

Signs in the Sky

1

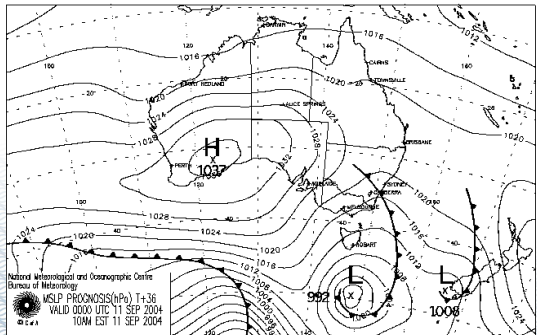


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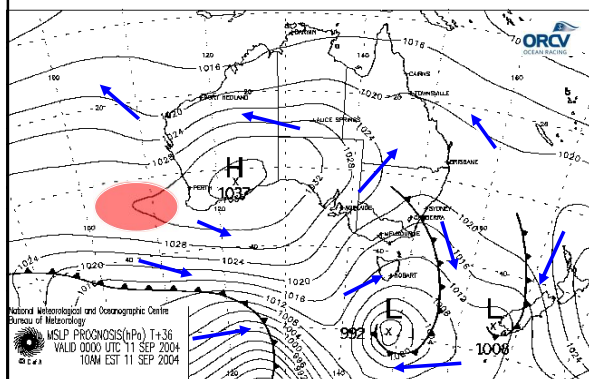
3

Exercise: Draw in wind directions and features



4

Answer: Draw in wind directions and features

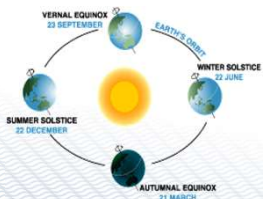
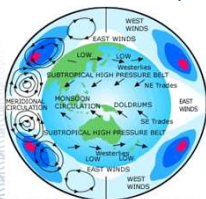


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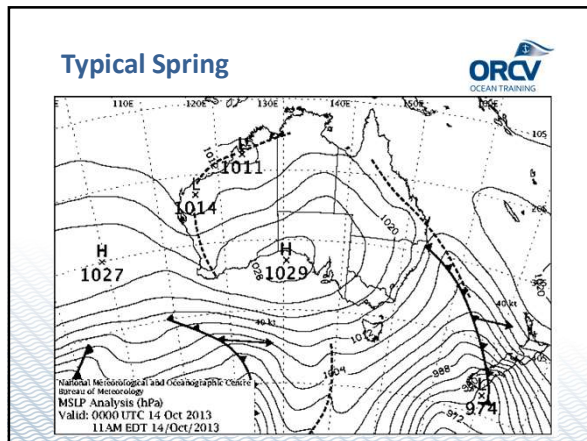
Seasonal Patterns



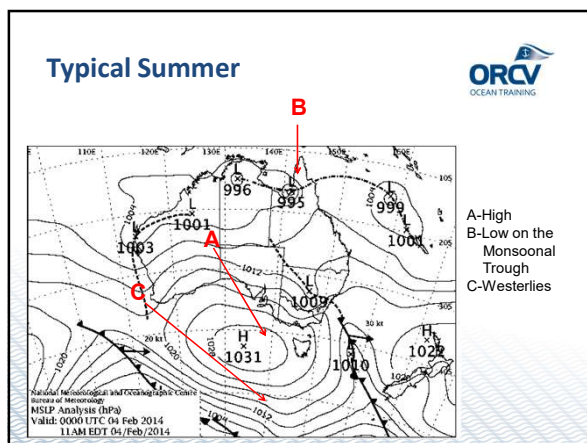
The north-south seasonal shift of the sun, which in turn shifts the monsoon trough, High band and Westerly band



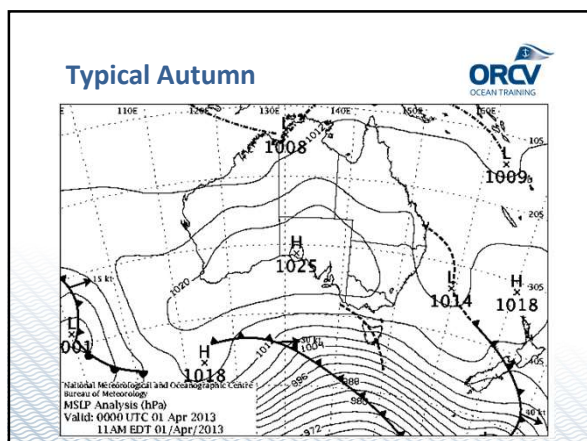
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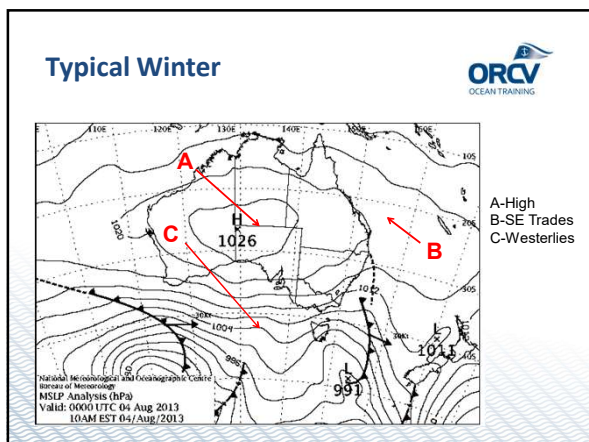
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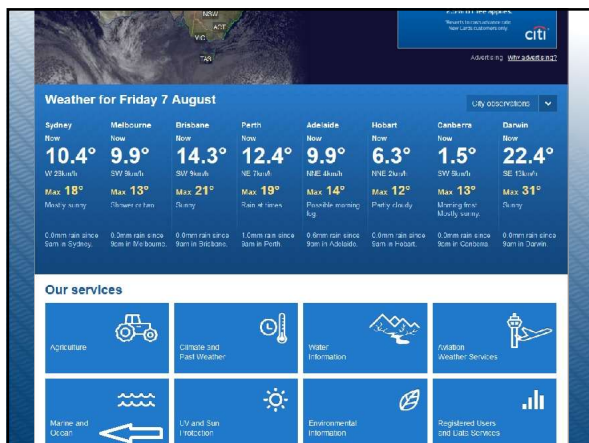
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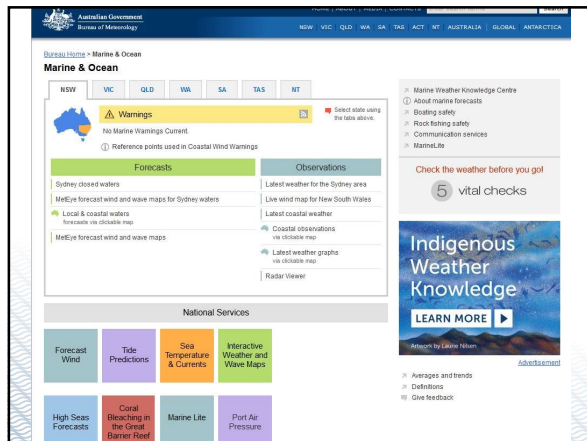
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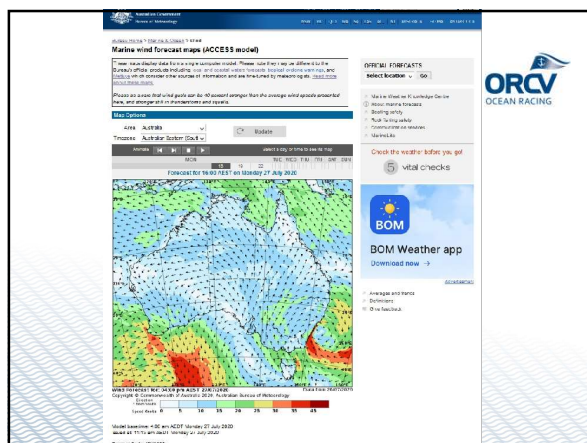
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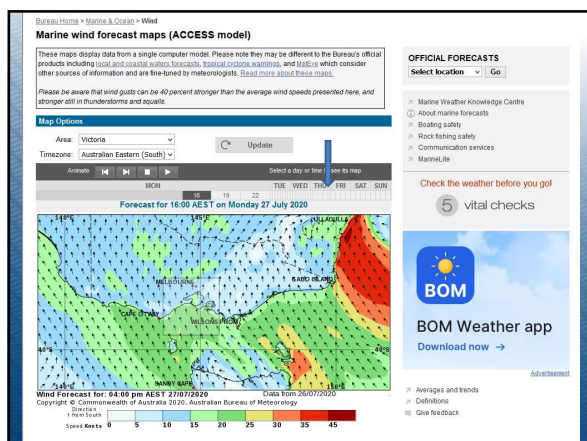
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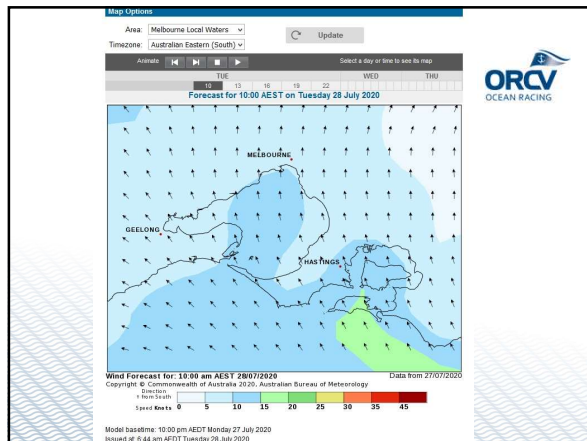
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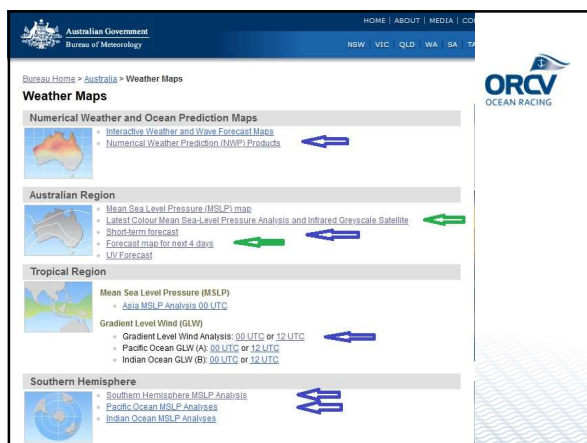
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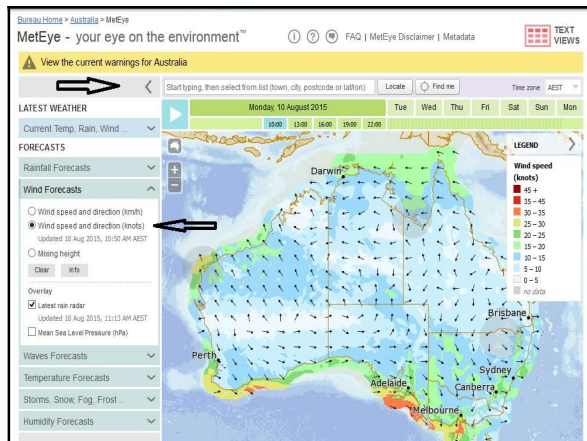
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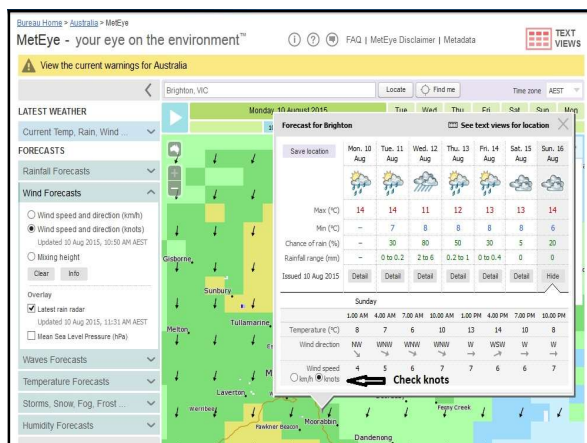
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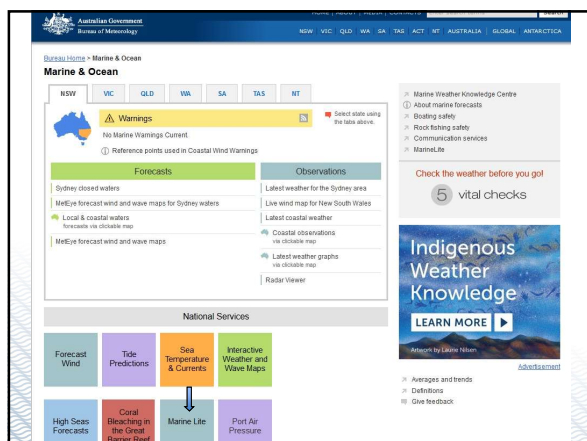
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Australian Government
Bureau of Meteorology

Marine Weather Services (lite)

Please refresh page for latest warnings

WARNINGS

OCEAN WIND WARNINGS

- Ocean Wind Warning 1 - Metarea 10
- Ocean Wind Warning 2 - Metarea 10
- Ocean Wind Warning 3 - Metarea 10
- Ocean Wind Warning 4 - Metarea 10
- Ocean Wind Warning 5 - Metarea 10
- Ocean Wind Warning 6 - Metarea 10
- Ocean Wind Warning 7 - Metarea 10

OLD WARNINGS

- Marine Wind Warning Summary for Queensland

NSW WARNINGS

- Marine Wind Warning Summary for New South Wales

VIC WARNINGS

FORECASTS

High Seas forecast

- North Eastern
- South Eastern
- Western
- Northern
- Southern

CHARTS

- Australia MSLP Analysis
- Pacific Ocean MSLP Analysis
- Indian Ocean MSLP Analysis
- All wind and wave charts for 7 days
- Bass Strait forecast
- Bass Strait and Approaches
Cape Otway to Sandy Cape and St Helens to Gabo Island
- QLD forecast
- Gulf Waters Coastal Waters Zones
QLD/NT border to Crab Island
- North Queensland Coastal Waters Zones
Torres Strait to St Lawrence
- South Queensland Coastal Waters

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- Wind gusts can be 40 percent stronger than the averages given here, and maximum waves may be up to twice the height.
- These charts show broad-scale conditions across a large area. Local effects - particularly near coastlines - may not be reflected in the charts.
- Tropical Cyclone (TC) tracks are only available when there is an active TC in the relevant area.

Australia (90E - 180E, 0S - 55S)

Chart type

MSLP Analysis [1-42 KB]

MSLP forecast [138 KB]

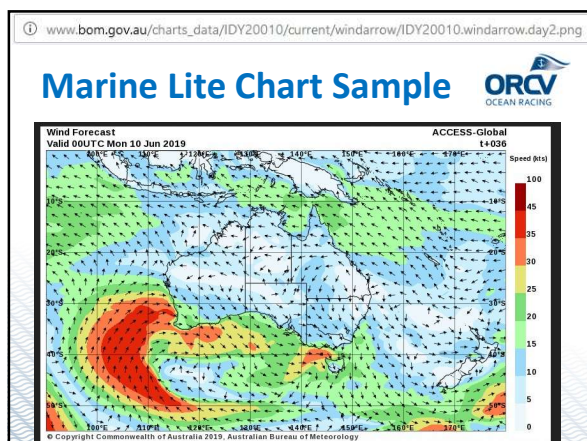
	Day 0 (analysis)	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Wind speed/direction	[101 KB]	[99 KB]	[99 KB]	[99 KB]	[98 KB]	[95 KB]	[96 KB]	[95 KB]
Total wave height/direction	[132 KB]	[131 KB]	[131 KB]	[133 KB]	[127 KB]	[122 KB]	[122 KB]	[122 KB]
Wave period	[86 KB]	[87 KB]	[89 KB]	[89 KB]	[88 KB]	[86 KB]	[80 KB]	[78 KB]
Primary swell wave height/direction	[140 KB]	[150 KB]	[146 KB]	[151 KB]	[152 KB]	[151 KB]	[139 KB]	[125 KB]
TC Tracks	WA System 1 System 2 System 3	NT System 1 System 2	Qld System 1 System 2 System 3					

Pacific Ocean (145E - 160W, 10N - 35S)

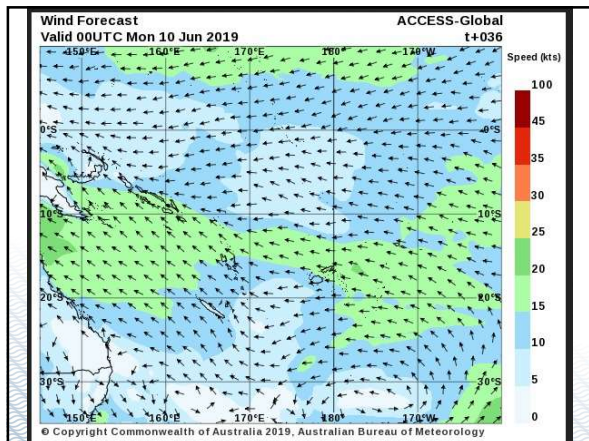
Chart type

MSLP Analysis [106 KB]

26



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Marine Wind Maps

Tide Predictions

Sea Temperature & Currents

Interactive Weather and Wave Maps

High Seas Forecasts

Coral Bleaching in the Great Barrier Reef

Marine Lite

Port Air Pressure

A service to ships reporting data to
 BOM for long range forecasting &
 for calibrating their instruments.
 Australian Voluntary Observing Fleet

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Select Port from Table

State	Port	Closest weather station	Distance from port	Link to check latest MSLP
NEW SOUTH WALES	Newcastle	Williamtown RAAF	13 km	Check MSLP
	Sydney Port Botany	Sydney Airport MO	4 km	Check MSLP
SOUTH AUSTRALIA	Port Kembla	Port Kembla	1 km	Check MSLP
	Adelaide	Adelaide Airport	13 km	Check MSLP
	Ceduna	Ceduna	6 km	Check MSLP
	Port Lincoln	Port Lincoln Airport	8 km	Check MSLP
	Port Pirie	Port Pirie Airport	8 km	Check MSLP
TASMANIA	Whyalla	Whyalla	8 km	Check MSLP
	Devonport	Devonport Airport	5 km	Check MSLP
	Hobart	Hobart (Eilerslie Road)	1 km	Check MSLP
VICTORIA	Geelong	Geelong Racecourse	8 km	Check MSLP
	Melbourne	Melbourne Olympic Park	7 km	Check MSLP
	Portland	Portland Harbour	1 km	Check MSLP
WESTERN AUSTRALIA	Albany	Albany Airport	13 km	Check MSLP
	Broome	Broome Port	0 km	Check MSLP
	Bunbury	Bunbury	5 km	Check MSLP
	Dampier Anchorage	Legendre Island	35 km	Check MSLP

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Latest Weather Observations for Melbourne (Olympic Park)

11/09/2020

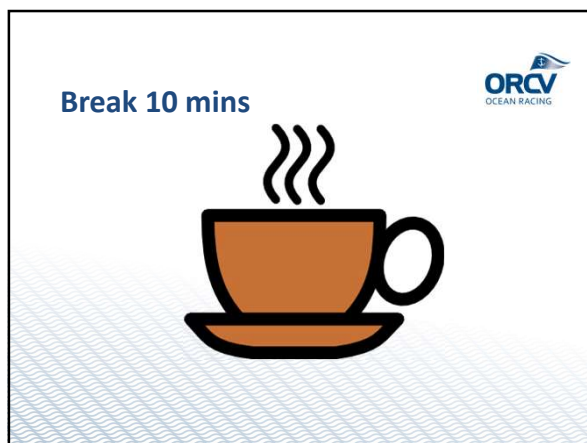
Issued at 11:02 am EST Monday 10 June 2019 (issued every 10 minutes, with the page automatically refreshed every 10 minutes)

[About weather observations](#) | [Map of weather stations](#) | [Latest weather observations for VIC](#) | [Other Formats](#)

Station Details ID: 086338 Name: MELBOURNE (OLYMPIC PARK) Lat: -37.83 Lon: 144.98 Height: 7.53 m
Data from the previous 72 hours. | See also: [Recent months at Melbourne \(Olympic Park\)](#)

Date/Time EST	Temp °C	App Temp °C	Dew Point °C	Rel Hum %	Delta T °C	Dir	Spd km/h	Gust km/h	Spd kts	Gust kts	Press QNH hPa	Press MSL hPa	Rain since 9am mm
10/11:00am	17.8	15.1	10.2	51	4.0	NNW	15	29	9	15	1011.8	1011.8	0.0
10/10:30am	16.7	13.2	10.8	68	3.2	NNW	20	32	11	17	1011.4	1011.4	0.0
10/10:00am	15.4	11.9	11.0	75	2.3	NNW	20	32	11	17	1011.8	1011.8	0.0
10/09:30am	15.1	11.1	10.3	73	2.5	NNW	22	33	12	18	1011.2	1011.2	0.0
10/09:00am	15.6	12.6	10.8	73	2.6	N	17	30	9	16	1011.2	1011.2	3.0
10/08:30am	15.5	12.7	11.3	76	2.3	N	17	28	9	15	1011.1	1011.1	3.0
10/08:00am	15.6	12.4	11.4	76	2.3	N	19	28	10	15	1010.7	1010.7	3.0
10/07:30am	15.1	12.3	11.5	79	1.9	N	17	24	9	13	1010.3	1010.3	3.0
10/07:00am	15.0	12.7	11.8	81	1.7	N	15	26	8	14	1010.4	1010.4	3.0
10/06:30am	15.0	12.4	12.0	82	1.6	N	17	28	9	15	1010.8	1010.8	3.0
10/06:00am	14.7	12.5	12.0	84	1.5	N	15	28	8	15	1011.0	1011.0	3.0
10/05:30am	15.4	12.6	11.4	77	2.1	N	17	32	9	17	1010.9	1010.9	2.6
10/05:00am	15.3	11.9	11.3	77	2.1	N	20	32	11	17	1010.9	1010.9	2.6
10/04:30am	15.3	11.1	11.1	76	2.2	N	24	39	13	21	1010.7	1010.7	2.6
10/04:00am	15.2	11.8	11.4	78	2.0	N	20	35	11	19	1010.9	1010.9	2.6
10/03:30am	15.3	11.6	11.5	78	2.0	N	22	41	12	22	1011.6	1011.6	2.6
10/03:00am	15.4	11.0	11.0	70	4.0	N	18	25	10	15	1011.4	1011.4	0.0

31



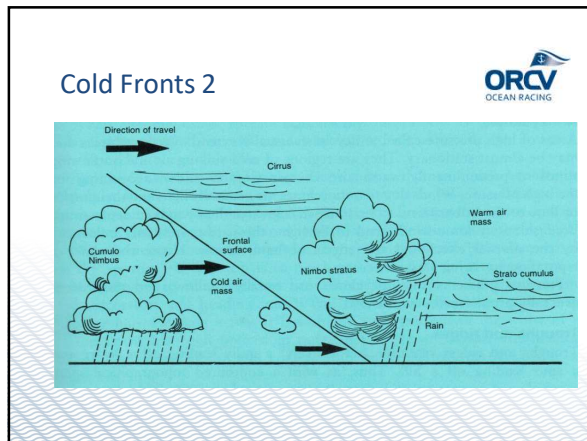
32

Cold Fronts 1

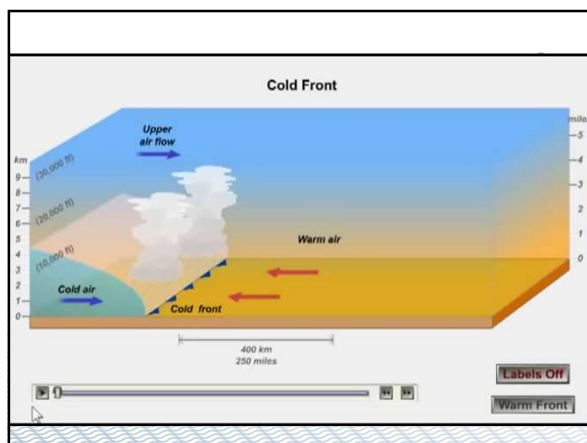
- Cold Fronts – boundary between warm and cold air masses
- Wind shifts with squalls, gust fronts, lightning
- Cold air pushes ahead forming a wedge that undercuts the less dense warmer air.
- The warmer air is forced to rise ahead of the front.
- The rising air reaches condensation level to form cloud

ORCV OCEAN RACING

33



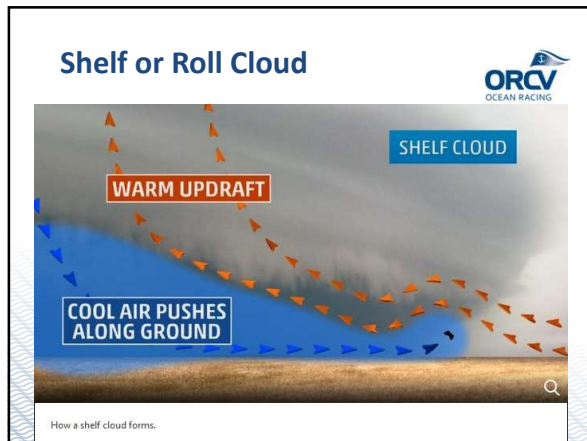
34



35



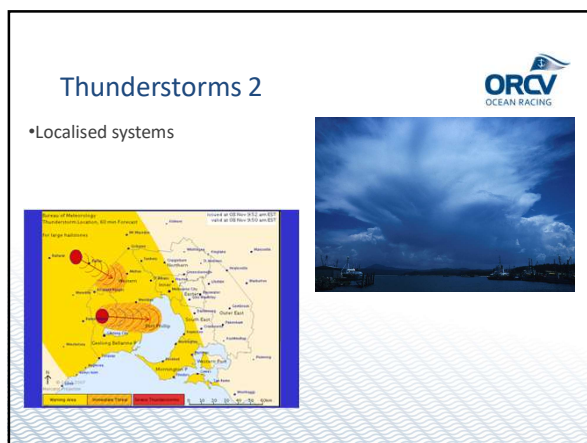
36



37



38



39

Squalls



Squalls. Sudden, sharp increase in wind. Often associated with cold fronts or thunderstorms

- Tassie Style – Feb 2014 d'Entrecasteaux Channel 60-70kn - Before and During Shots:

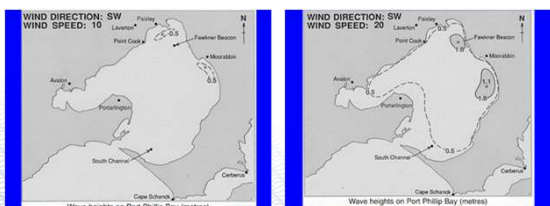


40

Weather effects on the Sea



- Fetch and wind strength
- Increasing southwesterly, fixed fetch

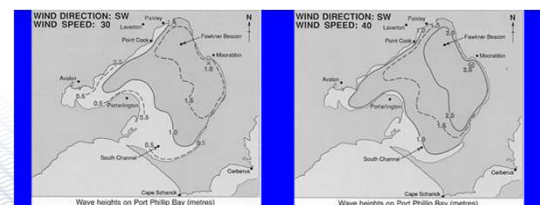


41

Fetch and Wind Strength



- Southwesterly example 30 -40 kn



42


Fetch and Wind Strength



- Northwesterly (extreme) example – Mornington April 2008
- Short Video <https://www.youtube.com/watch?v=7Ccl7W-5-pk>






43





44

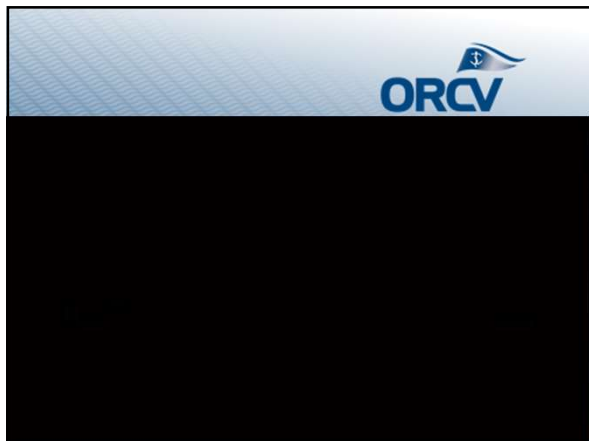
Wind over Tide Effects - PPB



- Southern PPB - Port Phillip Heads – strong ebb flow against south quadrant winds/waves.
- **Video**  Fez's First Week - YouTube.flv
- 1m 14s
- Northern PPB - Yarra Exit – River outflow and/or outgoing tide against south quadrant winds

45



46

Warnings

Strong wind 26 – 33 knots

Gale 34 – 47 knots

Storm force wind 48 – 63 knots

Hurricane warning 64 knots or more

Wind speed is the mean average taken over 10 minutes.

Gusts can be up to 40% stronger than forecast wind speed!

47

Beaufort Scale

- Admiral Beaufort RN
- 1830's - Pre-wind instruments – Based on Sea and Land effects
- Internationally Understood
- RYA p20
- Note Beaufort storm force is different to BOM Storm warning 48-63 kts

BEAUFORT SCALE WIND FORCE	DESCRIPTION	WIND SPEED IN KNOTS
1	Light air, ripples forming	1-3
2	Light breeze, small ripples	4-6
3	Breeze, small waves, high to low	7-10
4	Moderate breeze, white foam	11-16
5	Fresh breeze, moderate waves	17-21
6	Strong breeze, large waves, white foam	22-27
7	Near gale, very large waves, white foam	28-33
8	Gale, moderately high waves, breaking white foam	34-40
9	Severe gale, high waves, crests breaking white foam	41-47
10	Storm, very high waves with long breaking crests	48-55


REMARKS: This scale was devised for large sailing vessels and sea figures only refers to an AVERAGE speed, the gusts will up into the next force can be expected at times.


48

Clouds – Signs of the Sky

Why Study Clouds?

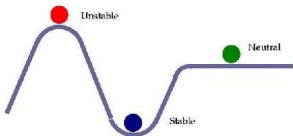
- Clouds are indicators of vertical motion
- Used to understand current and future winds and weather (local and regional)









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ATMOSPHERIC STABILITY

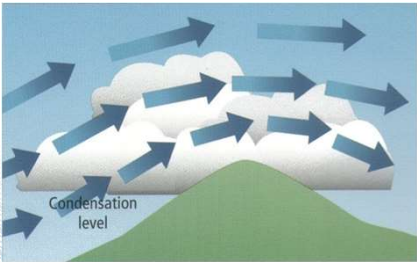





 <p>Unstable $T_{\text{parcel}} > T_{\text{air}}$ Parcel is lighter and moves up.</p>	 <p>Stable $T_{\text{parcel}} < T_{\text{air}}$ Parcel is heavier and moves down.</p>	 <p>Neutral $T_{\text{parcel}} = T_{\text{air}}$ Parcel stays put.</p>
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50

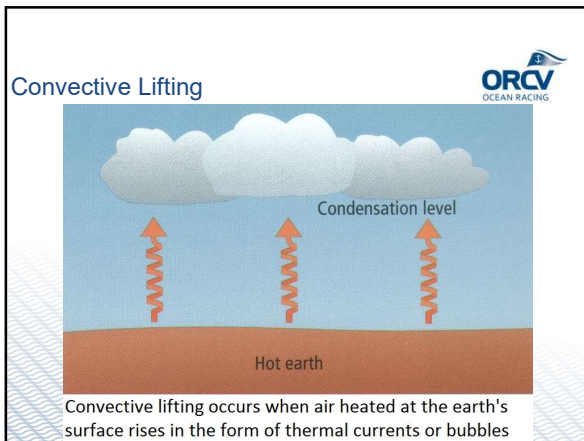
Orographic Lifting



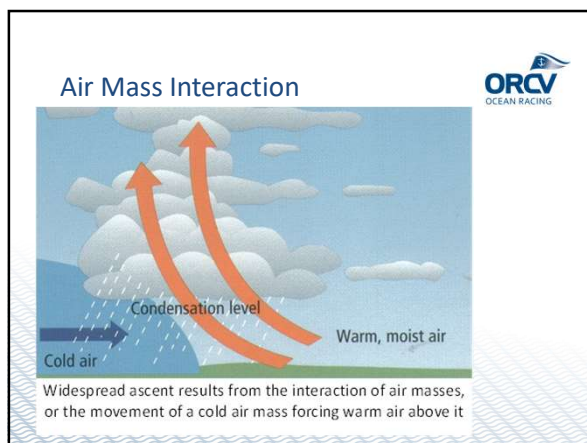
Orographic lifting occurs when air is forced upwards by a barrier of mountains or hills



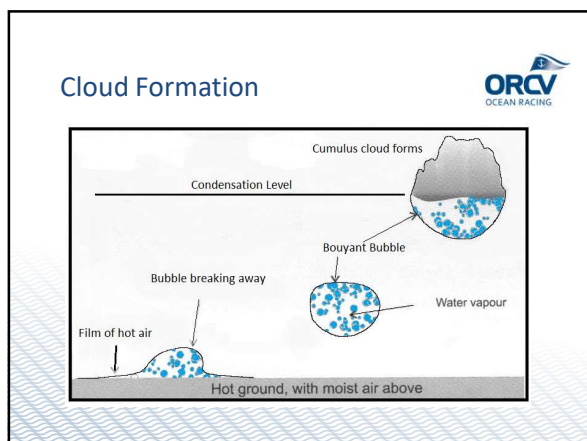
51



52



53



54

Air Turbulence Effects

Mechanical or frictional turbulence occurs when airflow is broken into a series of eddies as it moves over uneven surfaces

55

Cloud Types

Clouds are commonly grouped into physical categories that can be up to five in number:

- Cirriform
- Cumuliform
- Cumulonimbiform
- Stratocumuliform
- Stratiform.

These designations distinguish a cloud's physical structure and process of formation.

56

Cloud Types

Some low-level clouds

Lumpy

Cumulus

Lumpy and layered

Stratocumulus

Layered

Fog / stratus

Cumulonimbus

57

Cloud Types

ORCV
OCEAN RACING

Some mid-level clouds

Lumpy

Altostratus

Altostratus

Cumulonimbus

Layered

Altostratus

Altostratus

High

6km

Middle

2.5km

Low

Image from Wikimedia

58

Cloud Types

ORCV
OCEAN RACING

Some high-level clouds

Lumpy

Cirrocumulus

Cumulonimbus

Layered

Cirrostratus

Hair-like

Cirrus

High

6km

Middle

2.5km

Low

Image from Wikimedia

59

Clouds

ORCV
OCEAN RACING

Cirrocumulus

Cirrostratus

Cirrus

Cumulus

Cumulus (fair weather)

Cumulus

Cumulonimbus

Clouds with vertical development

Veil

(Anvil head)

Earth's surface

60

Cloud Features



What to look for with clouds:

- The base indicates the condensation level
- A flat top indicates an inversion layer or stability aloft
- Sloping cumulus is an indication of wind aloft
- Lenticular cloud indicates stability and wave form

61

Lenticular Clouds

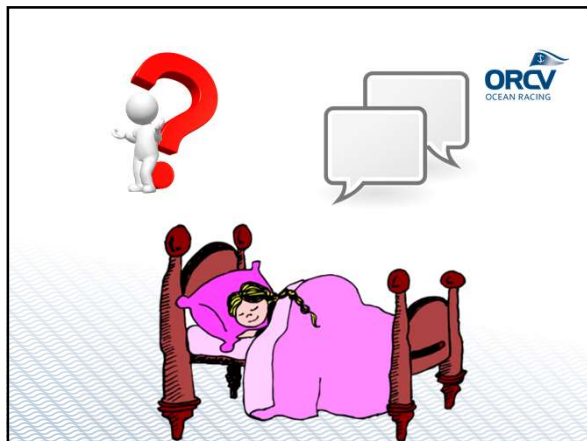


Lenticular clouds over the Derwent River before severe bushfires



Lenticular cloud over Port Phillip sea

62



63

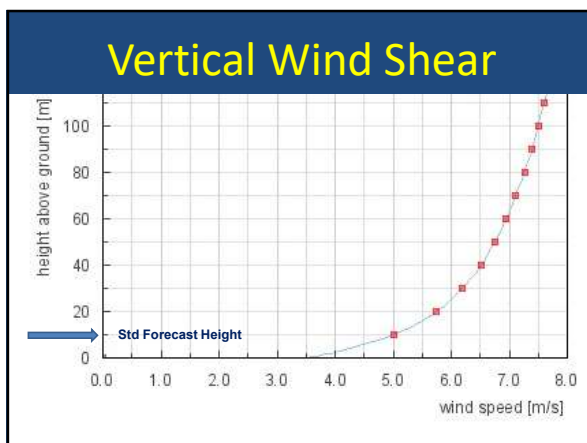


Weather Course

Module 1:-Session 3

Enclosed Waters

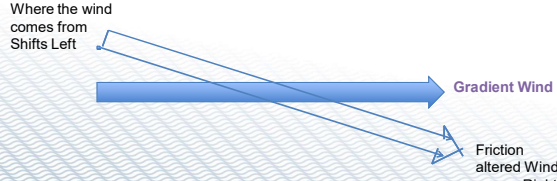
1



2

Frame of Reference

Consider effects as to where the altered wind is blowing towards. In the diagram below the modified W wind becomes a WNW. The effect of slowing a wind causes it to shift to right looking ahead (SH). Be sure to watch for the frame of reference in texts.



Where the wind comes from Shifts Left

Gradient Wind

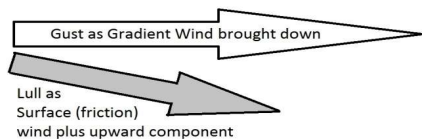
Friction altered Wind moves Right

3

Gusts and Lulls



- Surface wind over land maybe $\frac{1}{3}$ to $\frac{1}{2}$ of that aloft, $\frac{2}{3}$ of that over sea
- Coriolis turns slowed wind clockwise or 'veers' in southern hemisphere



4

Gusts and Lulls - Stability



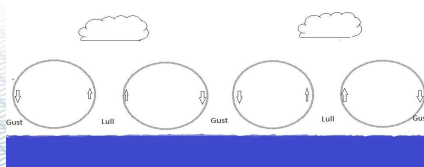
- Stability (and Instability) – vertical motion in atmosphere
- Stable air is often cool, dense
- Unstable air often warm, rising. Contact with a warm surface promotes mixing and instability
- Often stable in early morning until solar heating causes air parcels to rise and cause turbulence
- Observing the situation as stable or unstable assists in determining sailing conditions
- Cloud Formation and Type are Indicators

5

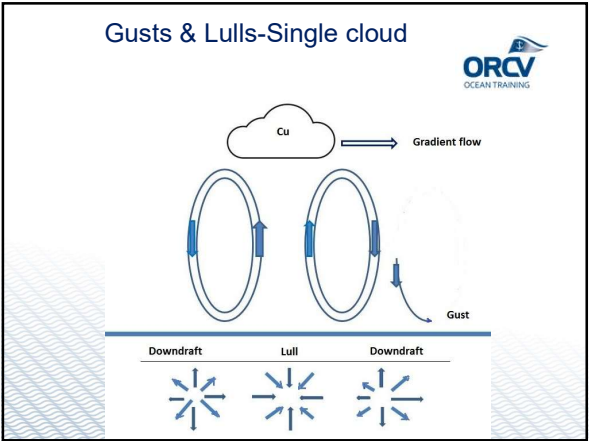
Gusts and Lulls



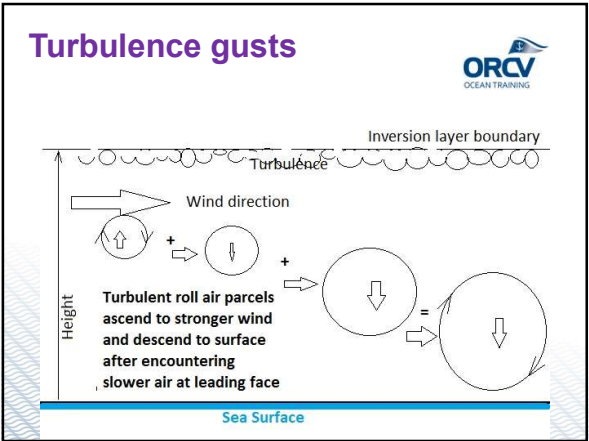
Patterns of cumulus cloud appear as turbulence increases
 Rising air also has a downdraft of cooler air to replace it.
 Downdraft brings down gradient wind as a gust
 Rising air with surface friction leaves a lull



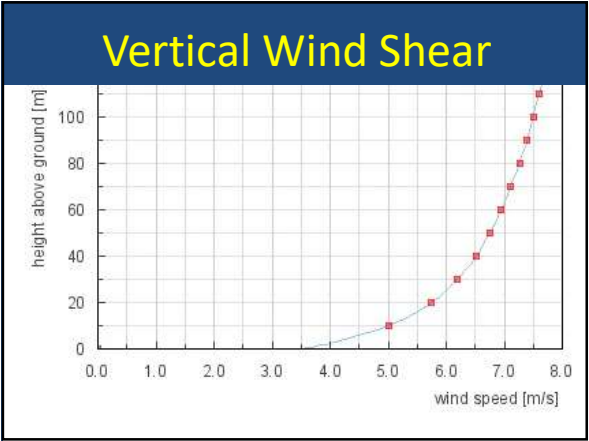
6



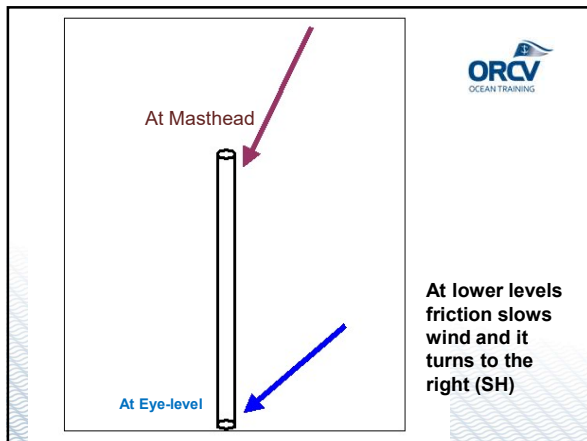
7



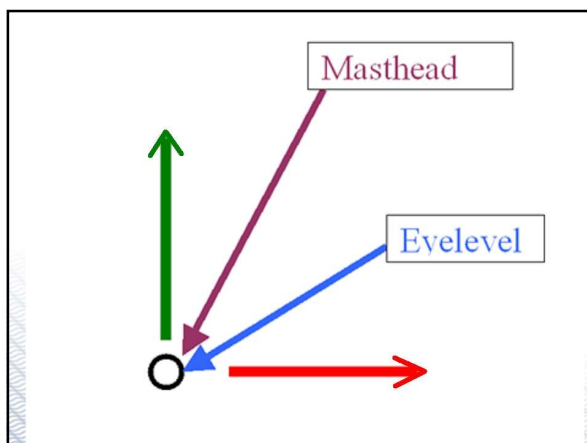
8



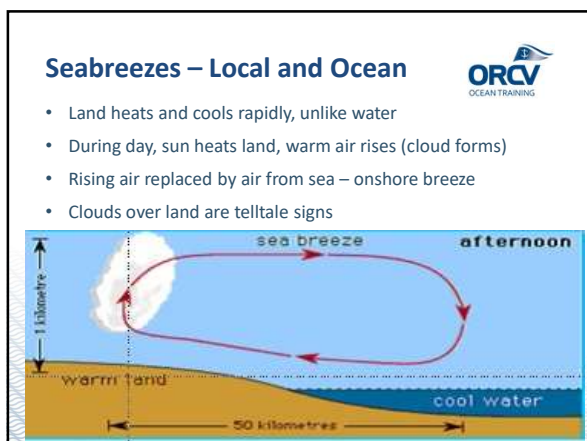
9



10



11



12

Local Seabreeze



- Often observed autumn and early winter on Port Phillip Bay
- Occurs in light conditions – no gradient wind – and low solar levels
- Small temperature differences, air rises around shore

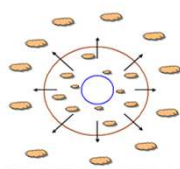


13

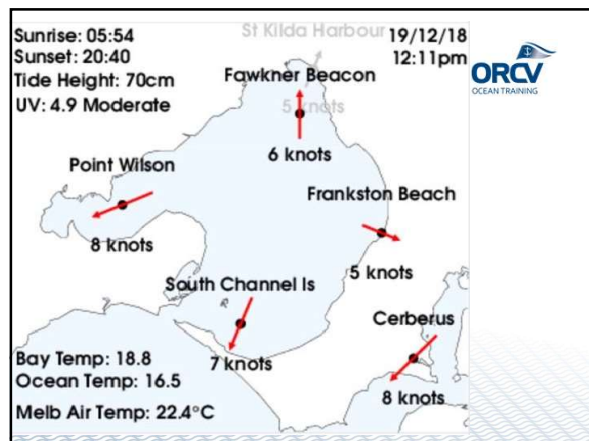
Local Seabreeze



- Breeze commences at right angles to shore, with sink towards northern Port Phillip Bay
- Forms by about 1030-11am, less than 10 knots
- By 330-4pm, solar levels insufficient and dissipates



14



15

Lake Breezes



Very Dependant on Surrounding Topography
Wind shadows and lee effects, fetch

Strong cool air subsidence overnight and early morning minimizes winds before mid-day unless Gradient Wind is strong.

Sea breeze similar to local bay sea breeze

Consider obstructions, valleys and funnelling.
Local knowledge important.

16

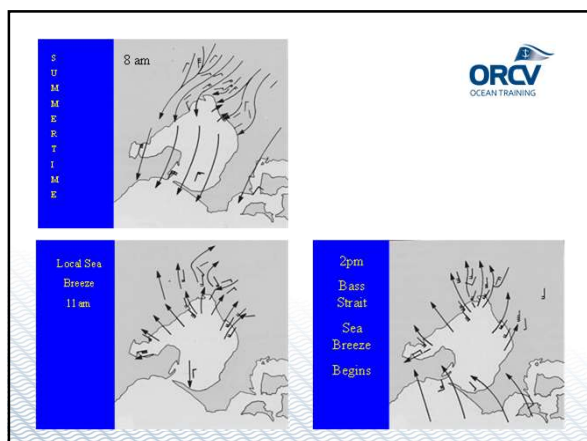
Ocean Seabreeze



- Common in summer, up to ~23 kn S-SE, starts to fade after 5 pm, shifts east as land continues to cool




17




18




5pm
 Bass Strait
 Sea Breeze
 Pushes
 North



8pm
 Land is
 Cooling
 Sea Breeze
 Dies and
 Shifts East

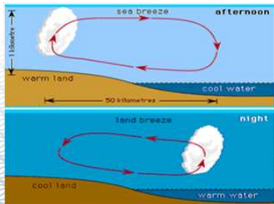


19




Land Breeze

- Similar process to seabreeze but in reverse
- Land loses heat into night sky unless cloud cover 'blanket'
- By ~ 1am, land has cooled, sea is warmer, enough for air to rise and offshore land breeze can occur




20



Land Breeze

- Starts close to shore (~1nm) and gradually moves outwards. Fades by ~9am
- Cold air – vegetation/smoke smell, sound travels well –old saying “go in until you hear the dogs barking”



(Check the chart depth)

21

Katabatic (Downslope) Winds



- Wind from cold dense air that runs downhill
- The home of katabatic winds – Antarctica – extreme example

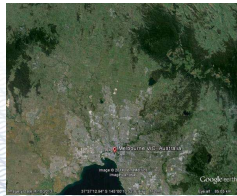


22

Katabatic Winds



- Yarra River valley, Derwent River/Channel valleys are local inshore examples
- Light gradient winds, at night, cloudless, hilly/mountainous
- Air is colder and denser at height and 'slides' downhill
- Starts about 1 am close to Shore, finish by 9am
- Eg Yarra Valley
- Inland lakes in hilly/-
- Or mountain areas



23

Katabatic-Bridgewater Jerry

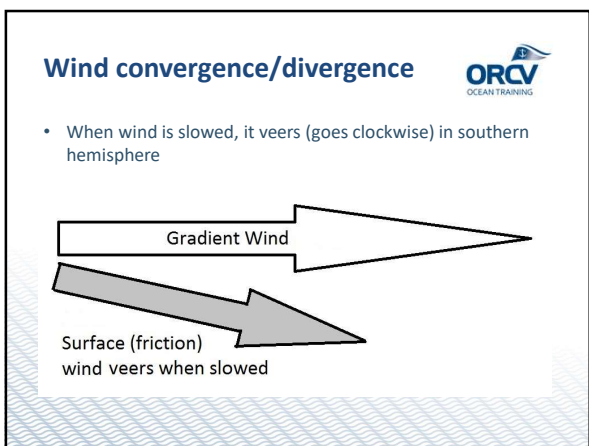


24

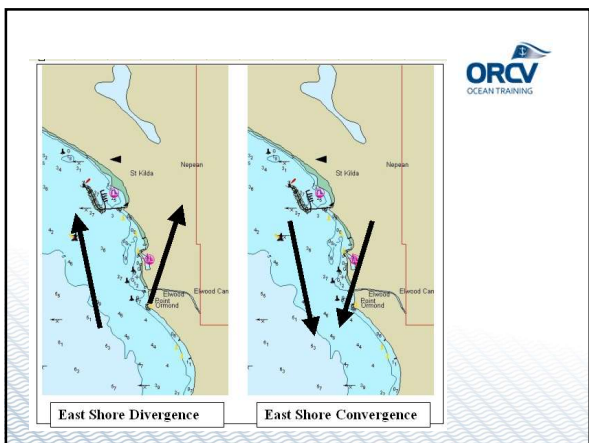
9



28

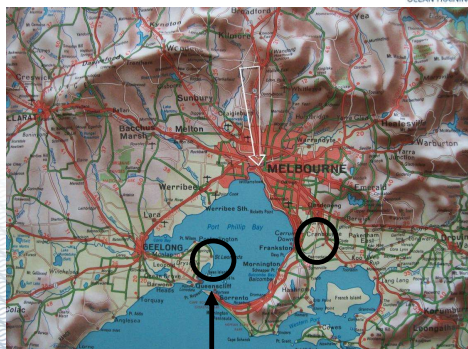


29



30

What happens here?



31

Questionnaire poll



- Most common sailing situation is proceeding north past Prince George or southerly along eastern shore in a sea-breeze (southerly wind).
- What happens to the breeze at?
- 1- Prince George
- 2- Carrum

32


Poll Choices




- 1-PG (a) Veers and freshens
- (b) Veers and softens
- (c) Backs and freshens
- (d) Backs and softens
- 2. Carrum (a) Veers and freshens
- (b) Veers and softens
- (c) Backs and freshens
- (d) Backs and softens

33

Break 10 mins




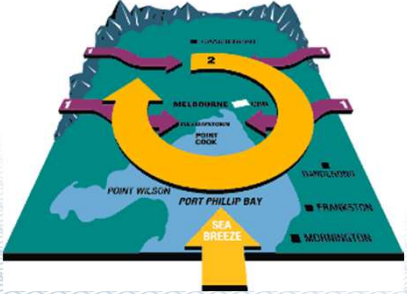


34

Spillane Eddy


Local to Port Phillip Bay





35

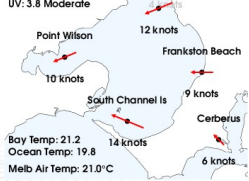
Bay Observations



- Wind on the Water
- Clouds
- Smokestacks
- Other Boats under sail/anchor
- BoM Station Obs, Bay winds

Sunrise: 07:37
Sunset: 19:09
Tide Height: 25cm
UV: 3.8 Moderate

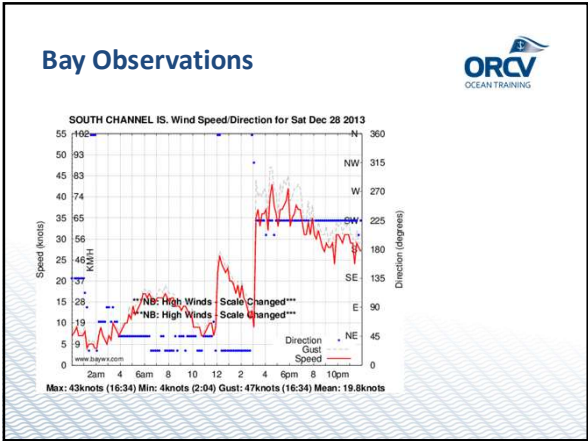
St Kilda Harbour 05/04/14
Fawkner Beacon 12:25pm



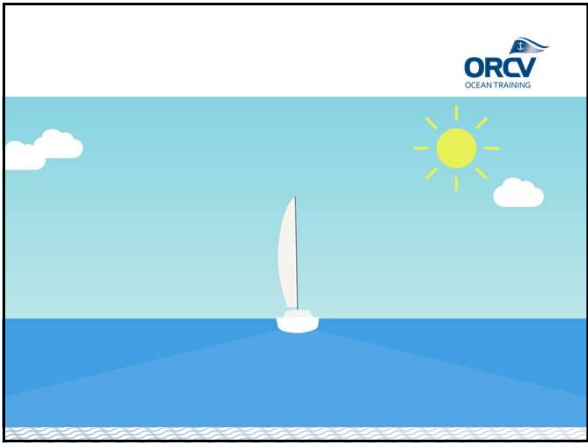
Bay Temp: 21.2
Ocean Temp: 19.8
Melb Air Temp: 21.0°C

www.bom.gov.au/vic/observations/melbournemap.shtml

36



37



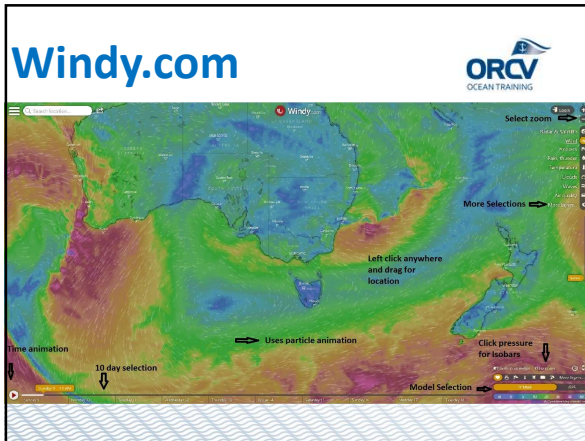
38

Predict Wind Offer

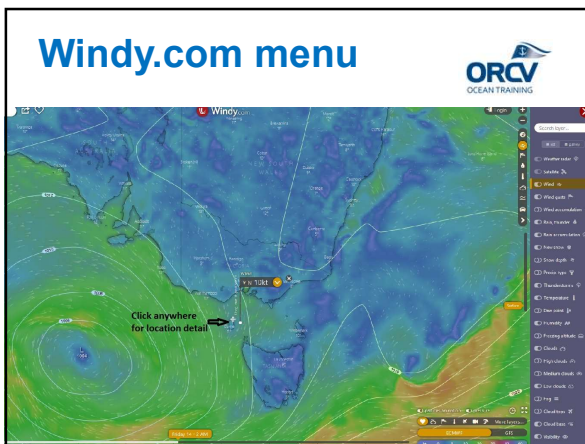


- All participants in this course can receive a free 3 months trial!

39



40



41

Bay Tides and Currents

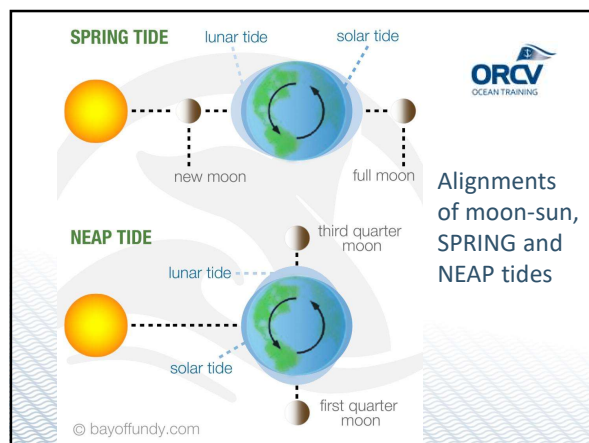
- What are Tides?
- Main forces that cause tides
 - Gravitational pull of moon & sun
 - Earth's rotation
- What are Currents?
- Depth can influence speed of Current
- Waves form on ocean at varying heights
 - Current, depth & coastline shape determine power of waves

42

What causes Tides?



43



44

Bay Tides and Currents



- Tide tables and graphs show the variations in tide, often with a lag time
- Semidiurnal - 2 High & 2 Low per day
- Diurnal - 1 High & 1 Low per day
- The bigger the range the stronger the currents

MELBOURNE (WILLIAMSTOWN)
LAT 37° 52' LONG 144° 55' TIME ZONE +1000
TIMES AND HEIGHTS OF HIGH AND LOW WATERS
MARCH - 2014

Time m	Time m	Time m	Time m
1 0217 0.76	9 0220 0.30	17 2325 0.78	25 0028 0.43
1 0813 0.41	0920 0.05	18 0448 0.32	26 0820 0.38
SA 1349 0.81	1442 0.20	MO 1243 0.77	TV 1923 0.20
2 0354 0.32	2111 0.02	13 0213 0.32	27 0230 0.34
3 0519 0.81	0207 0.38	MO 0400 0.60	28 0854 0.68
4 0638 0.34	0940 0.06	18 0300 0.26	29 0654 0.68
5 1012 0.83	1628 0.21	19 0410 0.61	30 0921 0.71
6 1204 0.23	MO 2158 0.62	TU 2254 0.33	31 2217 0.82
7 0454 0.64	0209 0.42	19 0413 0.62	0400 0.44
8 0536 0.27	TU 0919 0.02	20 1107 0.25	27 0654 0.64
9 1020 0.86	1609 0.22	WE 1712 0.82	28 1044 0.34
10 1258 0.25	2247 0.79	TH 2331 0.34	29 0654 0.61
11 0447 0.67	0417 0.45	FR 0504 0.65	30 0914 0.43
12 1125 0.22	1004 0.78	11 1145 0.23	28 1104 0.81
13 1215 0.89	1652 0.25	12 1752 0.88	FR 1750 0.27
14 0244 0.27	2344 0.77	13 0006 0.36	29 0022 0.80
15 0528 0.89	0551 0.48	21 0536 0.86	30 0532 0.40
16 0609 0.39	1159 0.73	22 0223 0.21	SA 1228 0.30
17 1050 0.80	1751 0.26	23 0432 0.69	31 0608 0.81
18 0205 0.29	14 0048 0.78	24 0541 0.38	30 0130 0.81
19 0207 0.16	0653 0.46	25 0410 0.68	0700 0.24
20 1320 0.18	FR 1359 0.76	SA 1302 0.20	SU 1359 0.82
21 1653 0.91	1904 0.24	26 0414 0.50	2026 0.33
22 0305 0.32	0151 0.71	23 0415 0.69	31 0233 0.83
23 0446 0.91	0802 0.42	24 0445 0.88	0701 0.28
24 1330 0.18	SA 1329 0.70	SU 1342 0.20	MO 1614 0.86
25 1409 0.16	1940 0.20	25 0446 0.88	31 0233 0.83
26 0207 0.88	0201 0.31	26 0446 0.88	31 0233 0.83
27 0443 0.34	0243 0.71	27 0443 0.34	31 0233 0.83
28 0524 0.84	0940 0.38	28 0443 0.34	31 0233 0.83
29 1409 0.16	SU 1445 0.73	29 0443 0.34	31 0233 0.83
30 0207 0.88	2127 0.24	30 0443 0.34	31 0233 0.83

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National Tide Centre
Add one hour to the times when Daylight Saving Time is in force

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Bay Tides and Currents



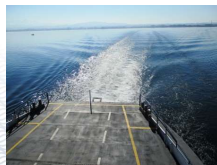
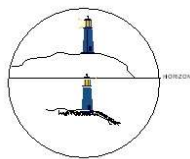
- Why is Tide Direction and Speed important?
- How can we tell on a Yacht what the tide direction and strength is?

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Check for Tide!



- Check drift with a transit
- GPS against speed and course
- Drift of floating object in
- Or angle of vessel wake



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Estuaries and Bays



- In the Southern Hemisphere mid-latitudes-
- Coriolis at work, but watch for land effects.
- Face the direction of tidal flow
- Stream will tend to be on your left
- Bends in narrow channels will favour currents to outside radius of bends, shallows increase flow rates.
- Tide turns first at shallows or edges.

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Bay Tides – Northern Port Phillip Bay

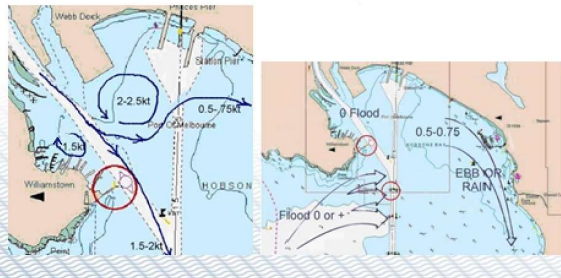


- Strong wind influence – northerlies/southerlies – water 'heaped up'
- Yarra outflow influence – heavy rain



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Bay Tides – Northern Port Phillip Bay



50

Bay Tides – Port Phillip Bay



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Bay Tides – Southern Port Phillip Bay



- Tides at Port Phillip Heads
- Difference between tidal heights and tidal streams (momentum)
- Slack water is not at change of tidal height at the Heads, rather ~3 hours after change - corresponds roughly to Low/High water in north of Bay (Williamstown)

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Bay Tides – Southern Port Phillip Bay



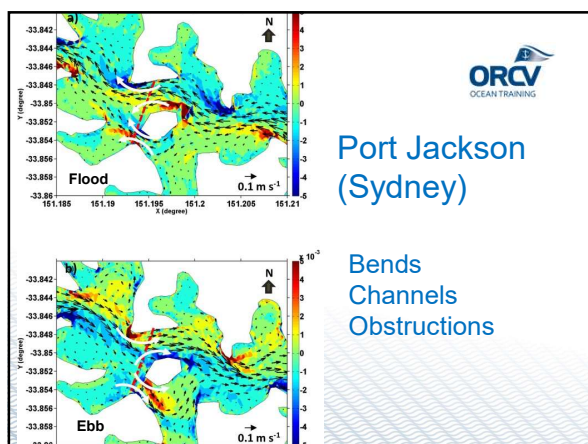
- South Channel, West Channel
- 2 knots flood or ebb maximum
- Varies as tidal range and rule of twelfths
- Dissipates quickly at Hovell to North
- Dissipates very quickly at West Channel Pile
- To Geelong-1.5kts max @ Pt Henry

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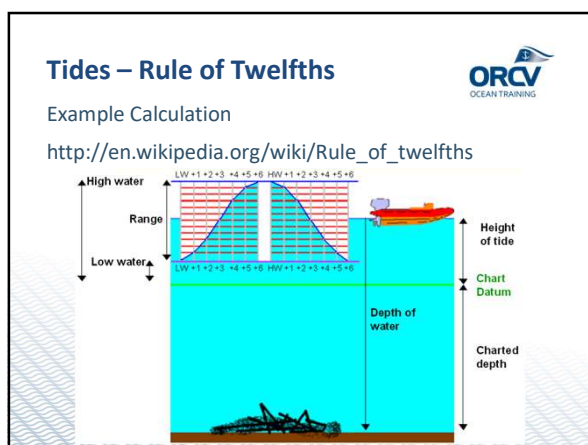
Westernport Bay



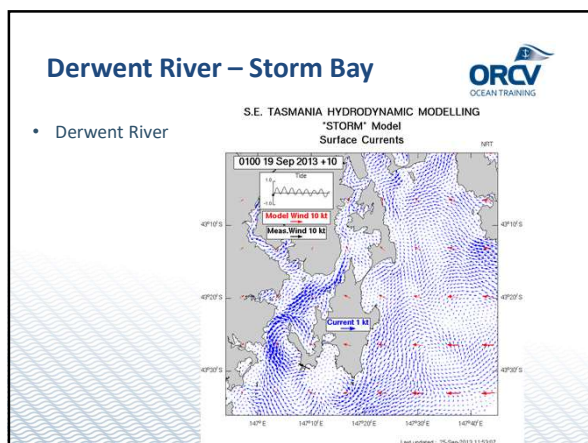
54



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Technology to Consider



Demonstration in Module 2 Coastal

- Predictwind
- BoM
- Tidetech
- Baywind
- Weatherzone
- What you get from the internet vs. what you don't get

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Race Director Segment



- Considerations:
- All of the above! In particular:
 - Forecasts and live data on baywide observations
 - On-water observations – smoke plumes, other boats
- When to start planning

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Thank you



ORCV Volunteer Project Team members who developed this course

- Tony Duckmanton, CFA
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- Andrew Roberts
- Neville Rose
- Ray Shaw
- Martin Vaughan



- Australian Bureau of Meteorology
- Kenn Batt, Senior Forecaster
 - Others noted in Reference Material



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- Jon Bilger, PredictWind**
www.predictwind.com
- Bob Houghton, Corporate Printers (South Melbourne) Pty Ltd**
www.corporateprinters.com.au
- Nick White, Expedition Navigation and yacht racing solutions**
www.expeditionmarine.com






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Upcoming events


Date	Event

Keep an eye on our website www.orcv.org.au for more details

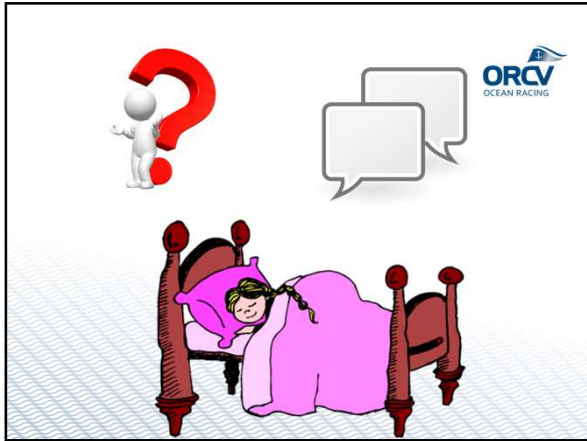


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Wrap up and feedback



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