Session 2C

Weather at Sea

Session 2C

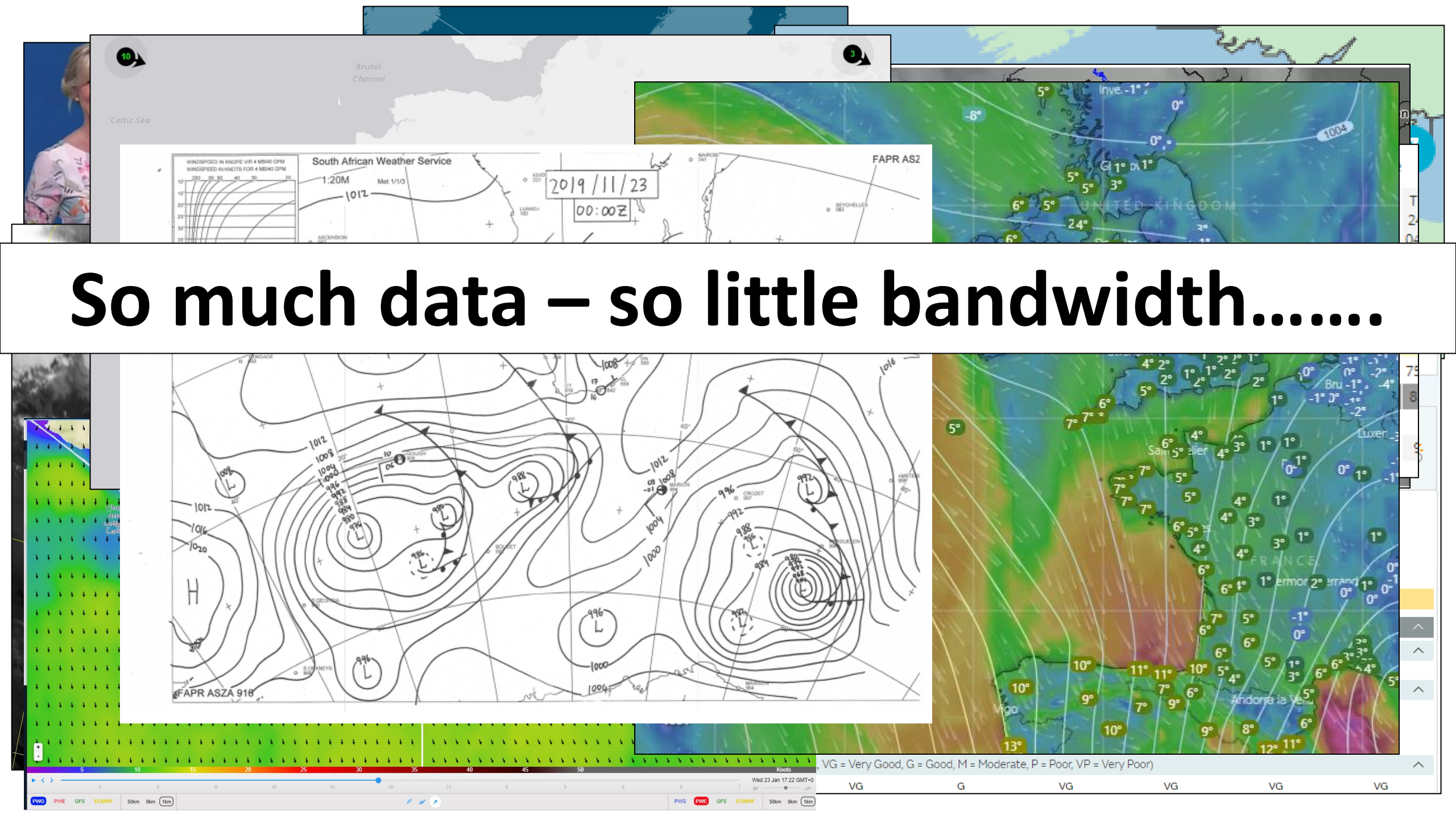
Weather at Sea

Chair: Magda Makowska

Speaker: Simon Rowell

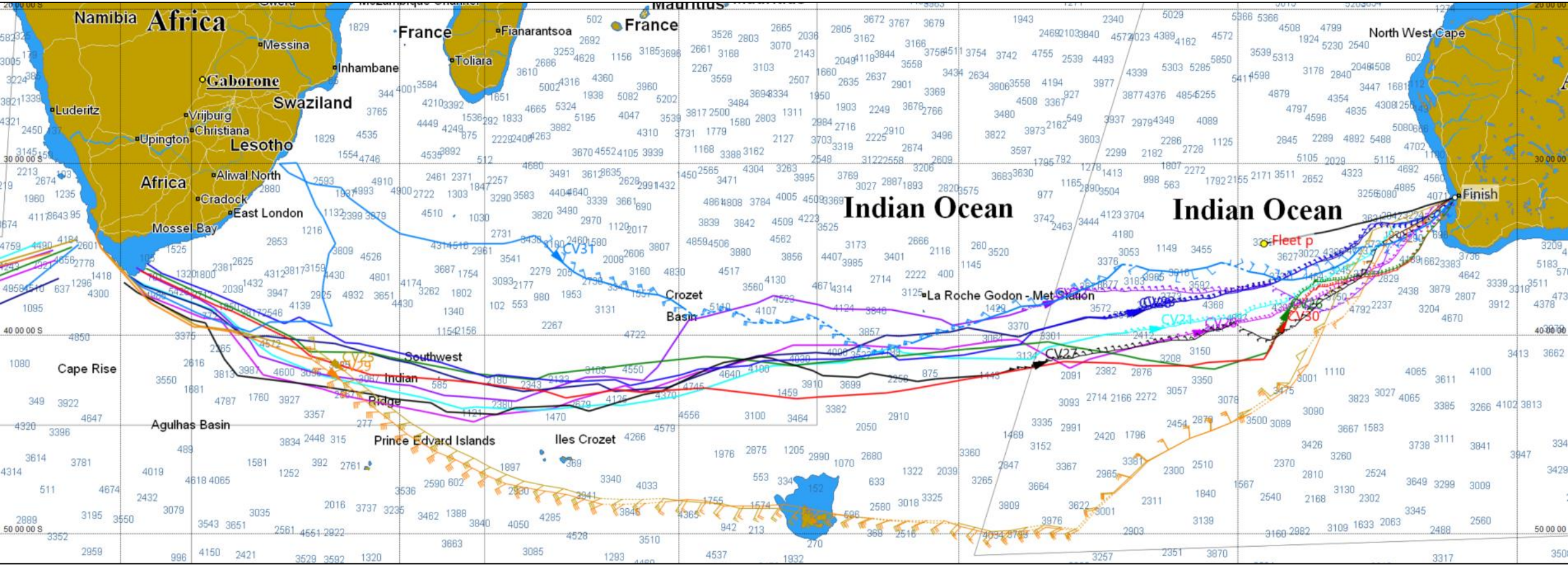
Forecasting from Ocean scale to Sub-Grid

Simon Rowell Meng MSc



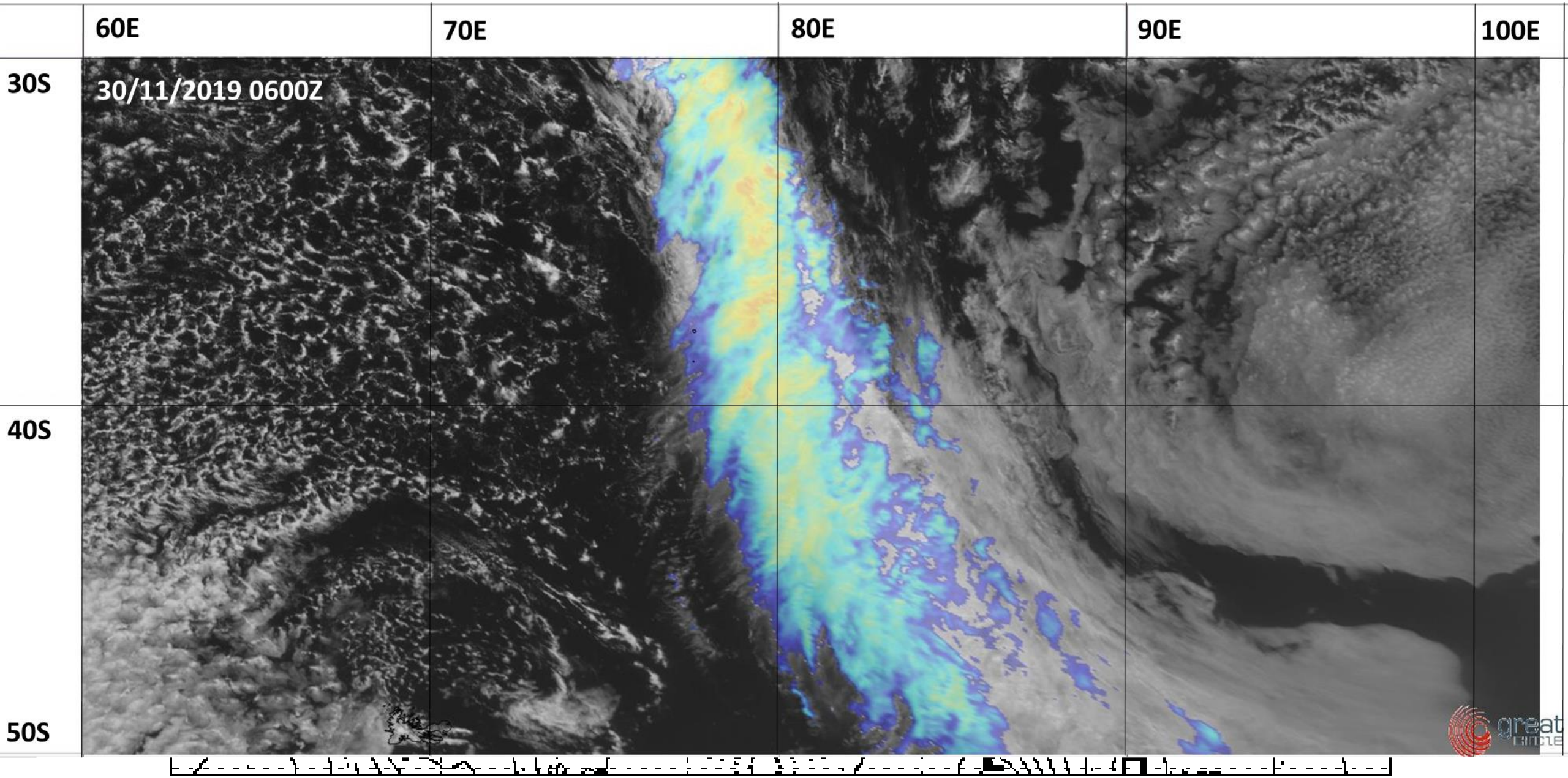
So much data – so little bandwidth……

The Clipper Race – currently sailing towards Fremantle

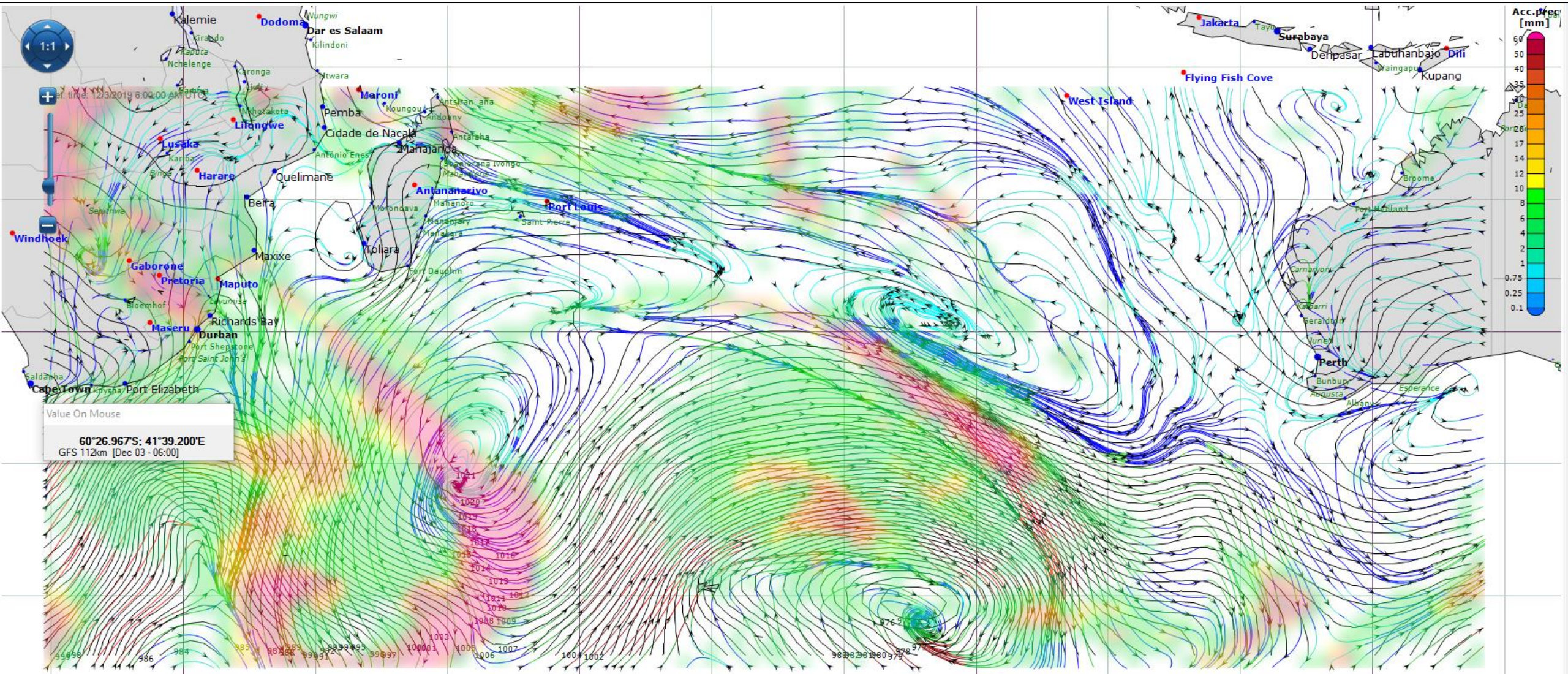


Positions as of 0600 UTC on Tuesday 3rd, with predicted routing onwards

Start with the Big Picture – ideally charts & satellite images

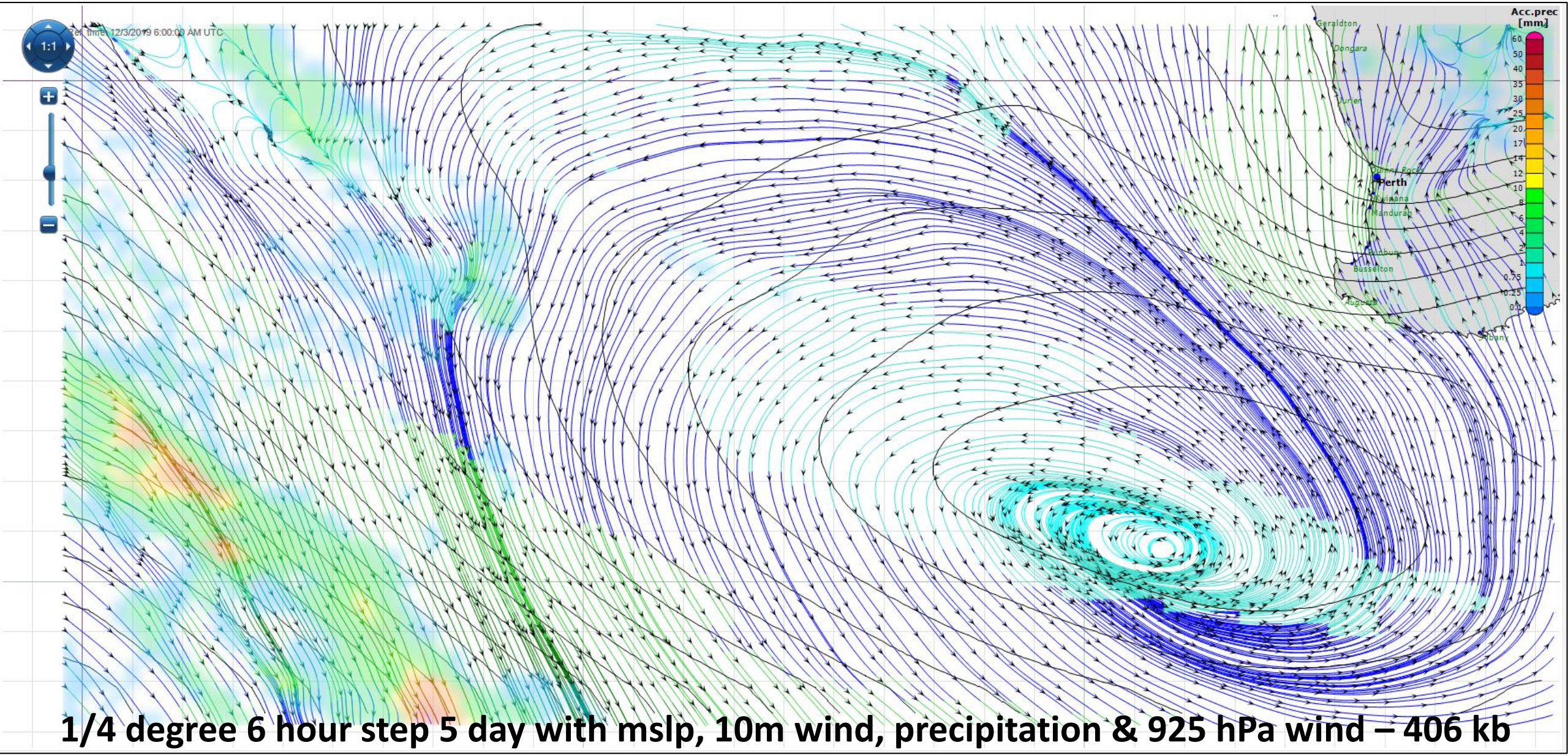


Start with the Big Picture – can you do it cheaply with GRIBs?



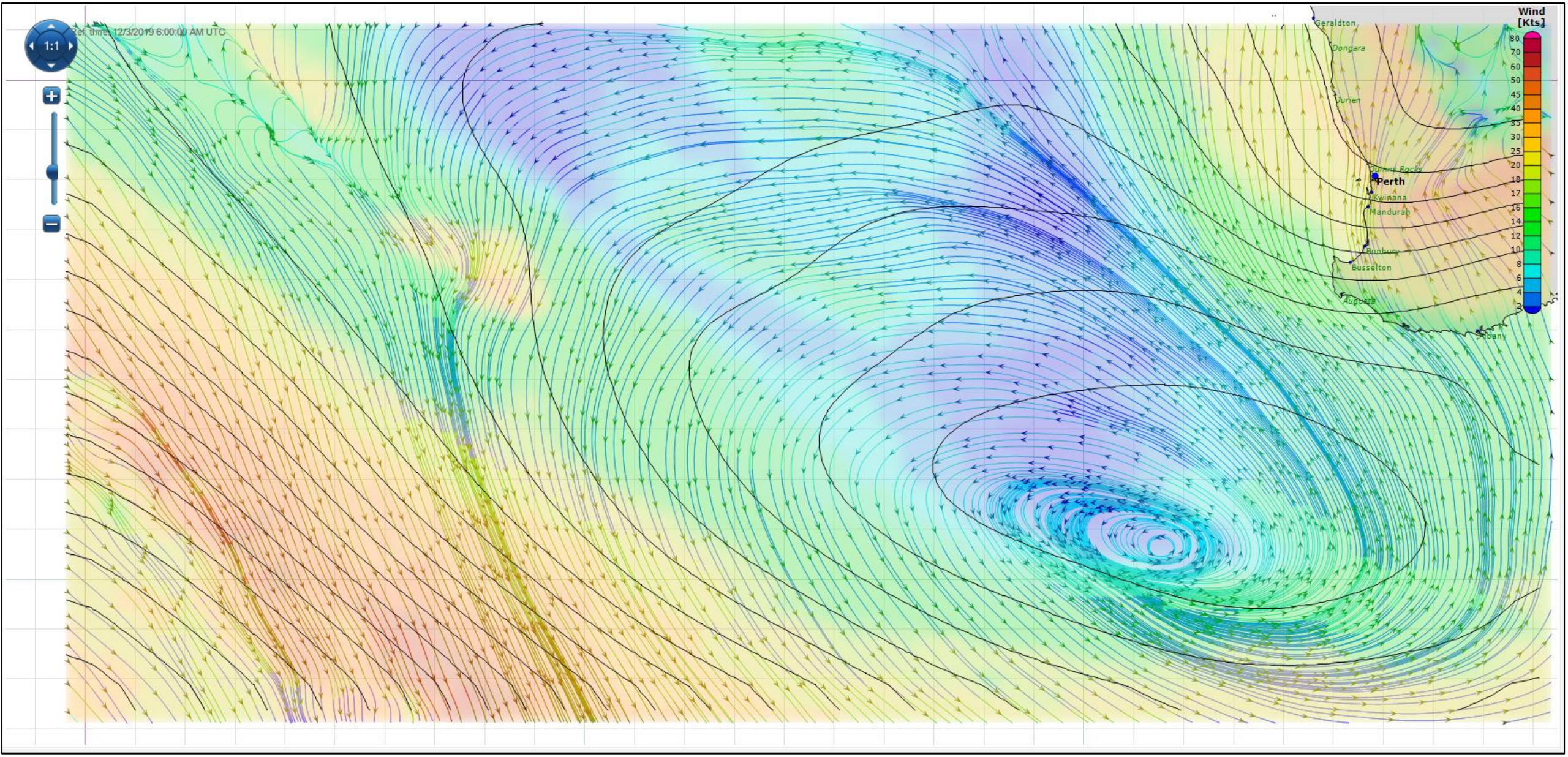
1 degree 24 hour step 7 day with mslp, 10m wind, precipitation & 925 hPa wind – 120 kb

Then use higher resolution for the next few days

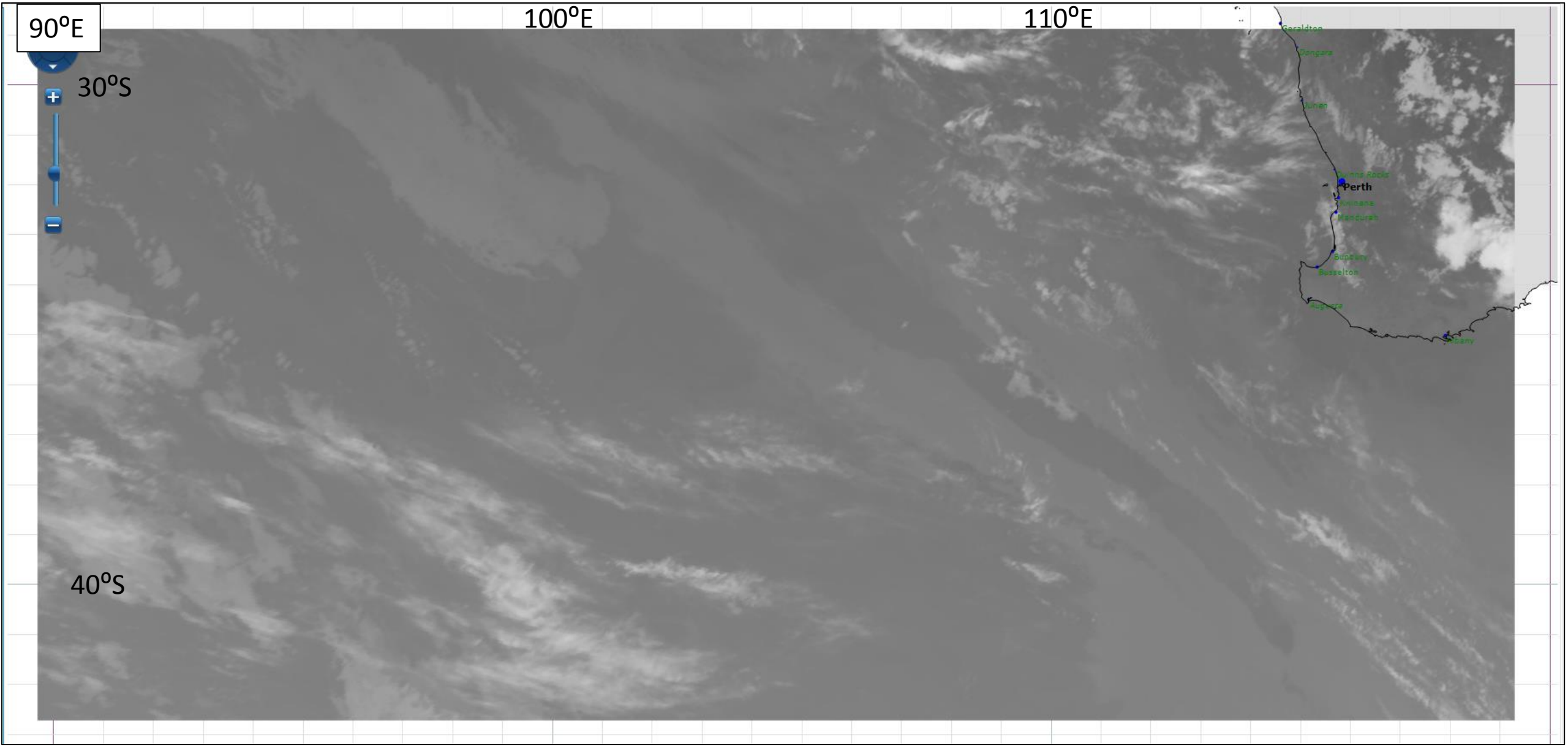


1/4 degree 6 hour step 5 day with mslp, 10m wind, precipitation & 925 hPa wind – 406 kb

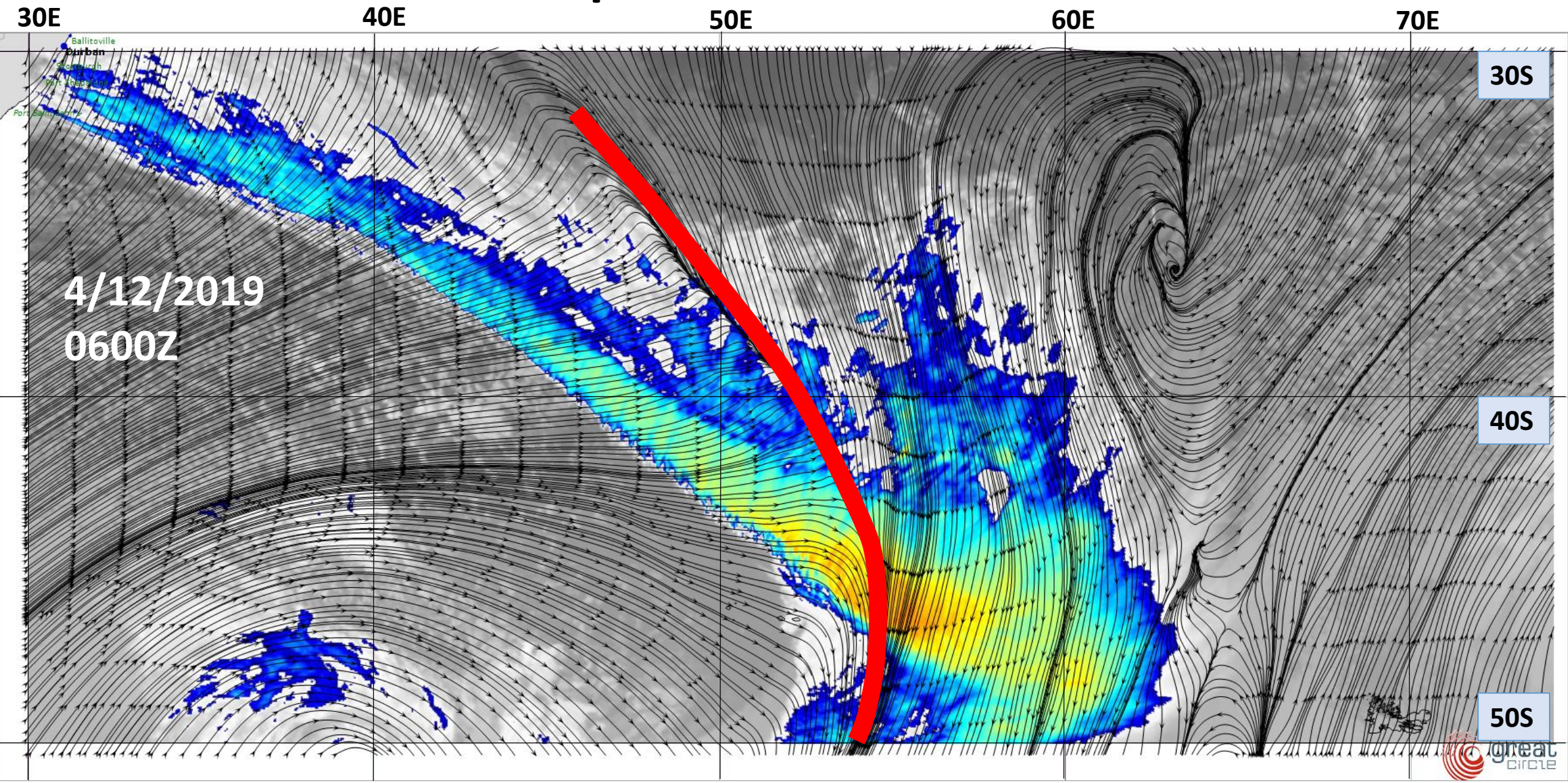
925 hPa winds for gust speed

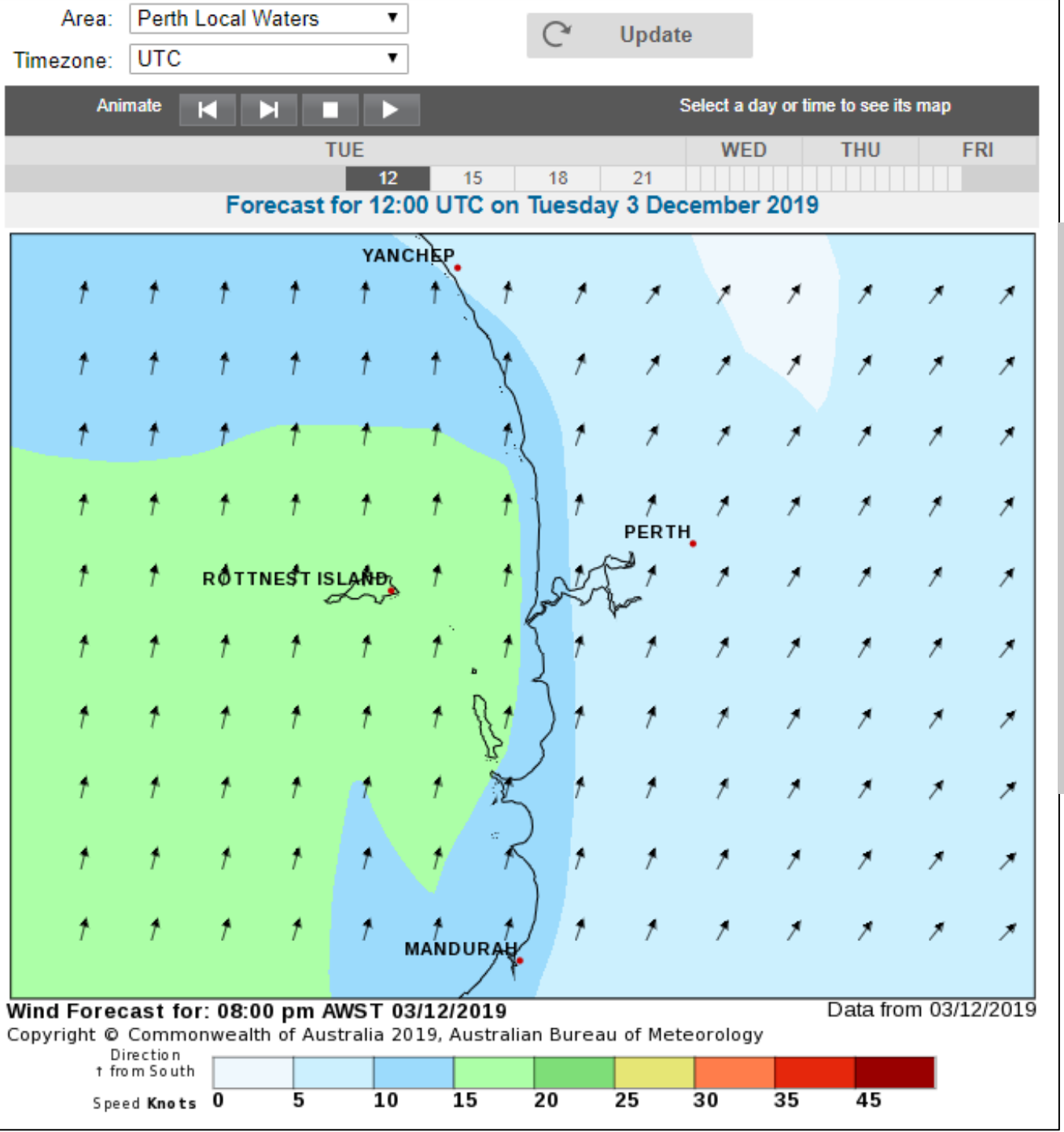


Local Satellite Image – 100 kB



Compare GRIBs to Actual



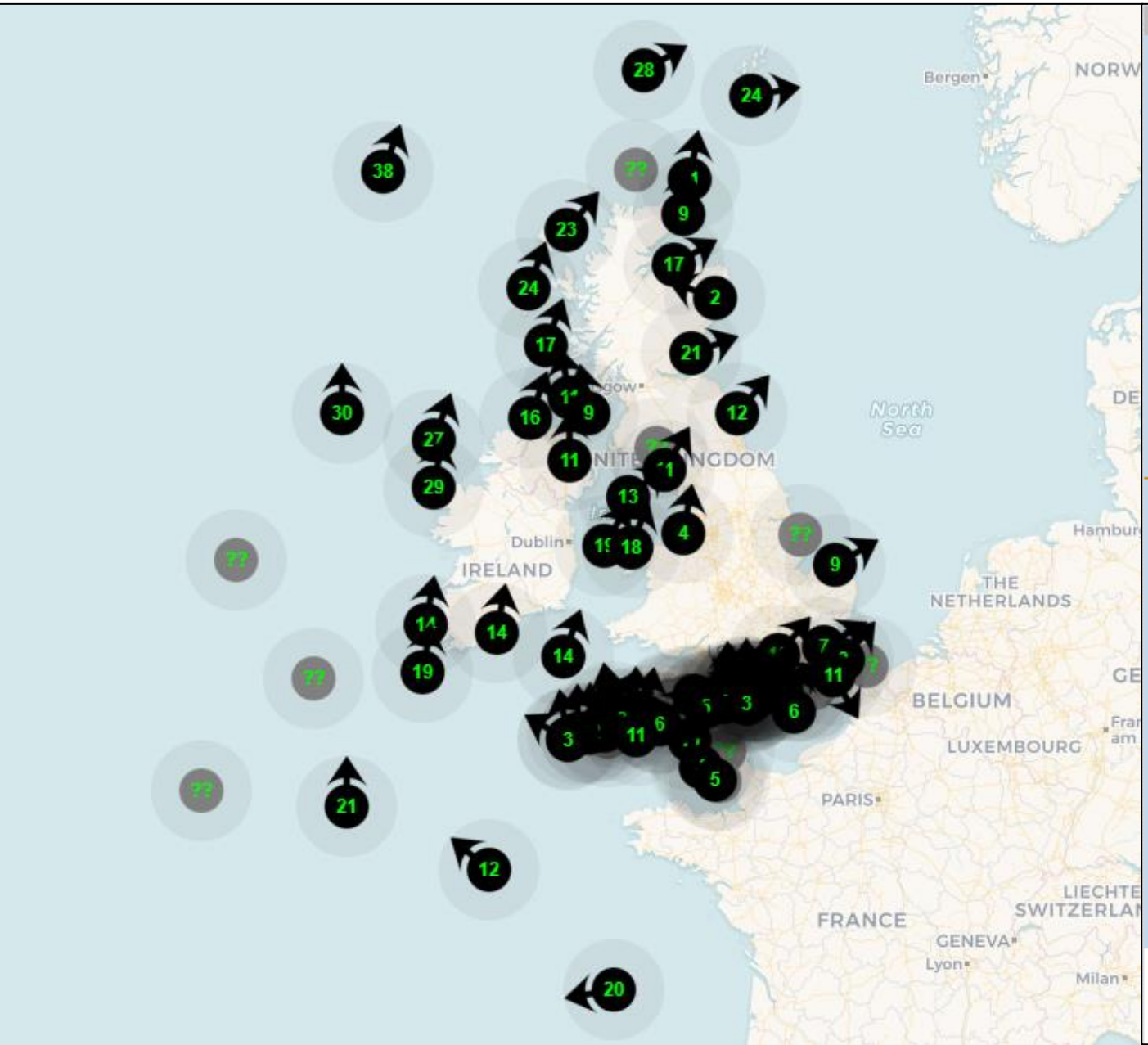


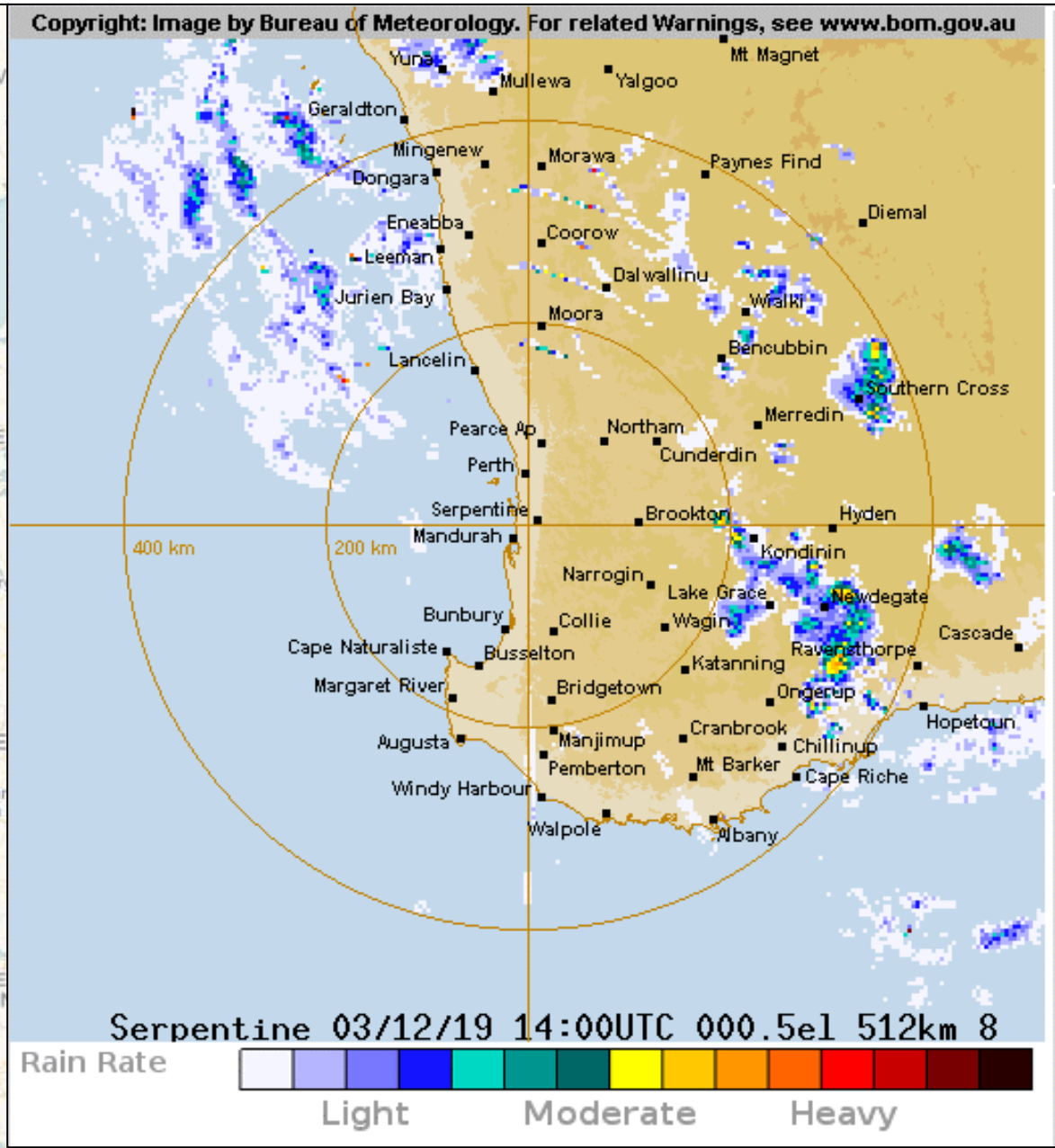
Higher Resolution as you get inshore

ABoM ACCESS model, approx. 4 km resolution around Perth.

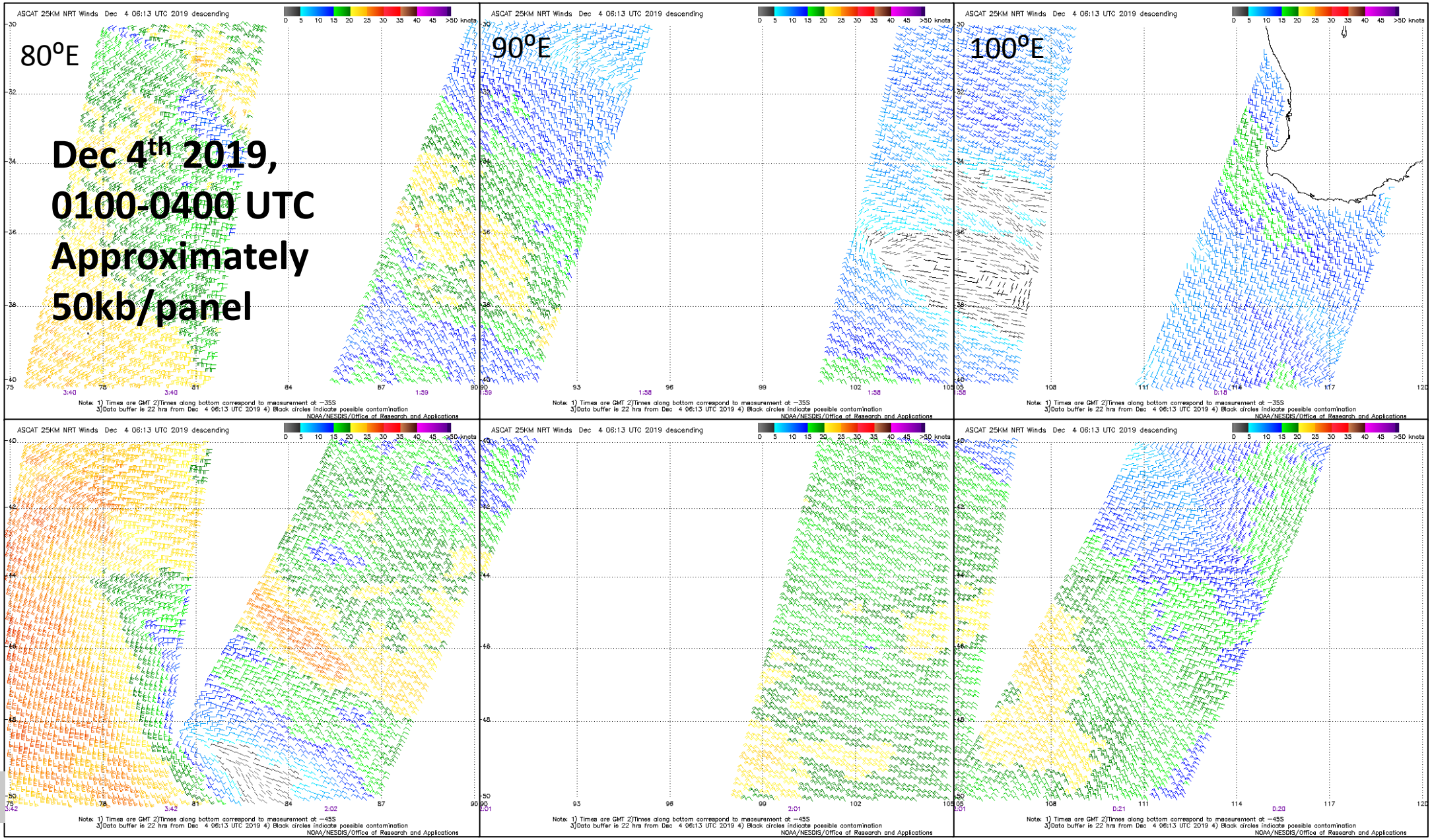
Only 24-36 hours ahead though.

Fill it in with as much Observation Detail as you can



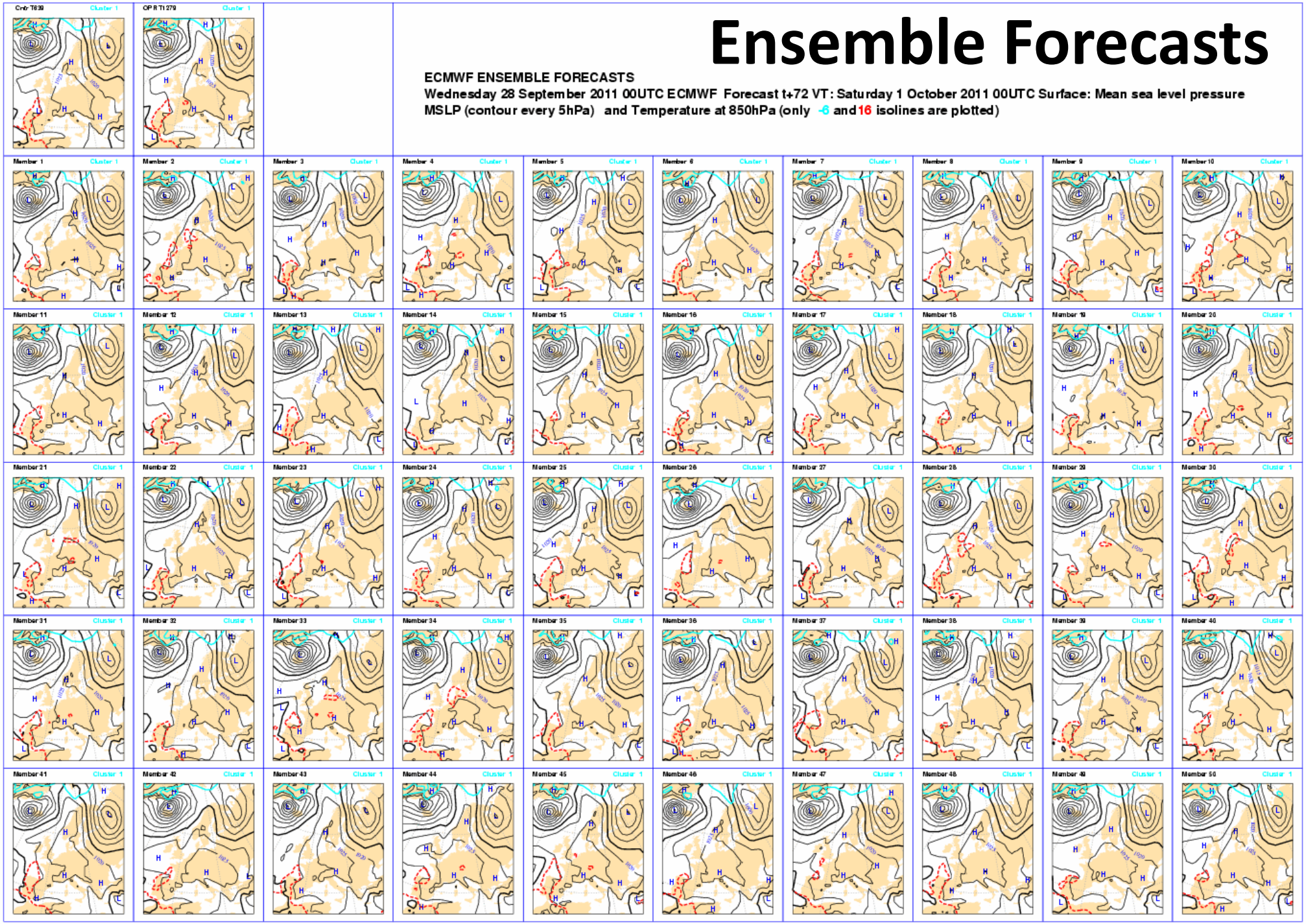


What about when you're mid-ocean? ASCAT scatterometer data

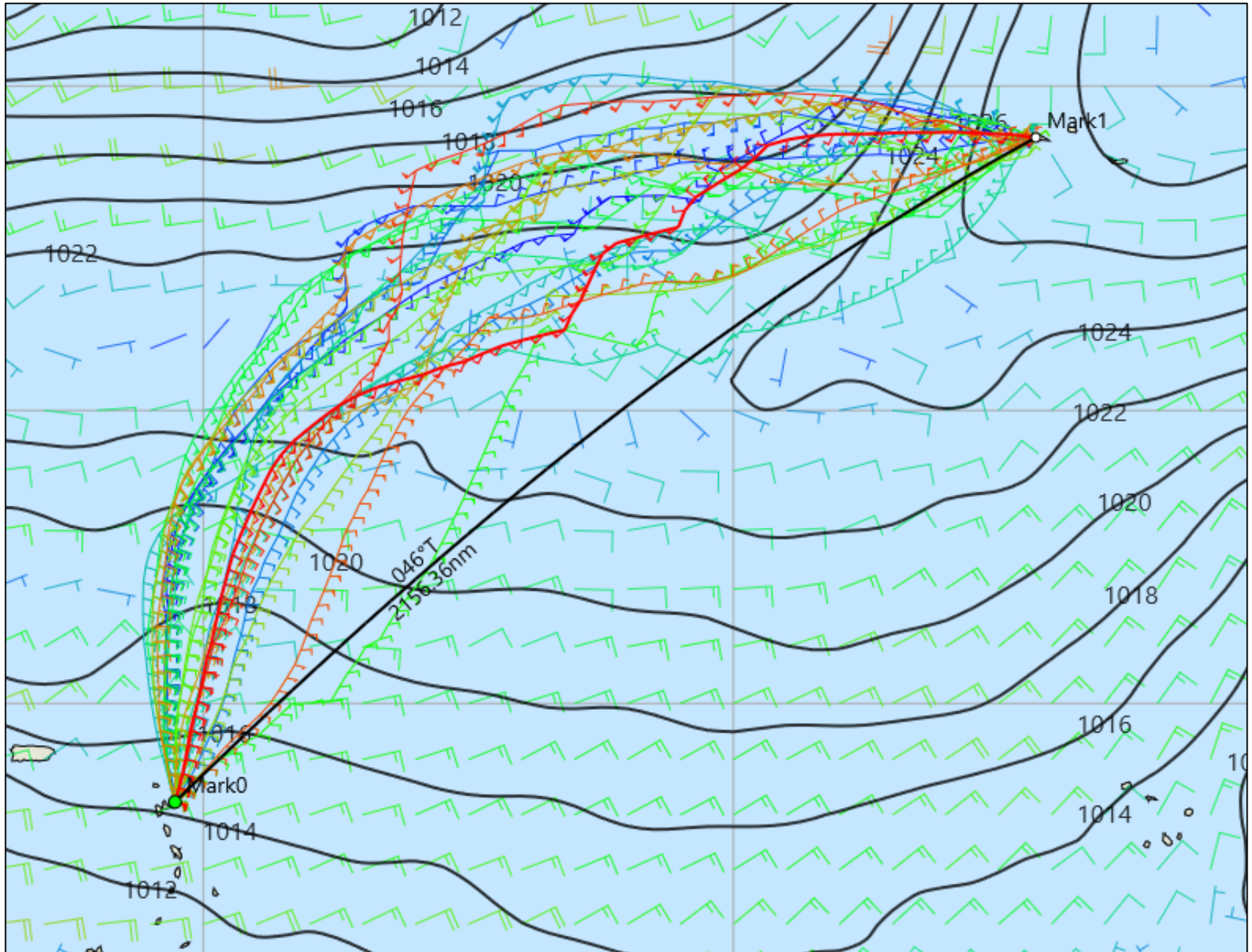


Ensemble Forecasts

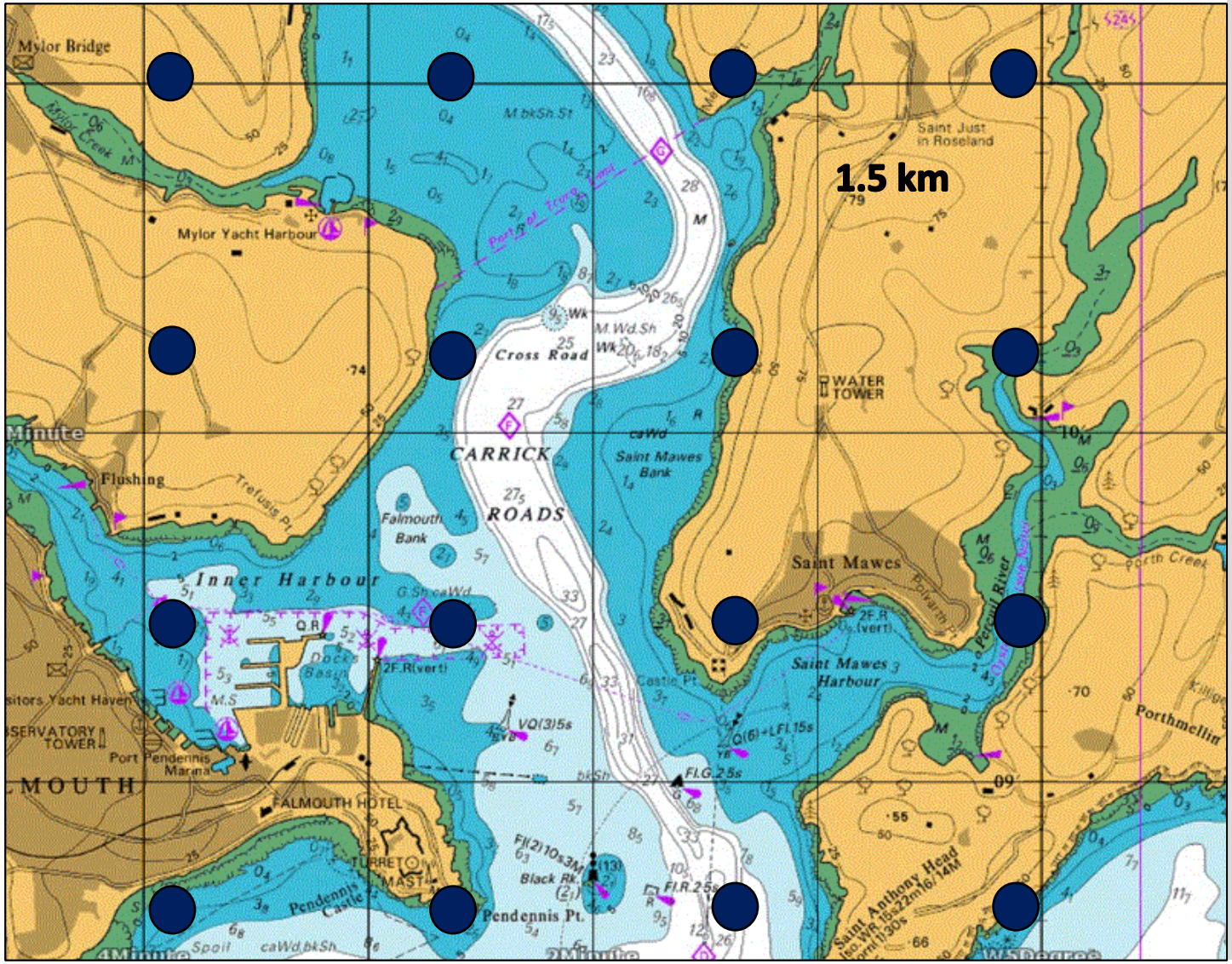
ECMWF ENSEMBLE FORECASTS
Wednesday 28 September 2011 00UTC ECMWF Forecast t+72 VT: Saturday 1 October 2011 00UTC Surface: Mean sea level pressure
MSLP (contour every 5hPa) and Temperature at 850hPa (only -6 and 16 isolines are plotted)



Ensemble Forecasts for pre-departure planning



What's the Model Resolution?

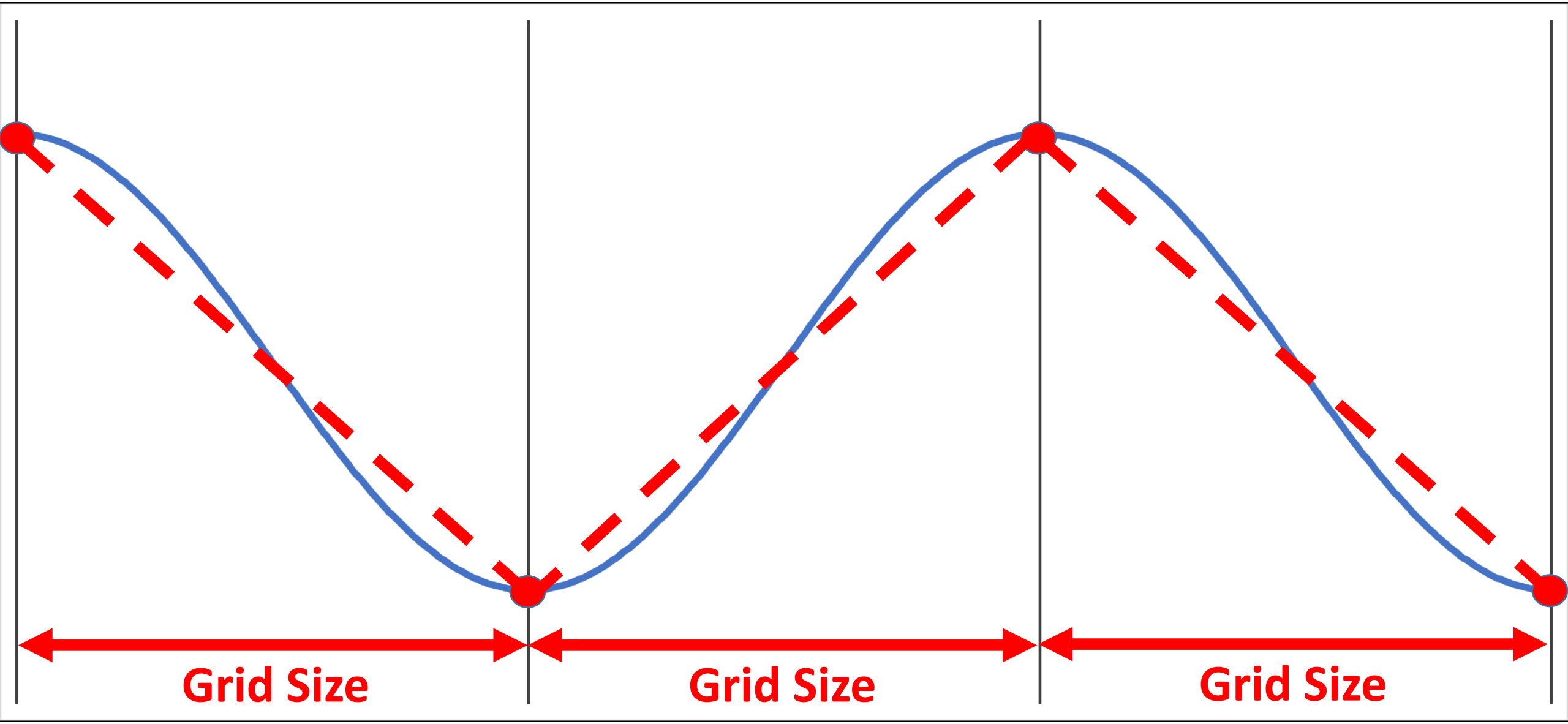


GFS – ¼ degree output. The global model has a 13 km grid

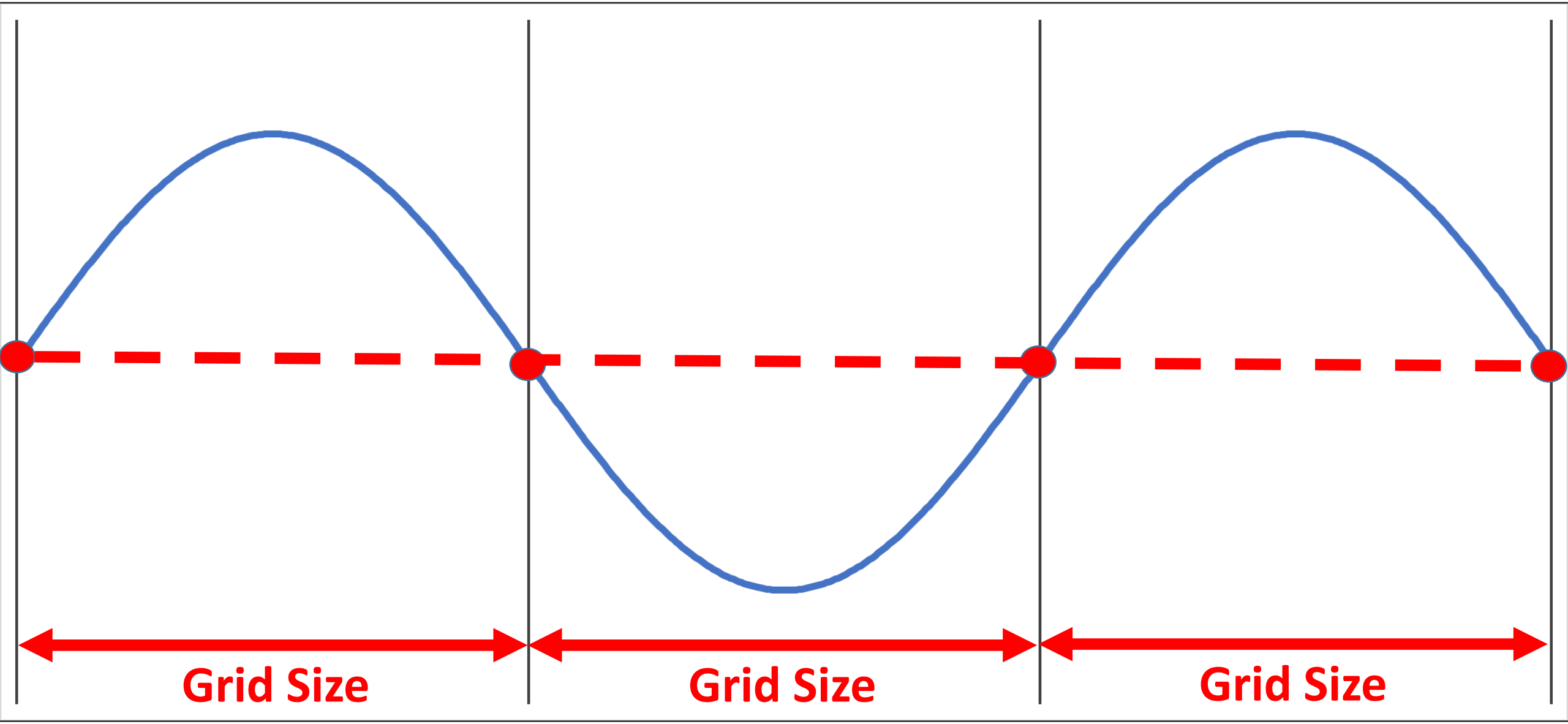
ECMWF has a 9 km global grid

Met Office has a 10 km global grid, 1.5 km over & around the UK

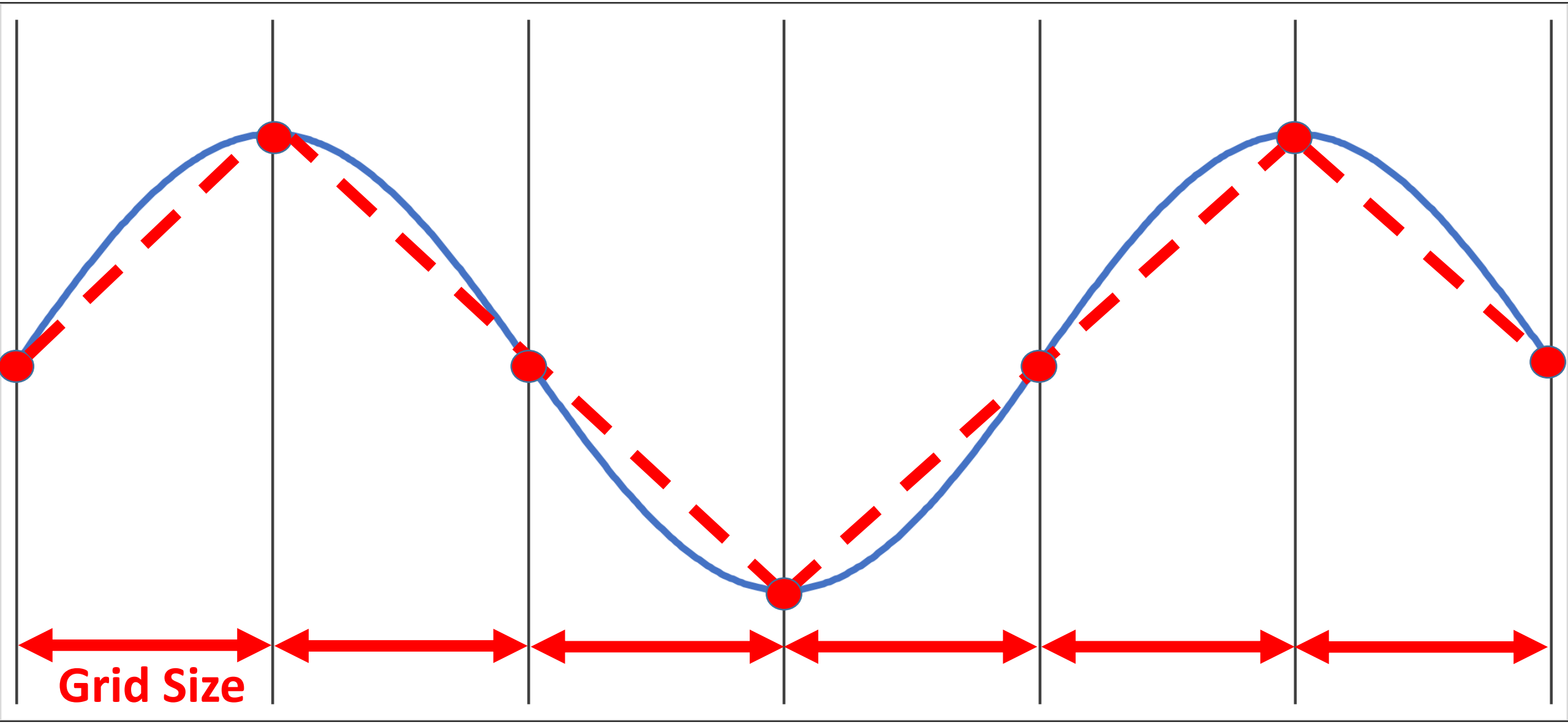
Why do we care about the Model Resolution?



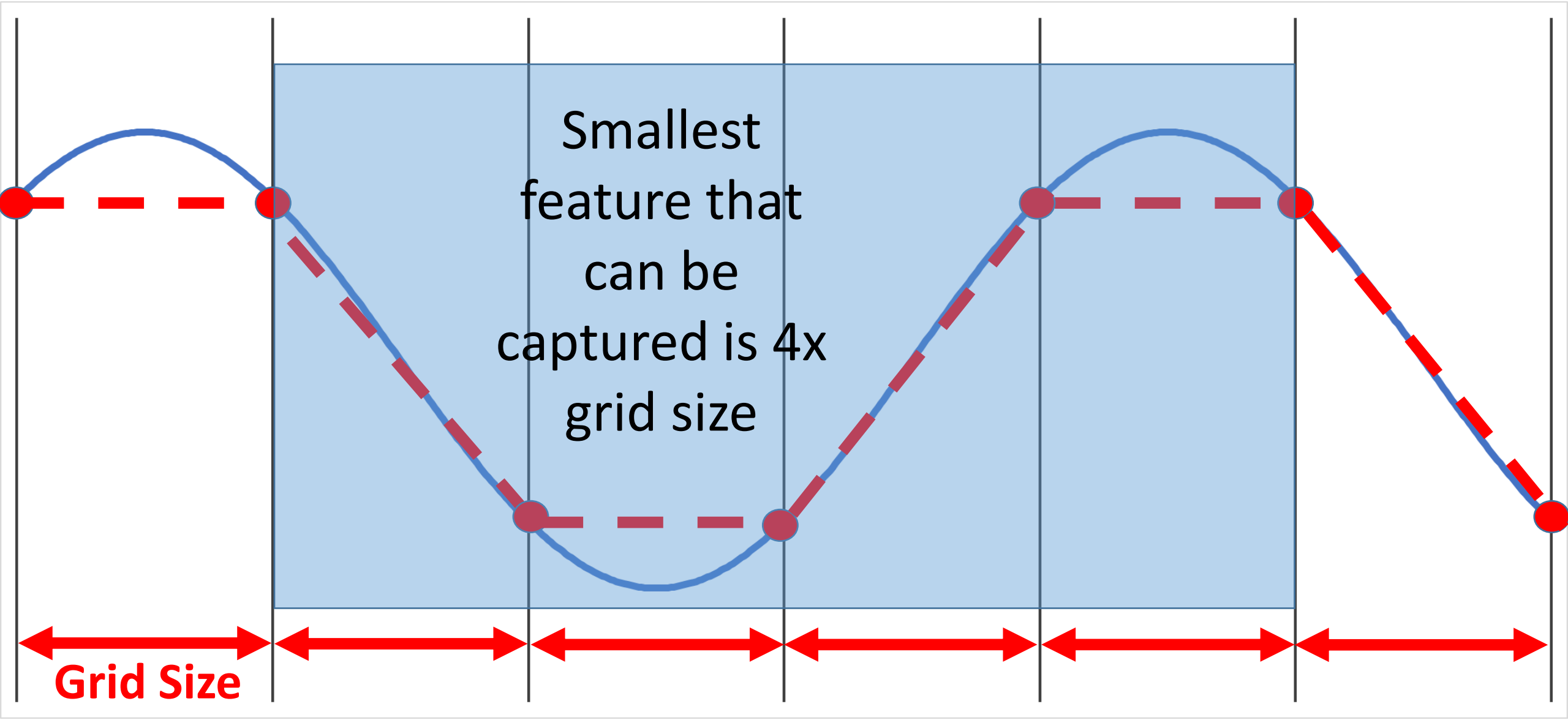
Why do we care about the Model Resolution?

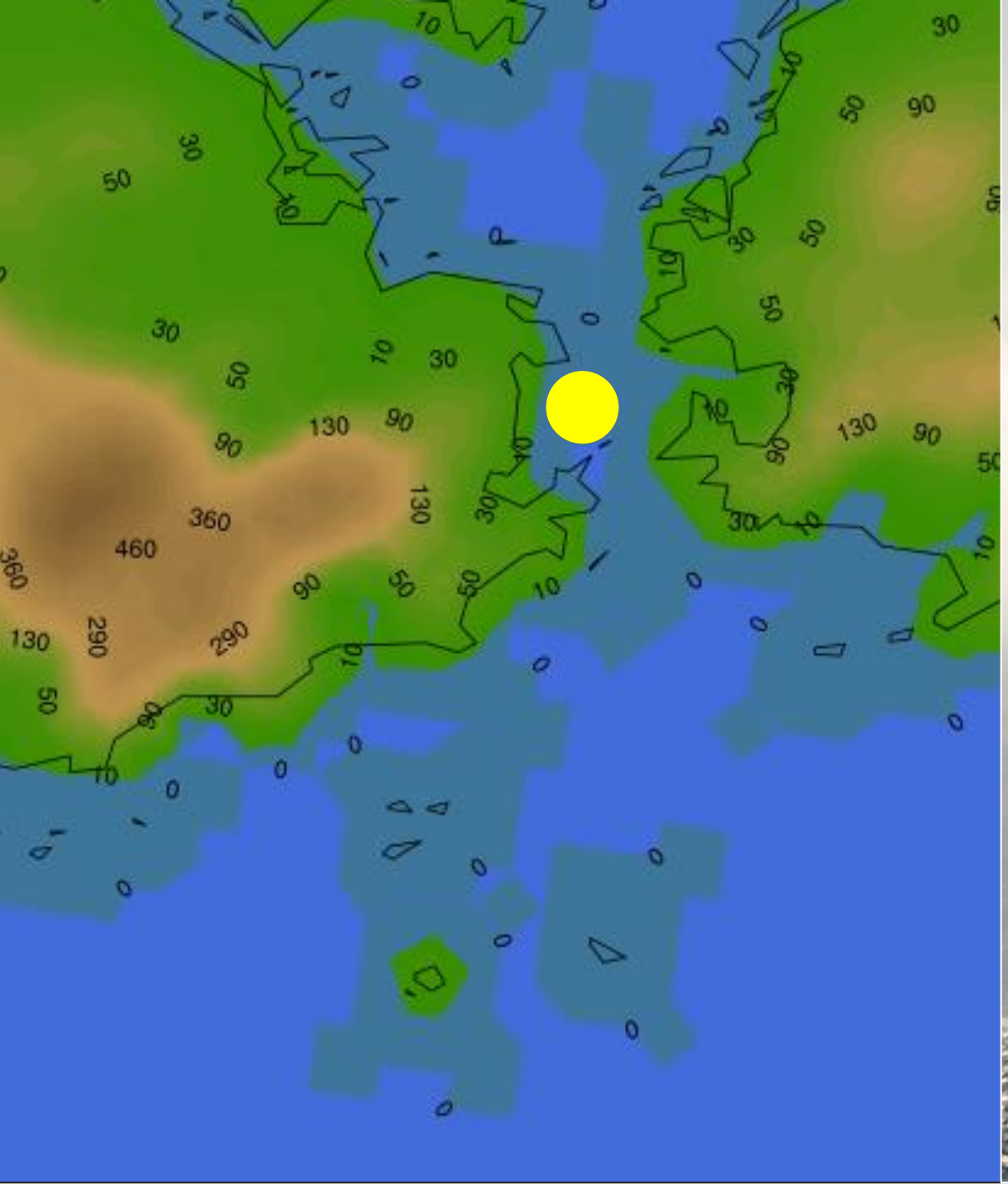


Why do we care about the Model Resolution?



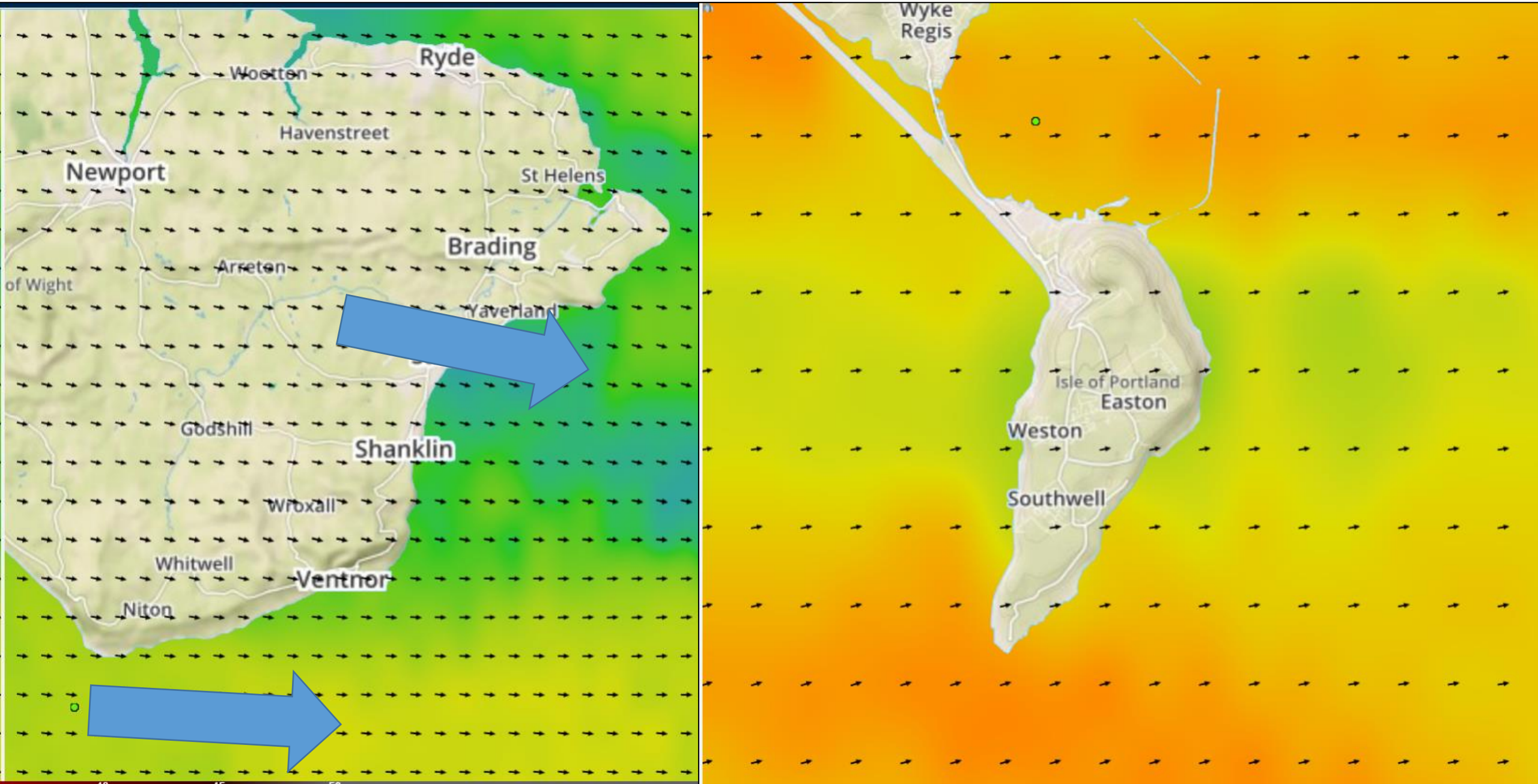
Why do we care about the Model Resolution?




0
10
30
50
90
130
360
460
290

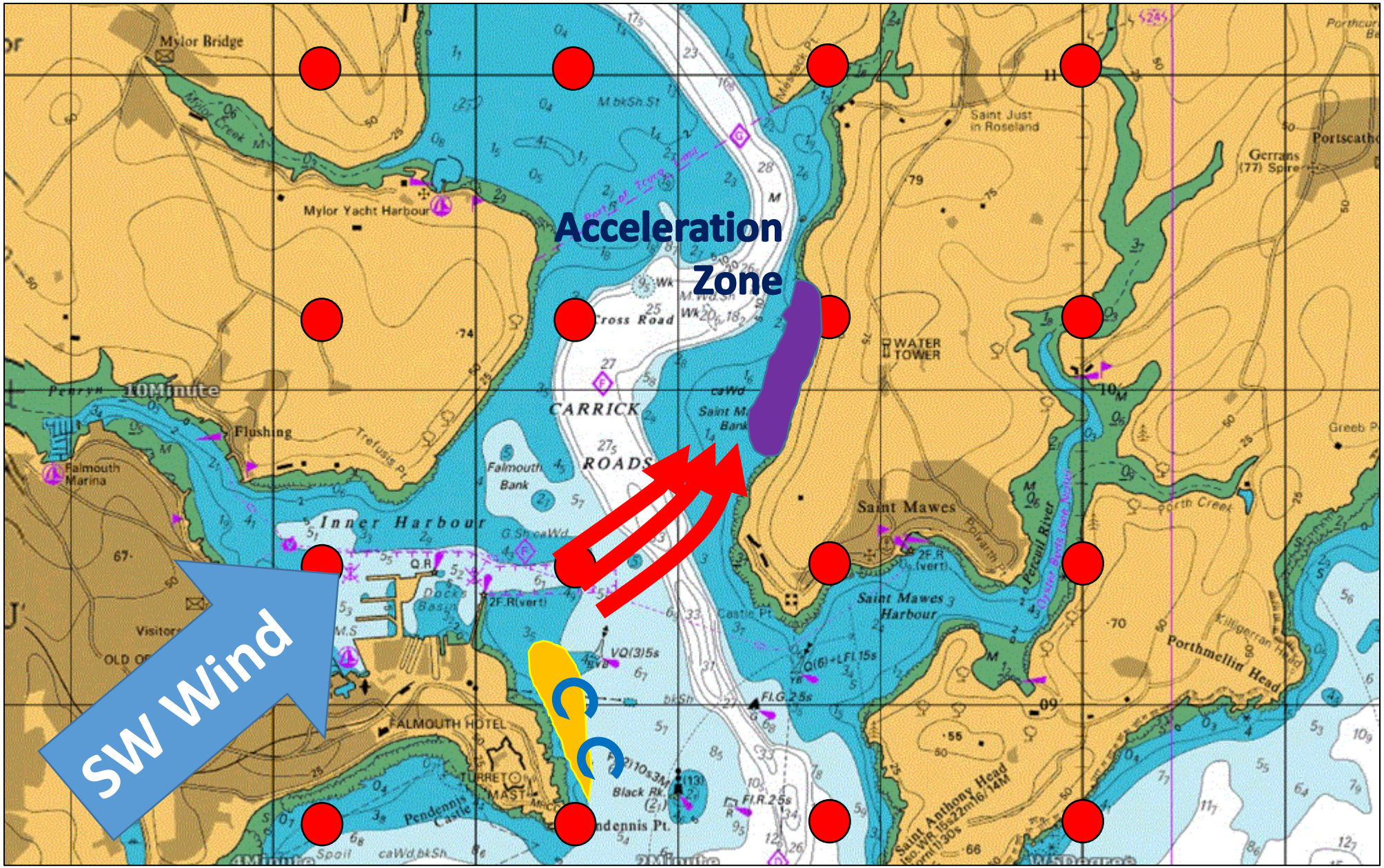
Dom Tidey

Portland Bill & the Isle of Wight Exist!



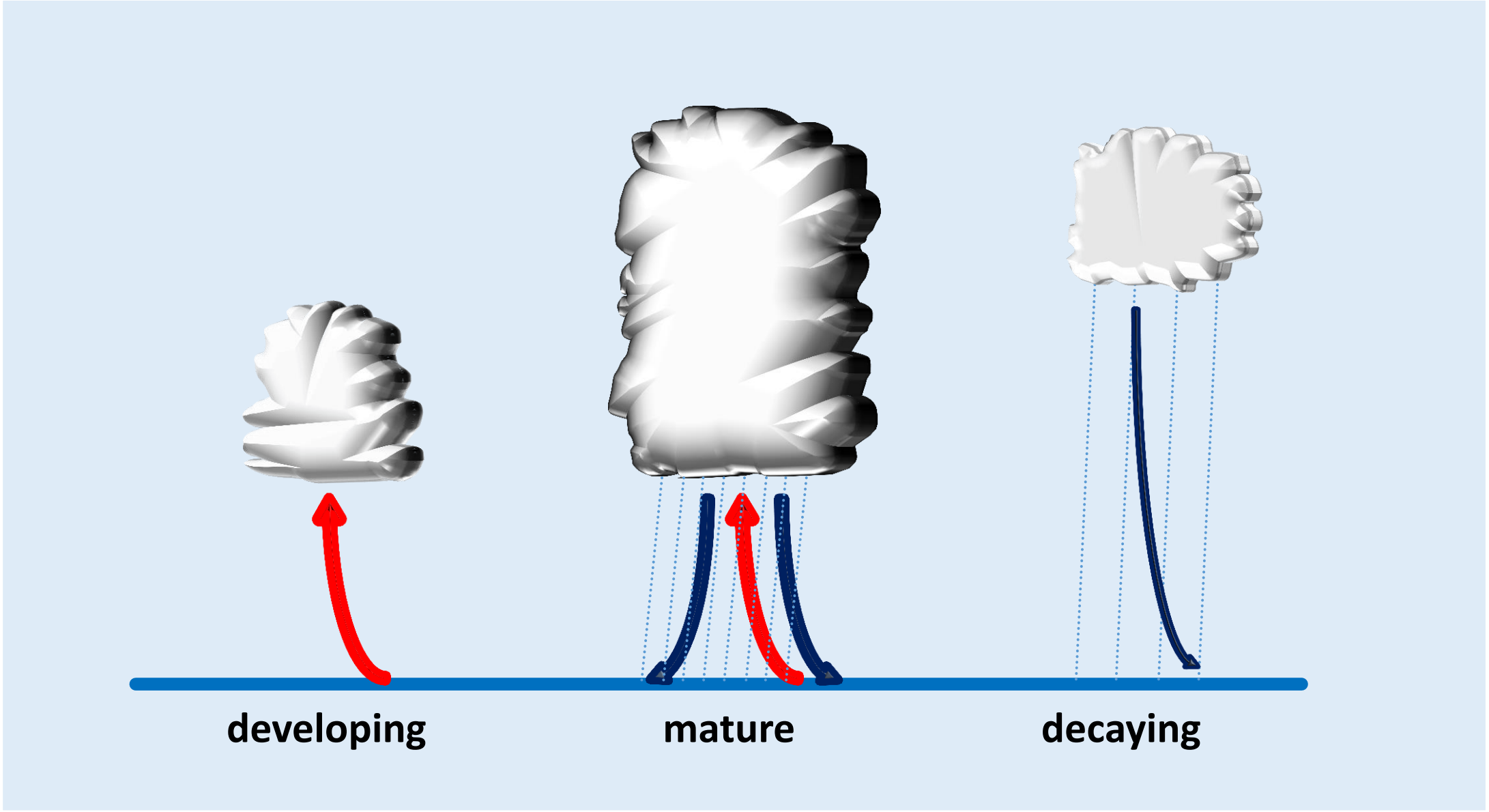
We’ve got our forecast – what about the sub-grid stuff?

Sub-Grid Forecasting

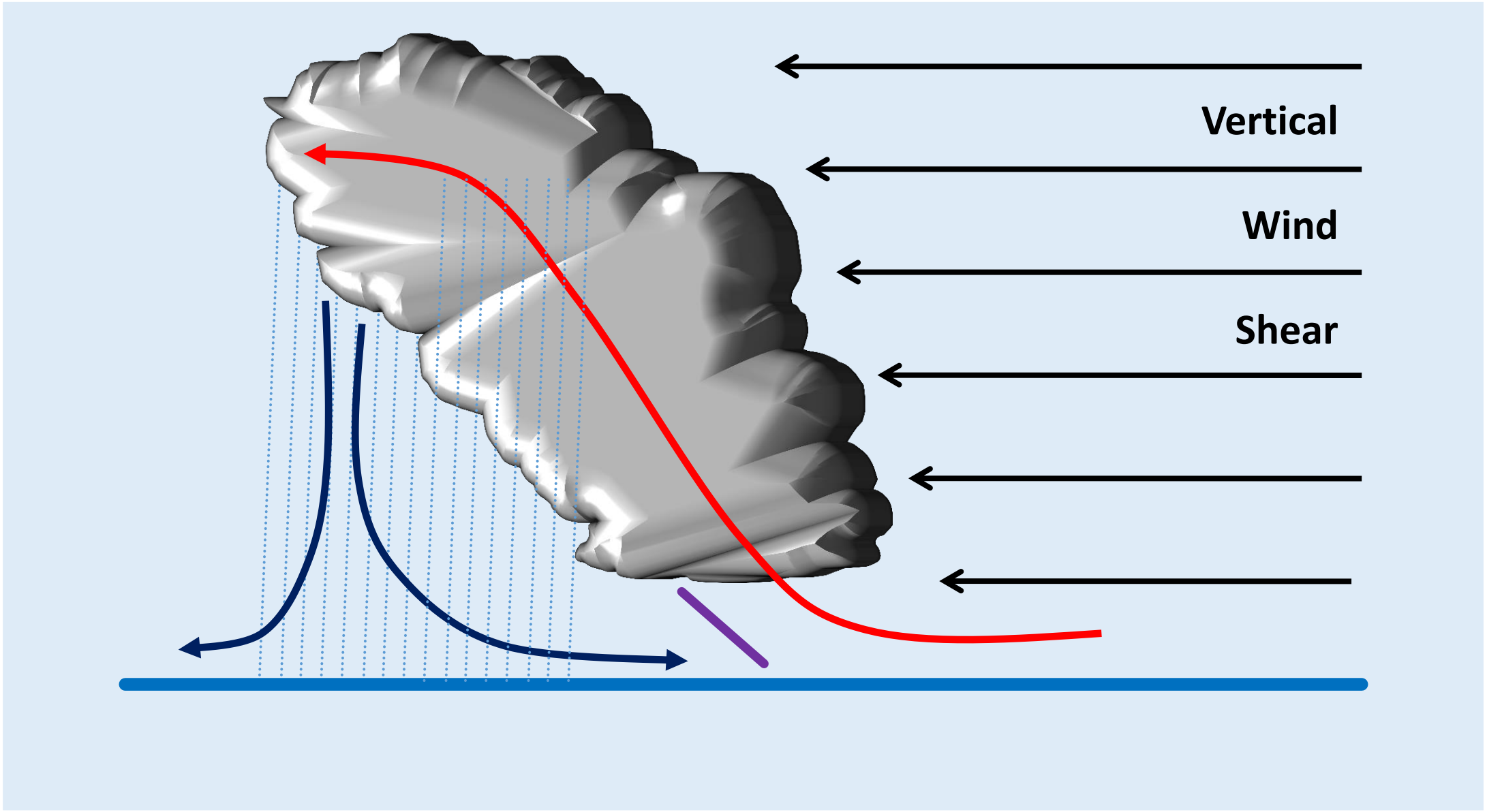


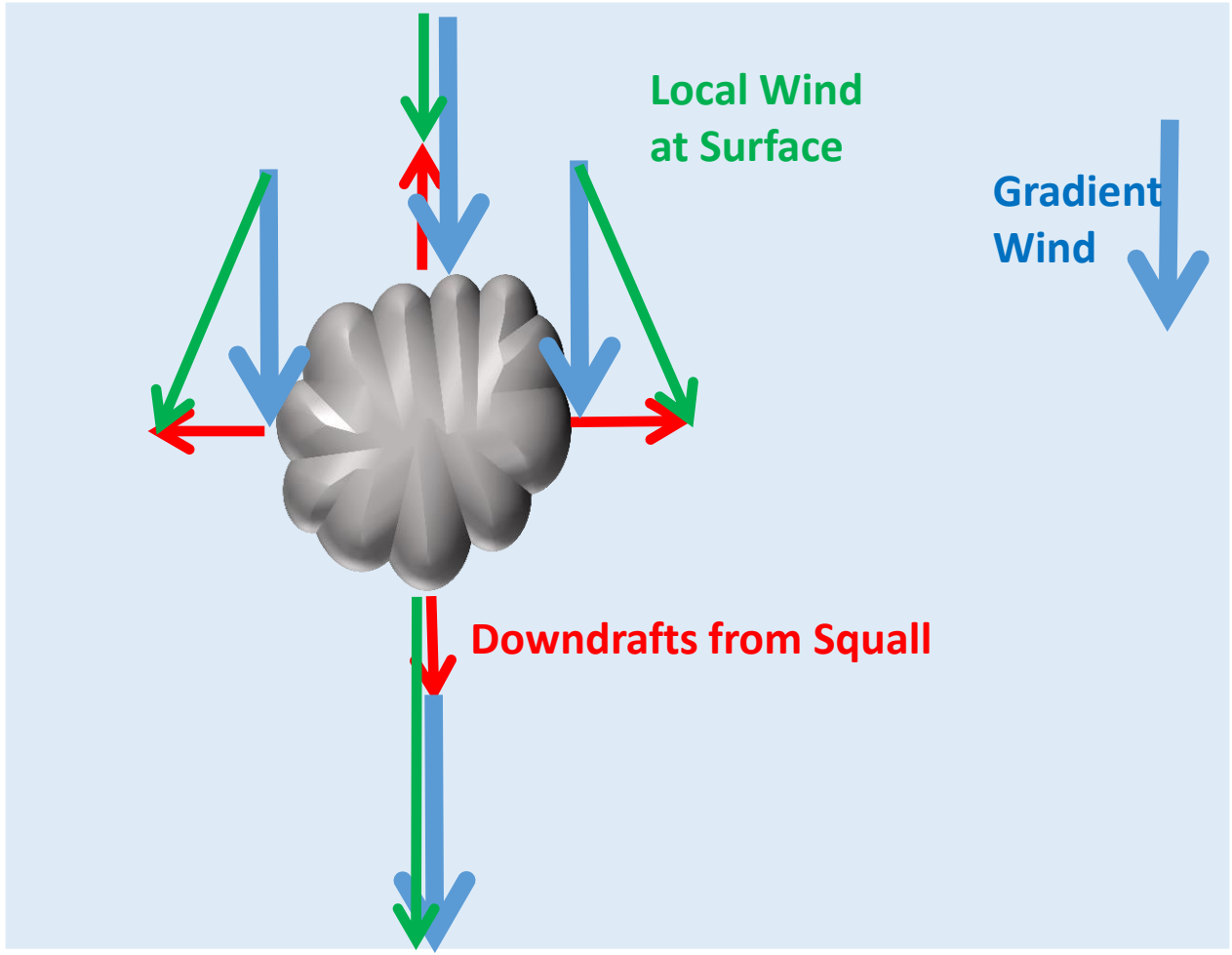
After Storm Doris – still a big acceleration around Portland Bill

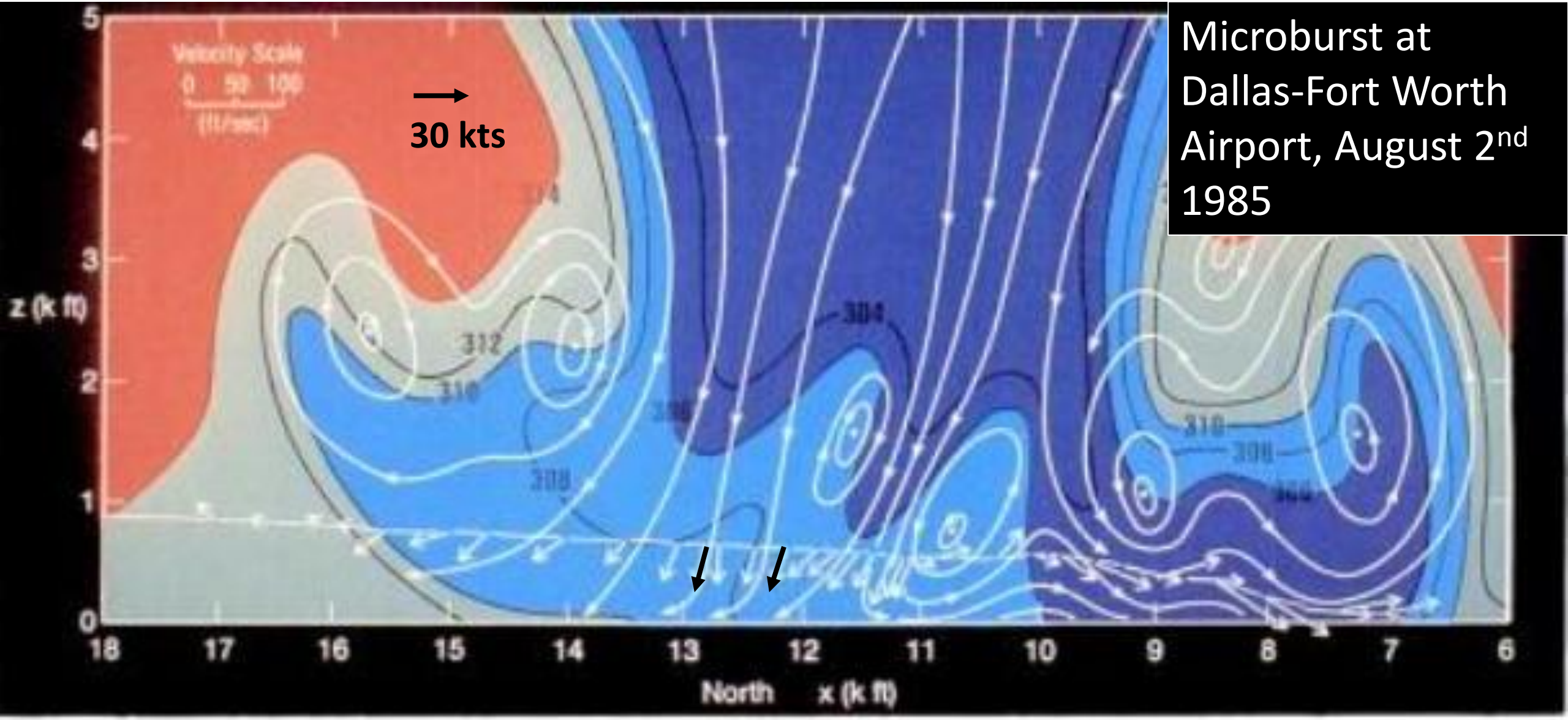
Squalls



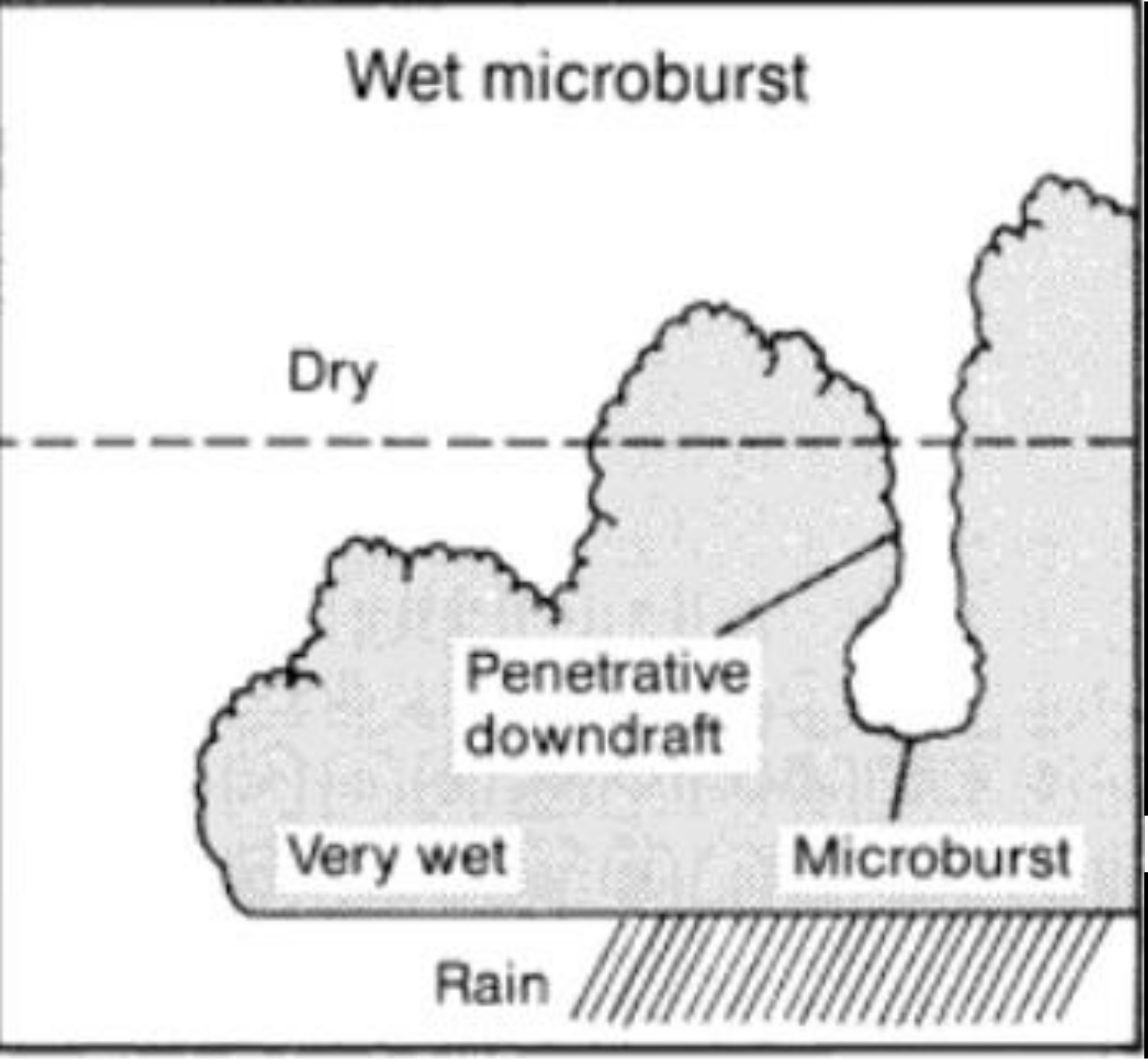
Self-Sustaining Squalls




Local Wind
at Surface
Gradient
Wind
Downdrafts from Squall



Microburst at Dallas-Fort Worth Airport, August 2nd 1985

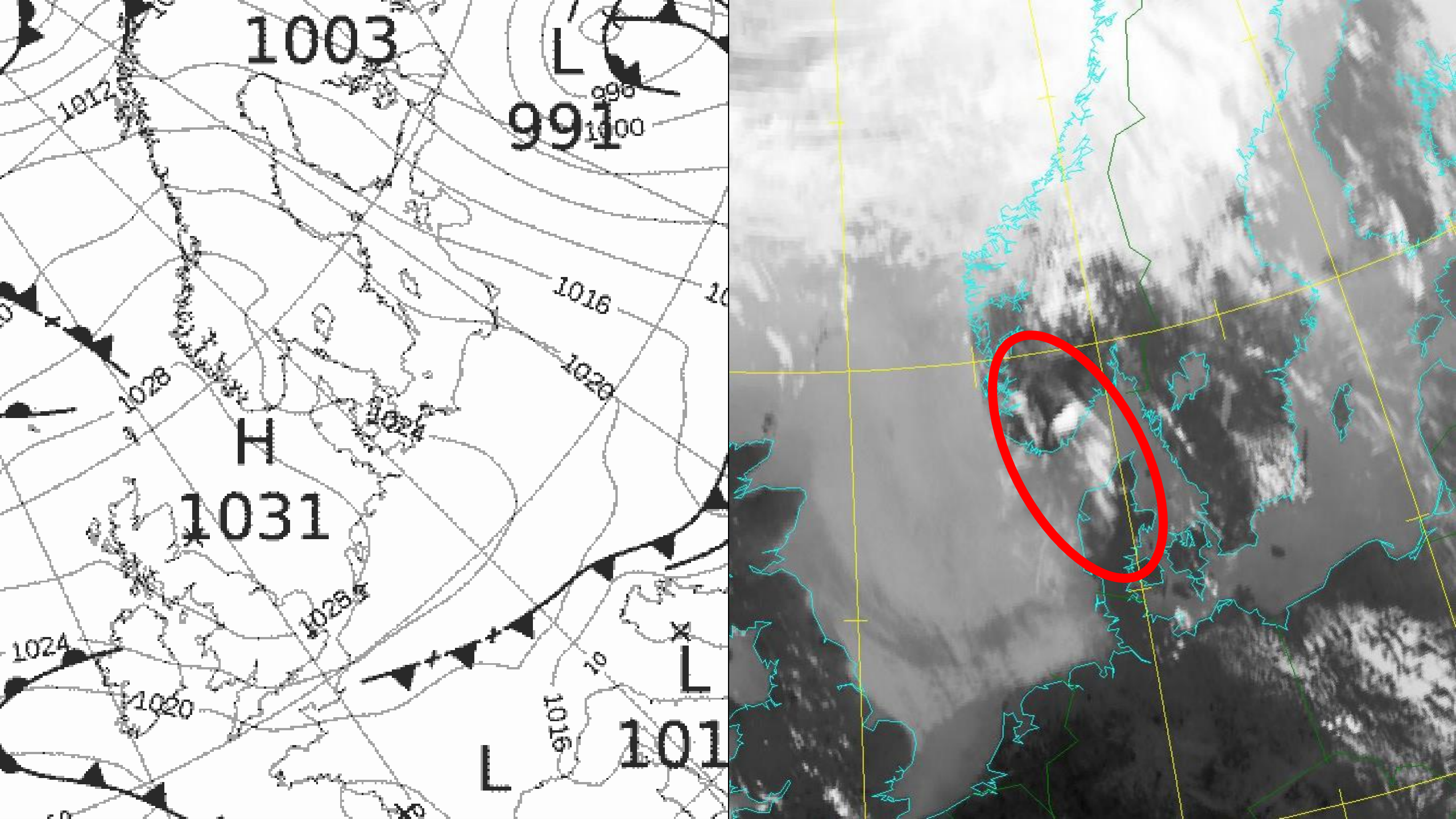


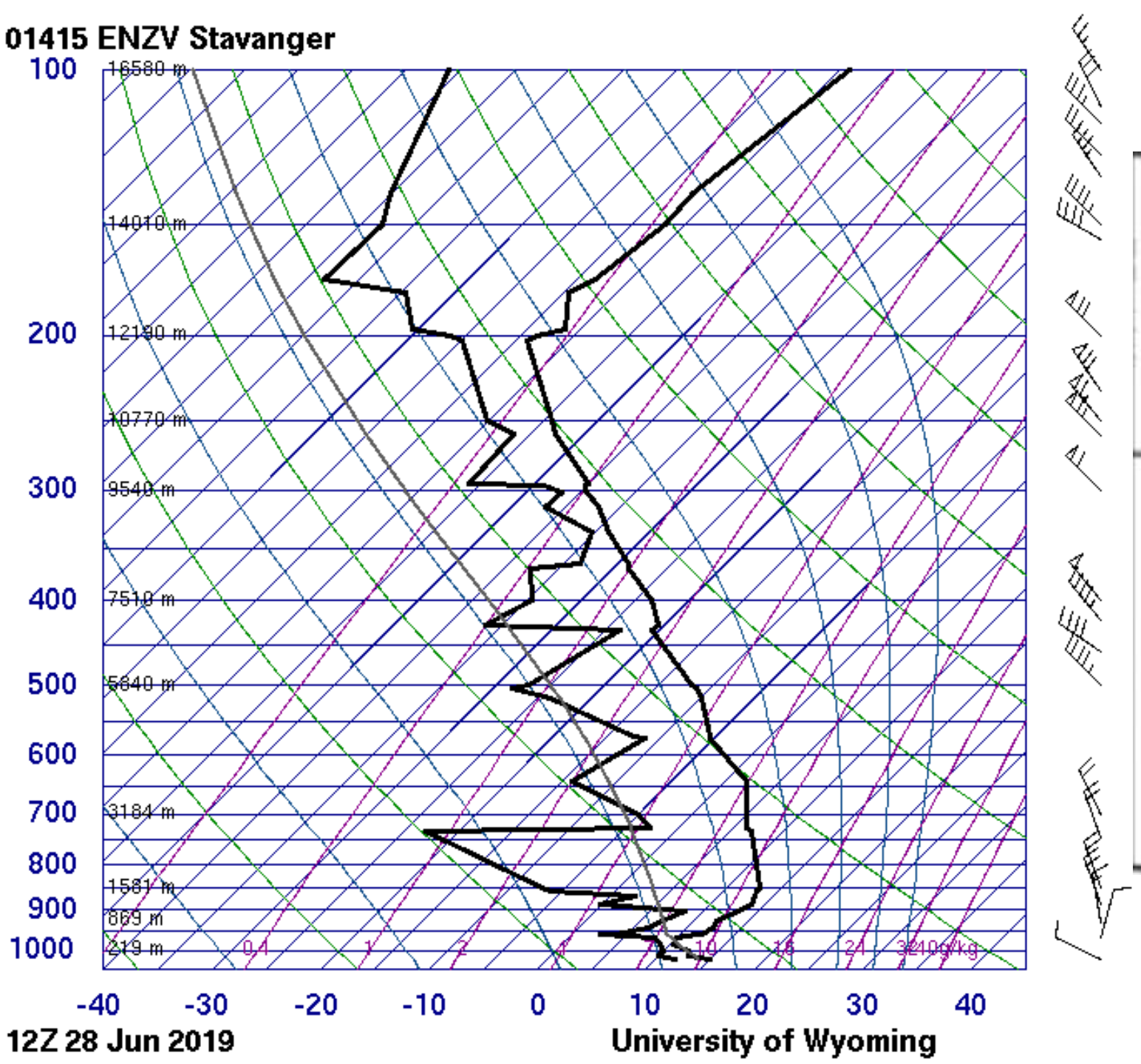
- Dry air above the freezing level is carried down, often taking ice particles with it.
- This dry air immediately has moisture evaporate into it, cooling the air around it. Ice particles melt, also cooling the air further.
- This negatively buoyant air accelerates downward, taking raindrops with it.
- These often are carried faster than they would be if they just fell.

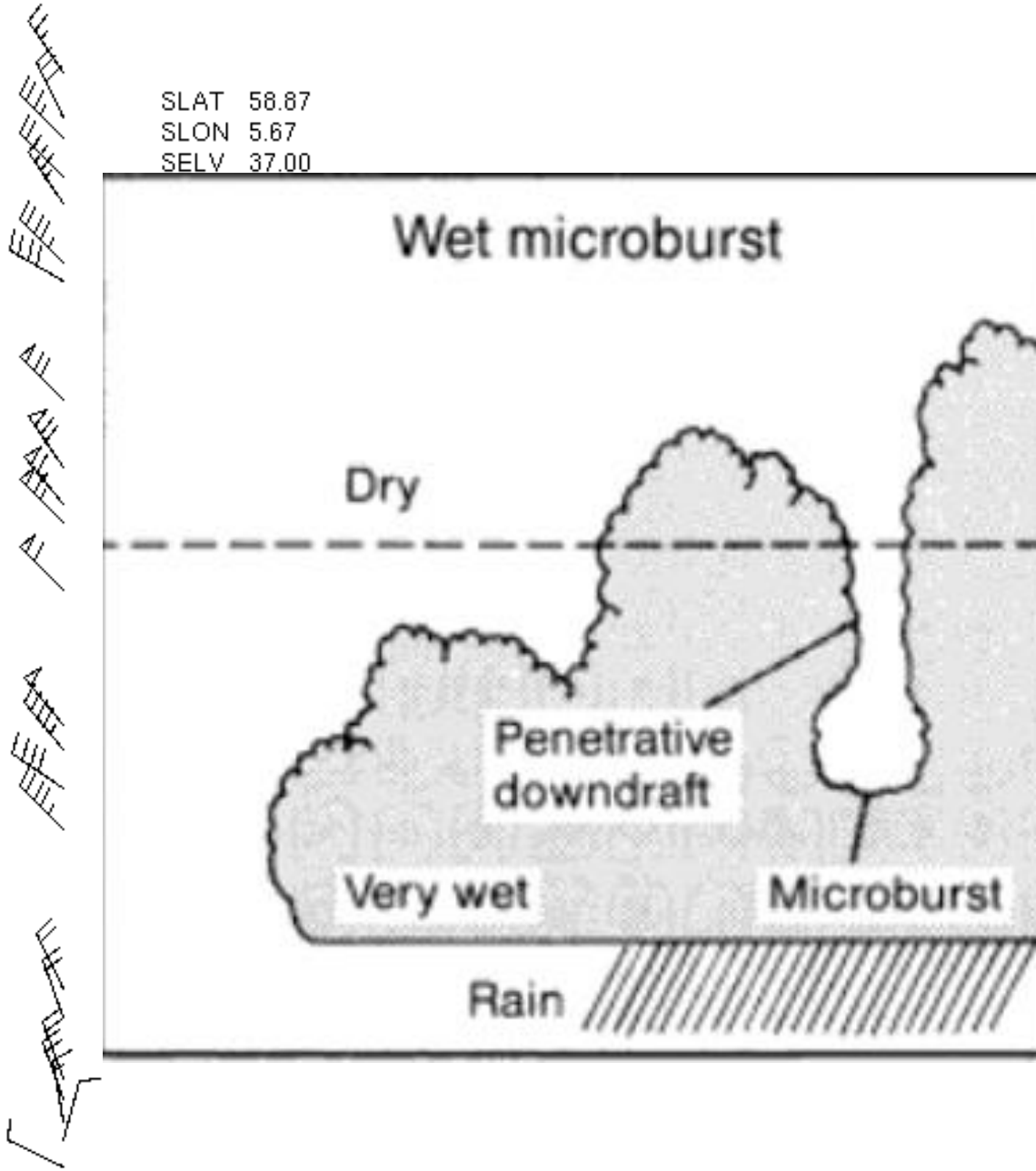
Microbursts, a Handbook for Visual Identification.
Caracena, Holle & Doswell 1990, US Dept of Commerce

Microburst in Queensland January 2015 (Peter Thomson)

Just before a microburst, June 2019 in the Skagerrak


1003
L
991
1012
996
1000
1016
1020
1028
H
1031
1028
1024
1020
L
1016
L
101


01415 ENZV Stavanger
100
200
300
400
500
600
700
800
900
1000
16580 m
14010 m
12190 m
10770 m
9540 m
7510 m
5840 m
3184 m
1581 m
869 m
219 m
0.4
1
2
4
7
10
16
24
32
40g/kg
-40
-30
-20
-10
0
10
20
30
40
12Z 28 Jun 2019
University of Wyoming


SLAT 58.87
SLON 5.67
SELV 37.00
Wet microburst
Dry
Penetrative
downdraft
Very wet
Microburst
Rain

In the tropical
Atlantic, under the
N Atlantic High

Virga: wisps of descending air, with moisture evaporating as it comes down – potential for development.

- Use synoptics & satellite images to match forecast with actual
- Use GRIBs at a practical level of detail
- Use the various outputs to get an idea of the overall shape of the systems
- Think sub-grid – what's it actually going to do?
- Use your weather eye to look at the clouds – sometimes obvious (really deep, really dark), sometimes not (virga)
- And, most importantly

If it Looks Like an Elephant Turn Left!
Thanks very much – questions please