



# A frontal eddy intensively sampled at sea and overflown by SARAL

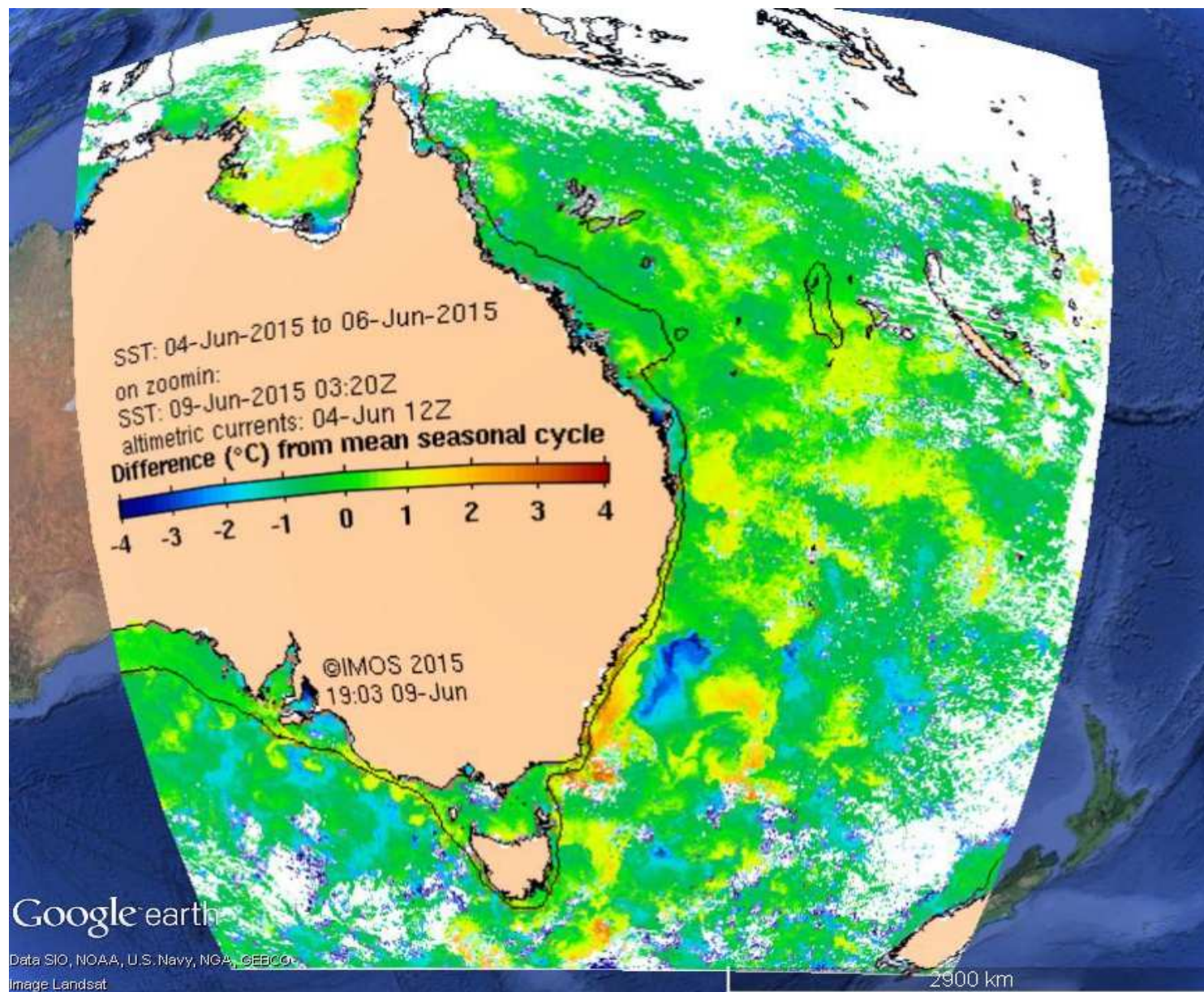
David Griffin, Moninya Roughan, Shane Keating , Amandine Schaeffer, Iain Suthers  
CSIRO Oceans and Atmosphere, University of NSW

[www.csiro.au](http://www.csiro.au)

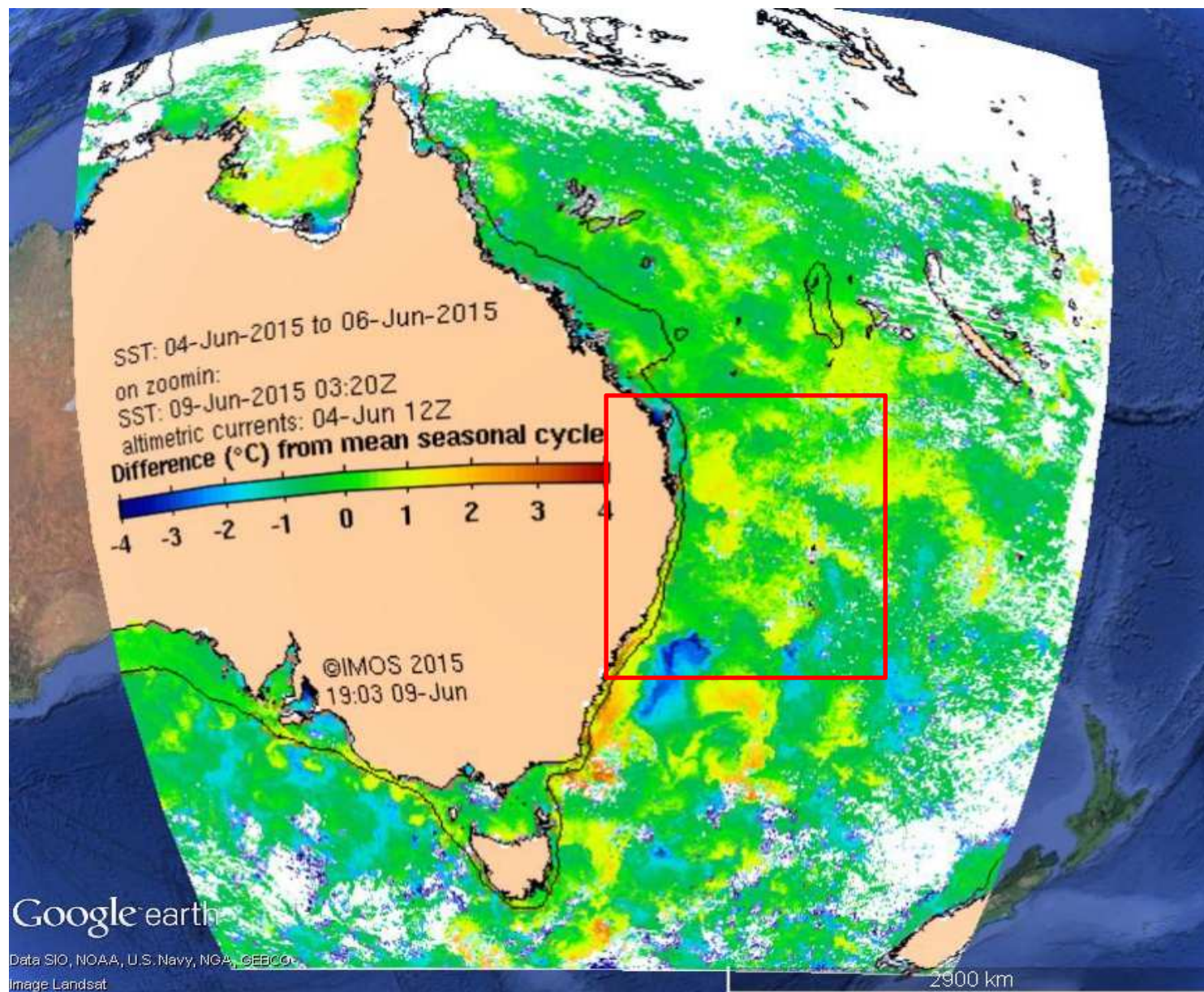


# Nearly-maiden voyage of RV Investigator

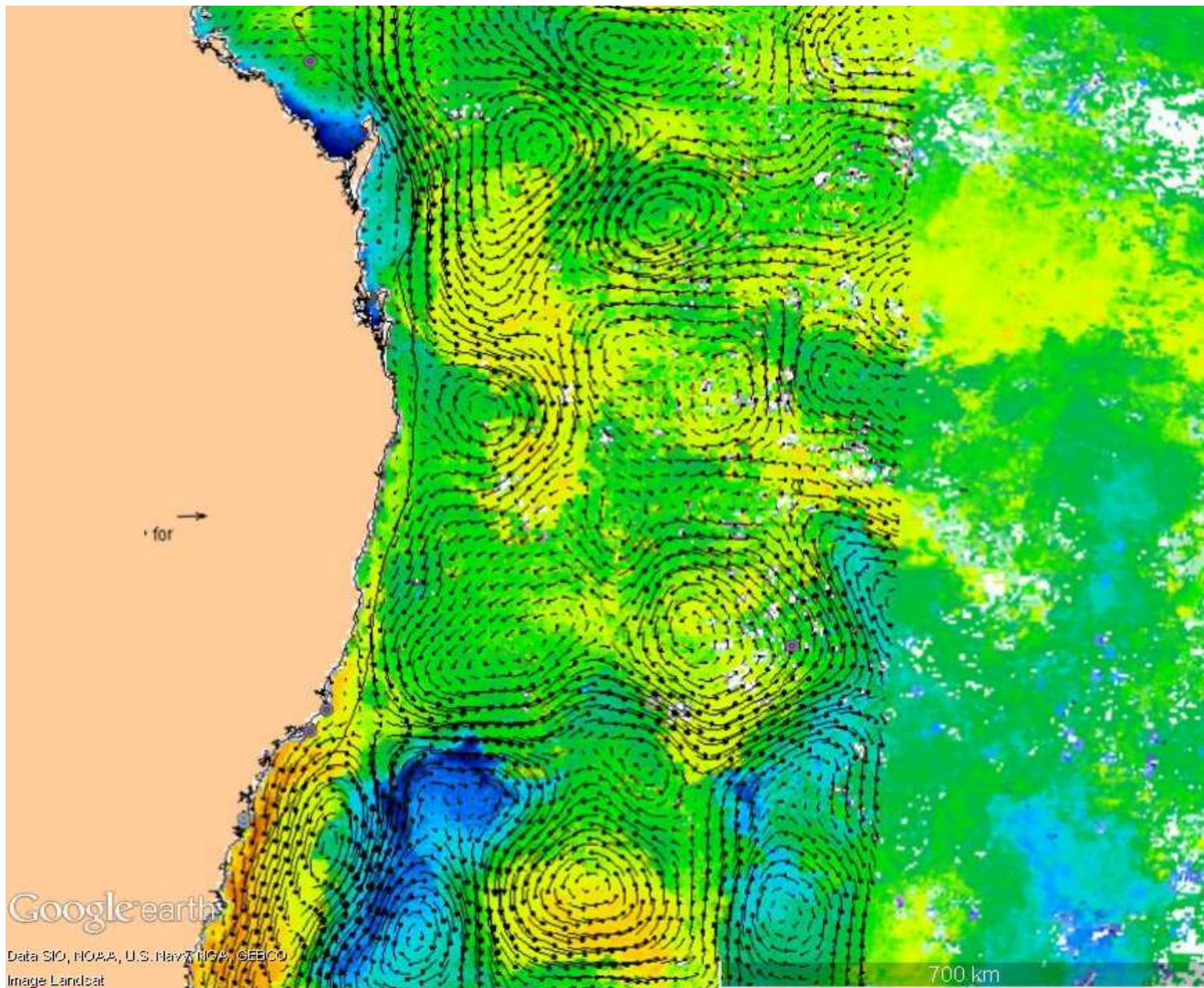
- Iain Suthers of UNSW led a June 2015 voyage with the ambitious goal of finding and studying a sub-mesoscale 'frontal eddy'.
- These often form on the landward side of the East Australian Current.
- Success hinged on an eddy forming, and being visible (from space).
- We did not count on it being sampled by an altimeter.
- But it was (by AltiKa)!



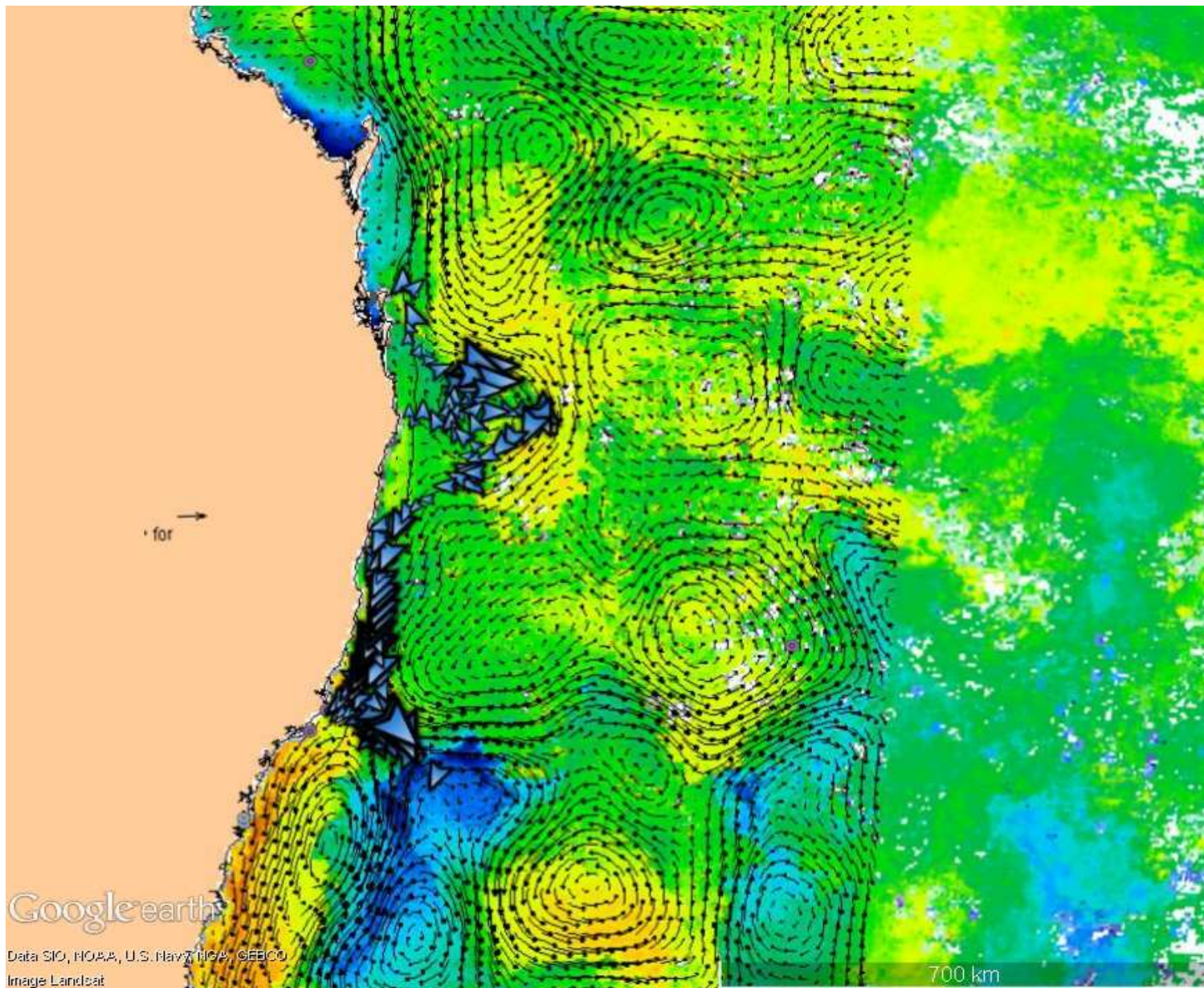




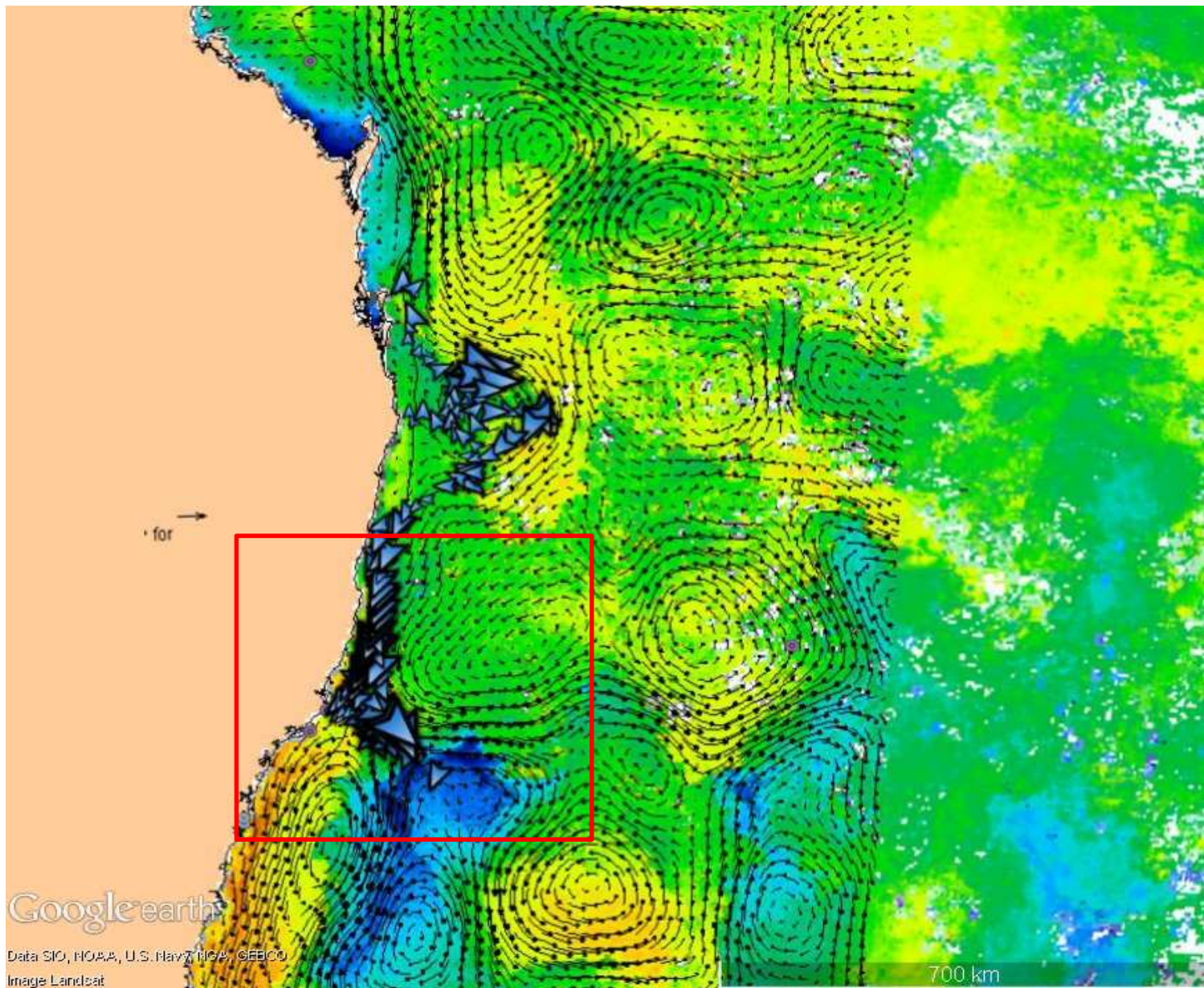




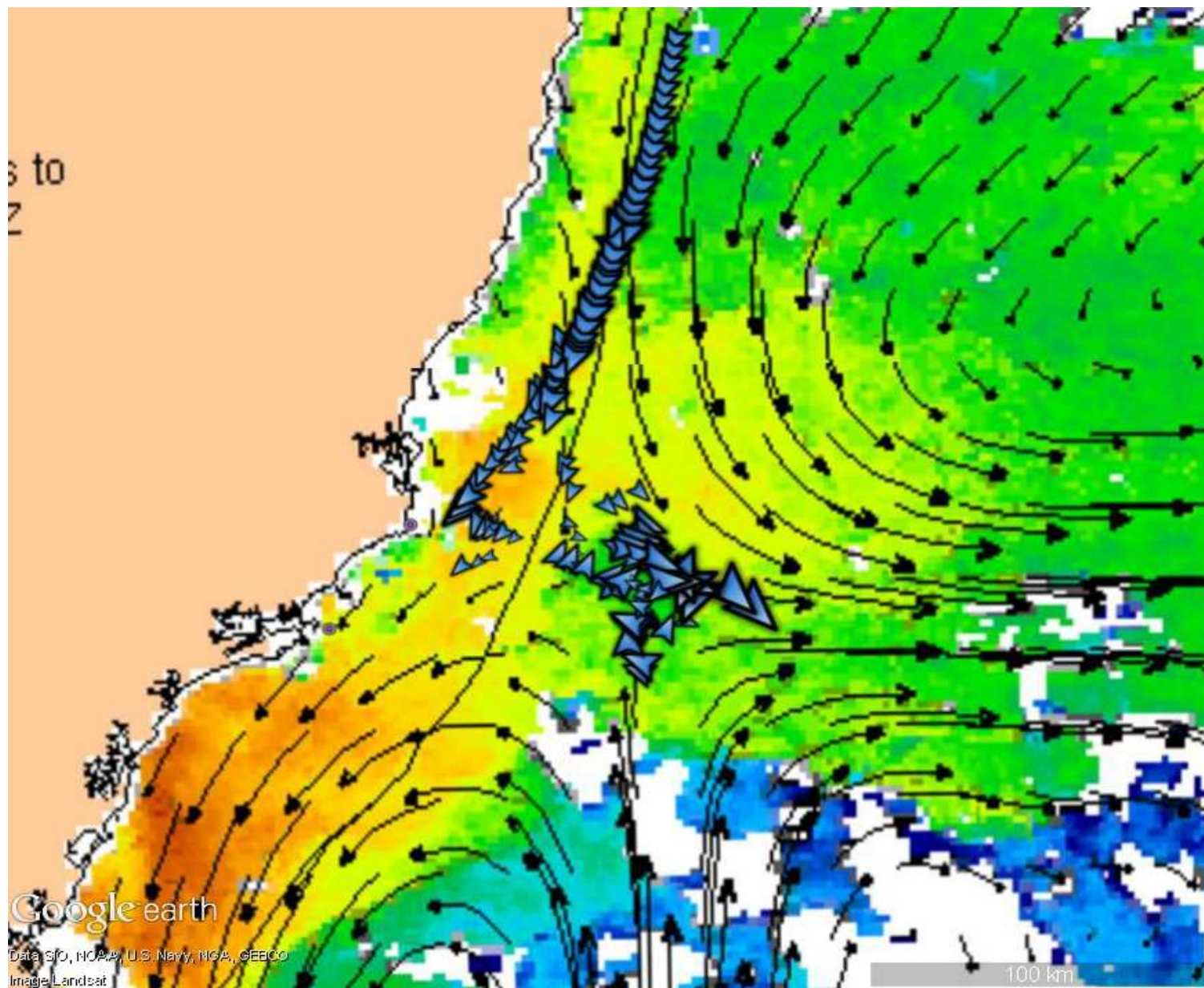




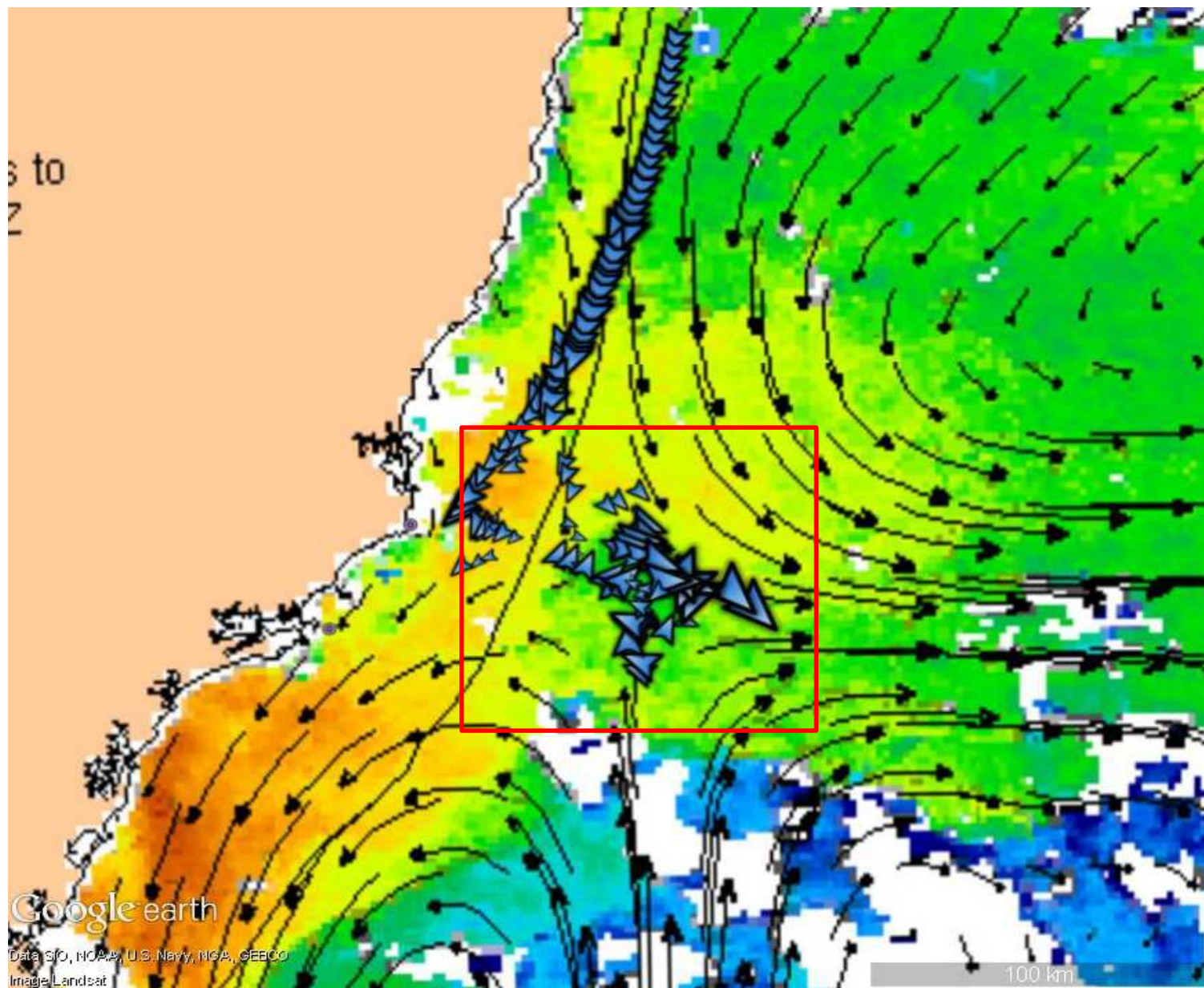


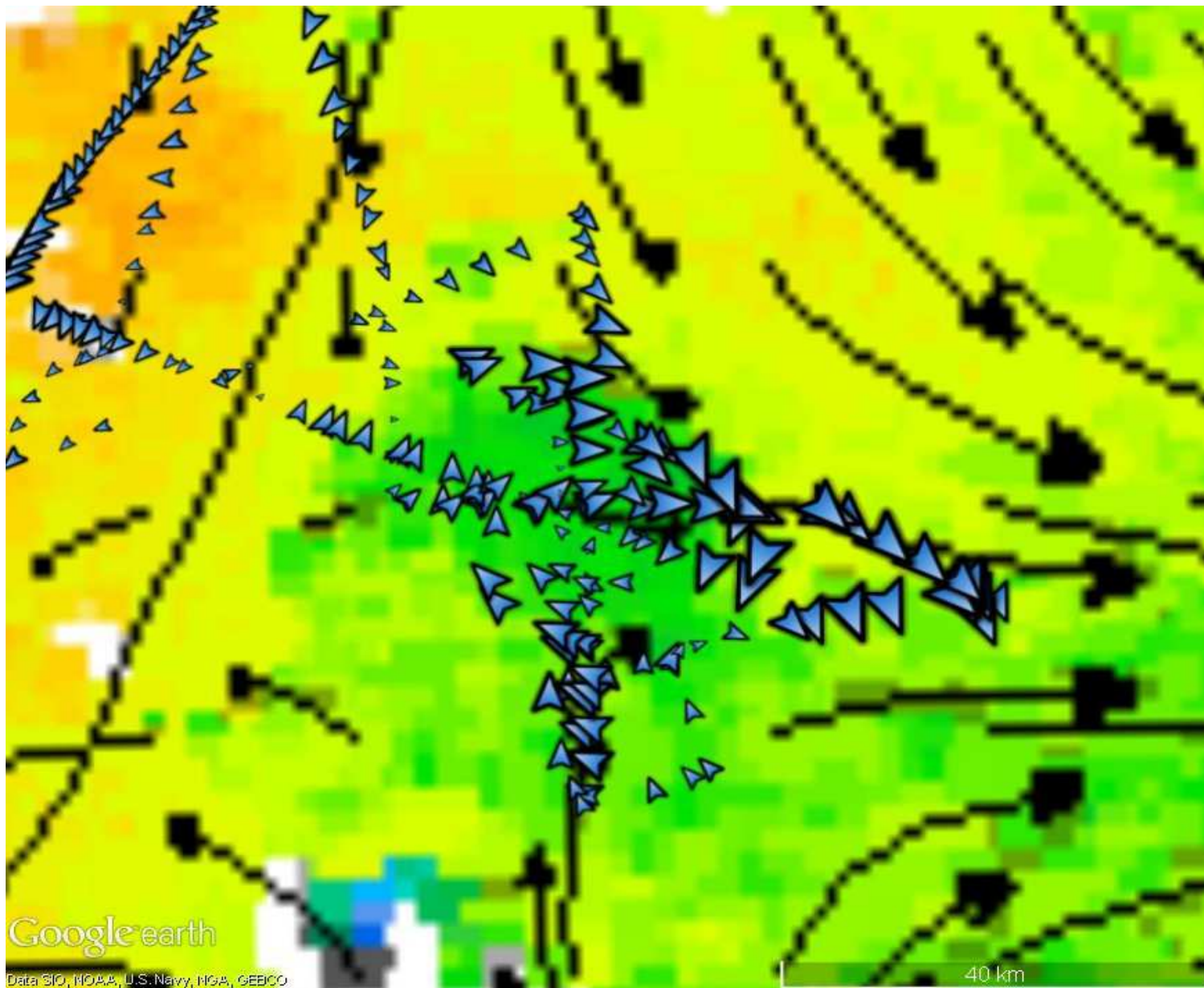




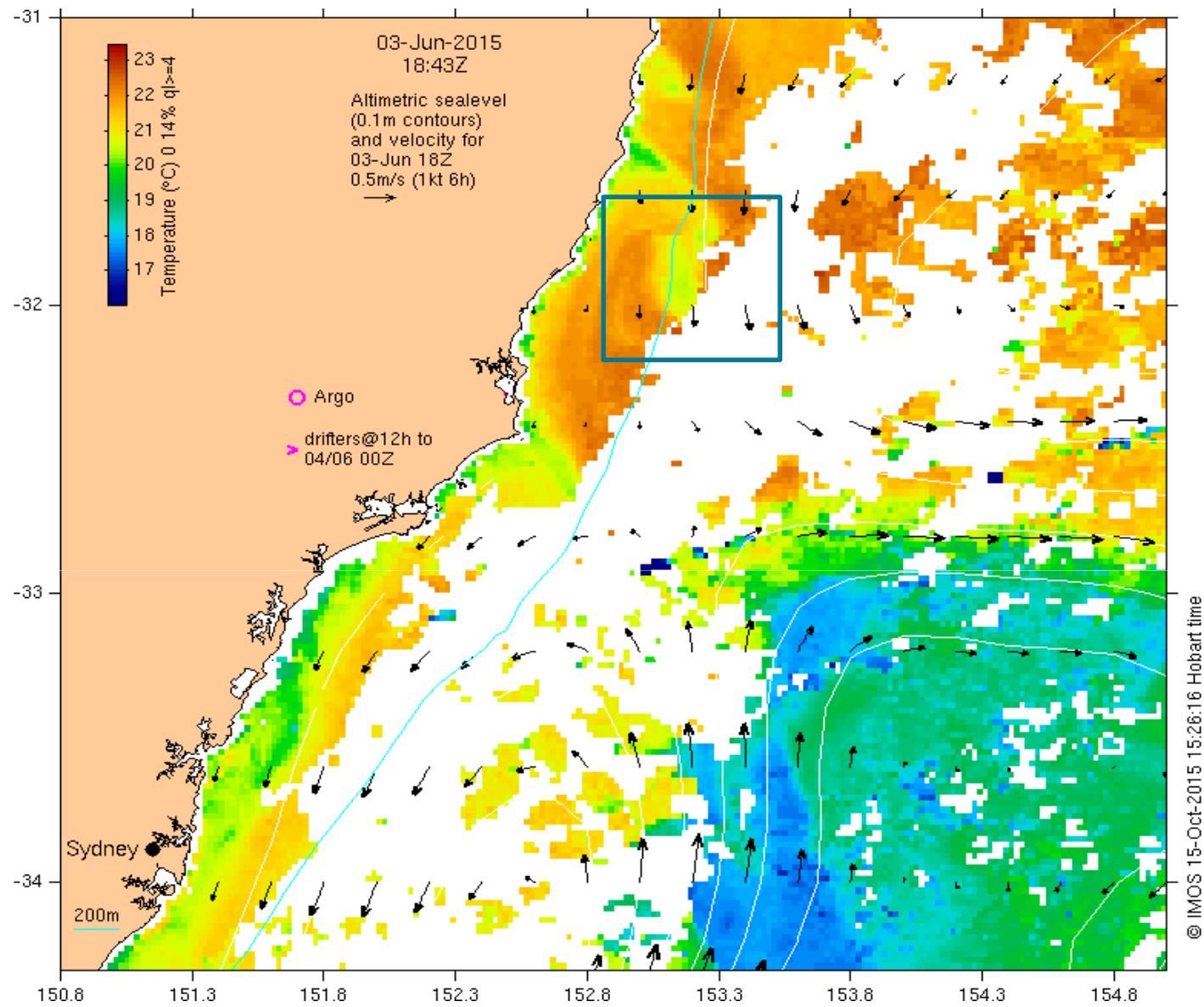


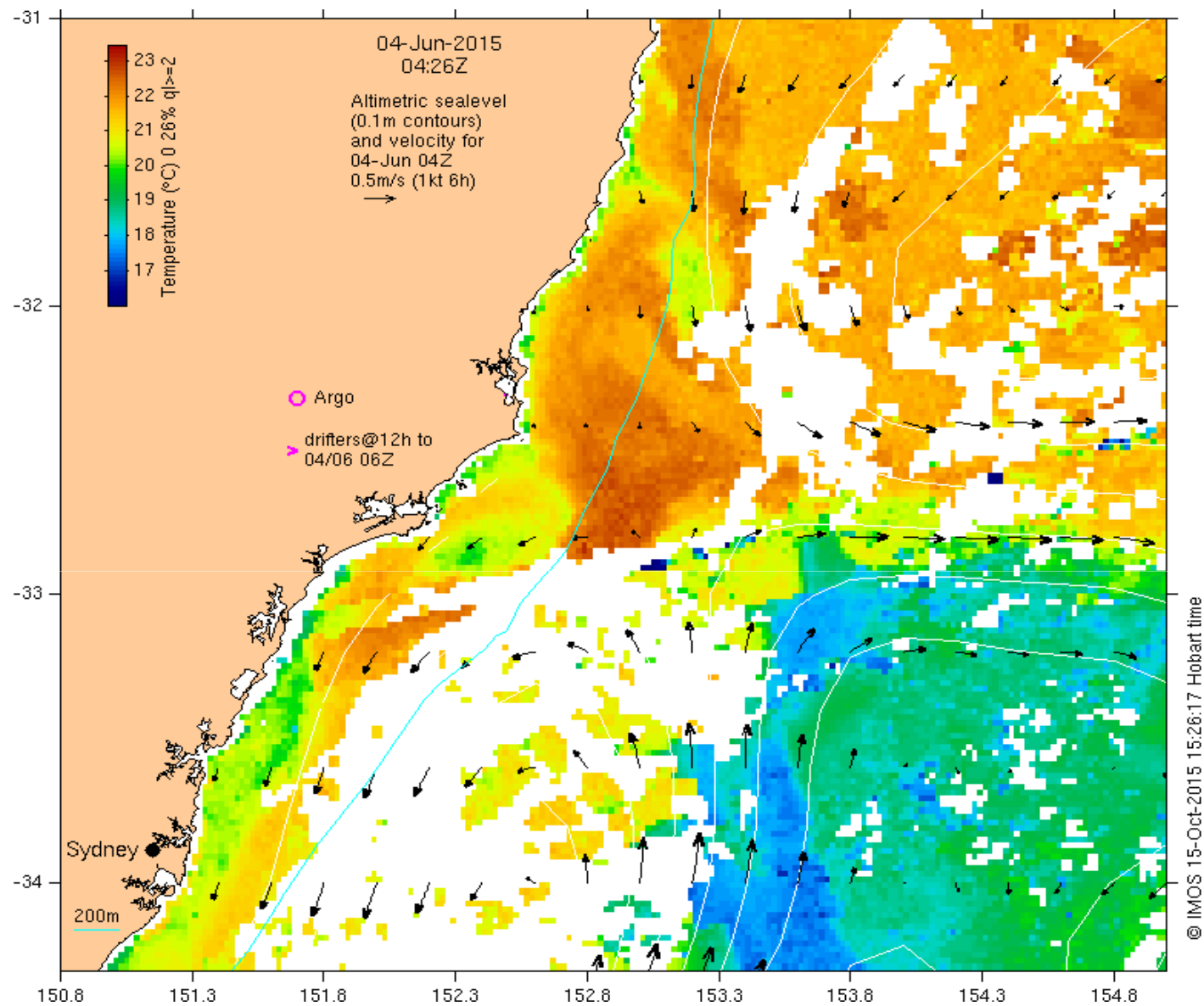




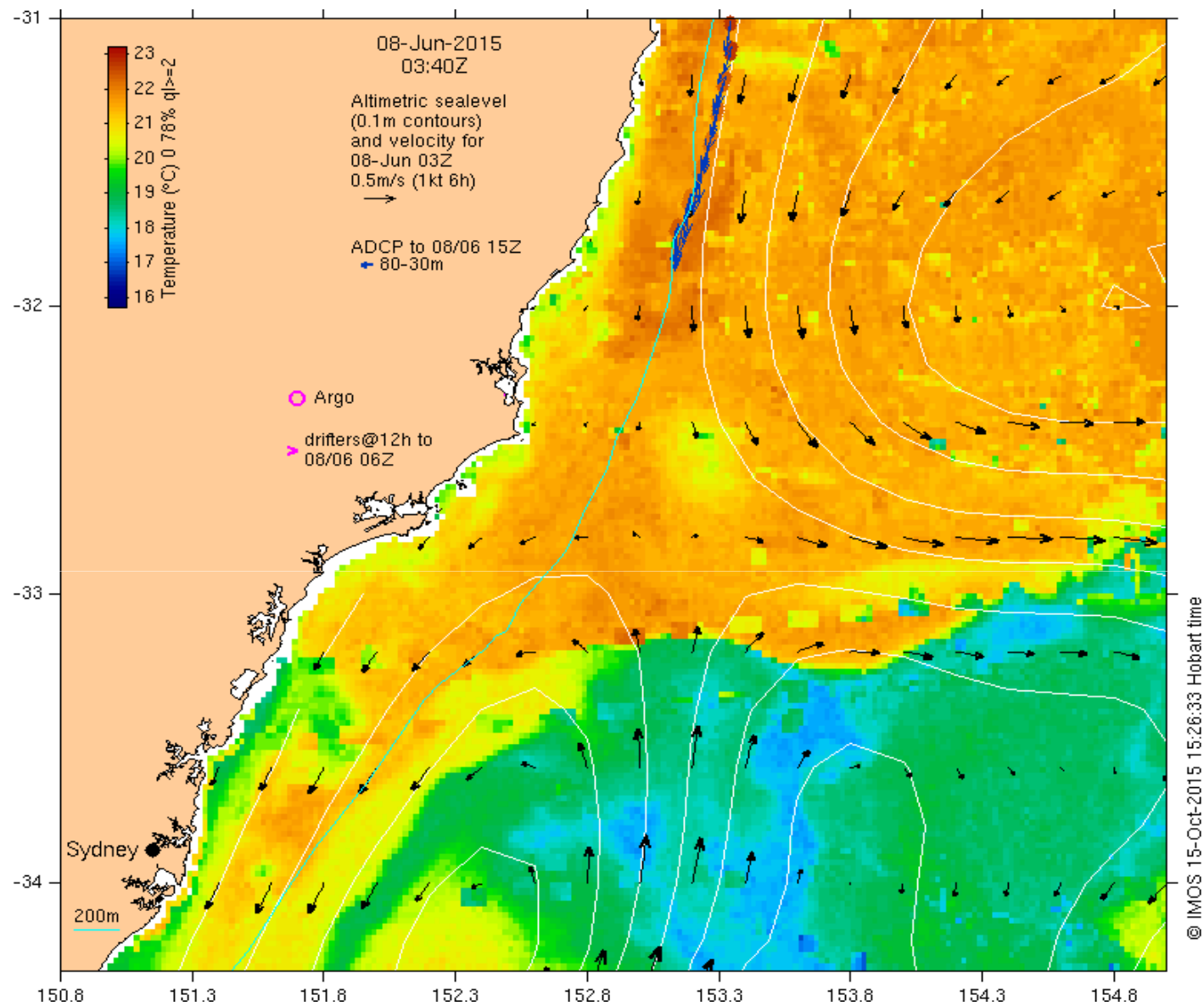


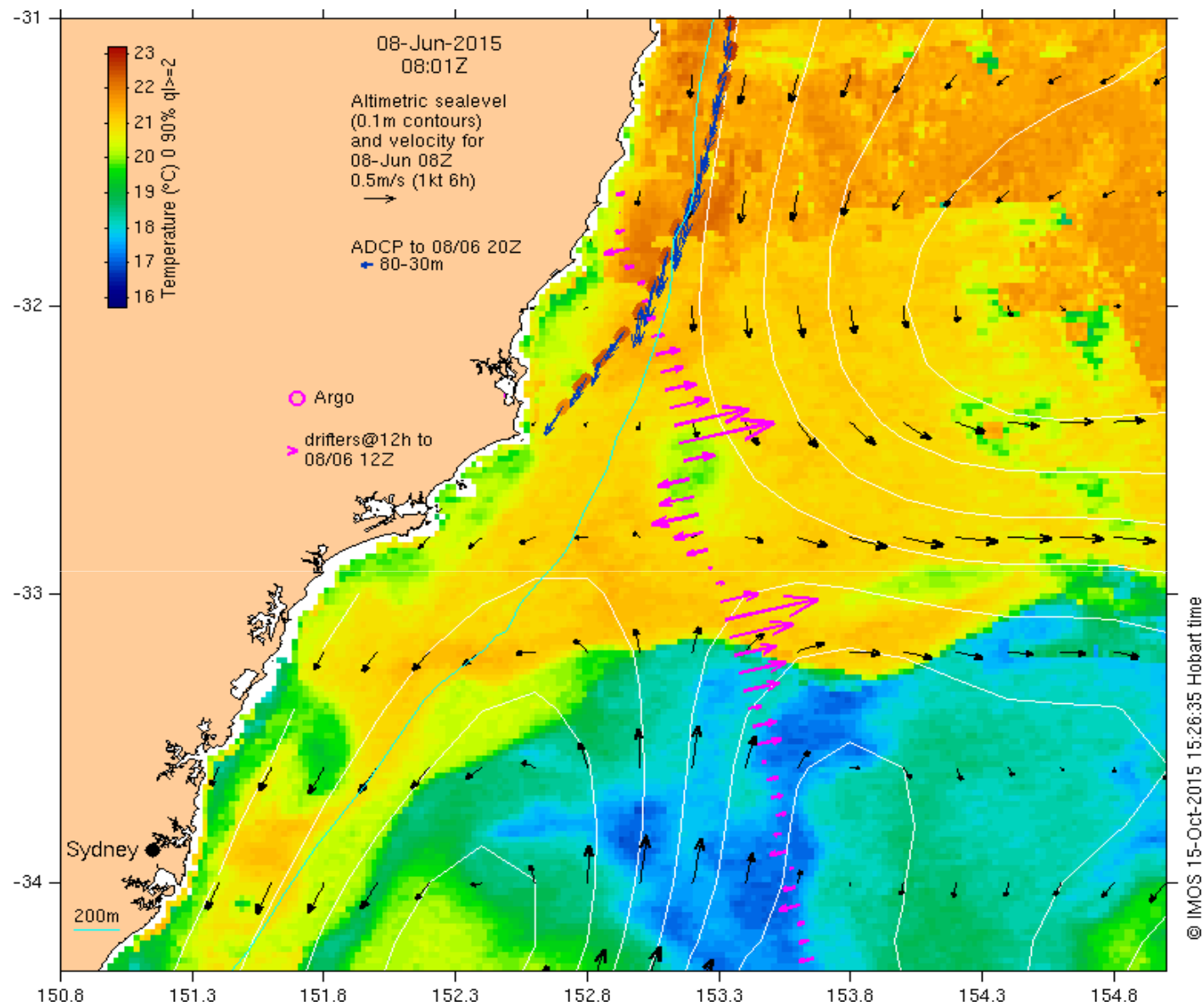




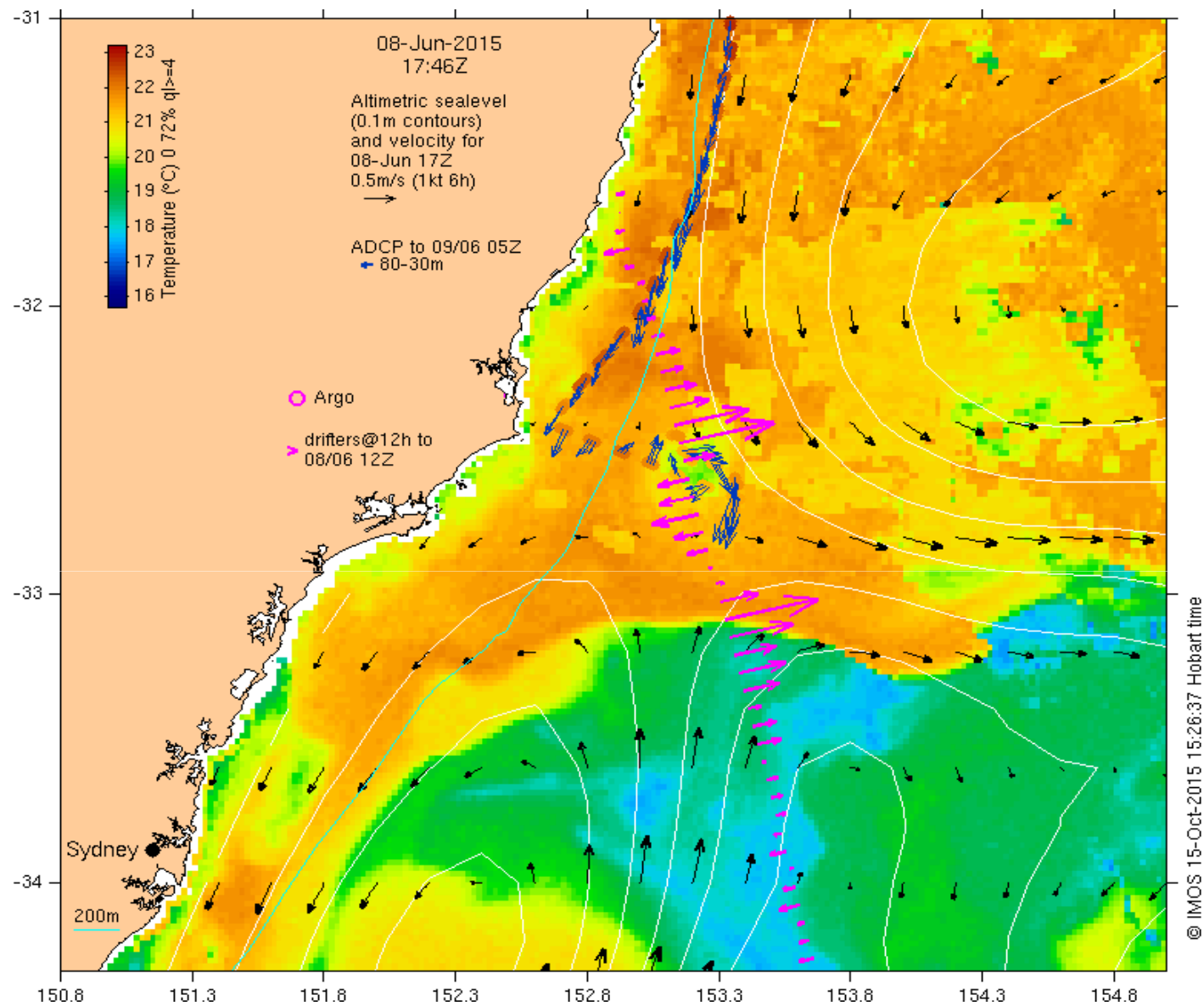


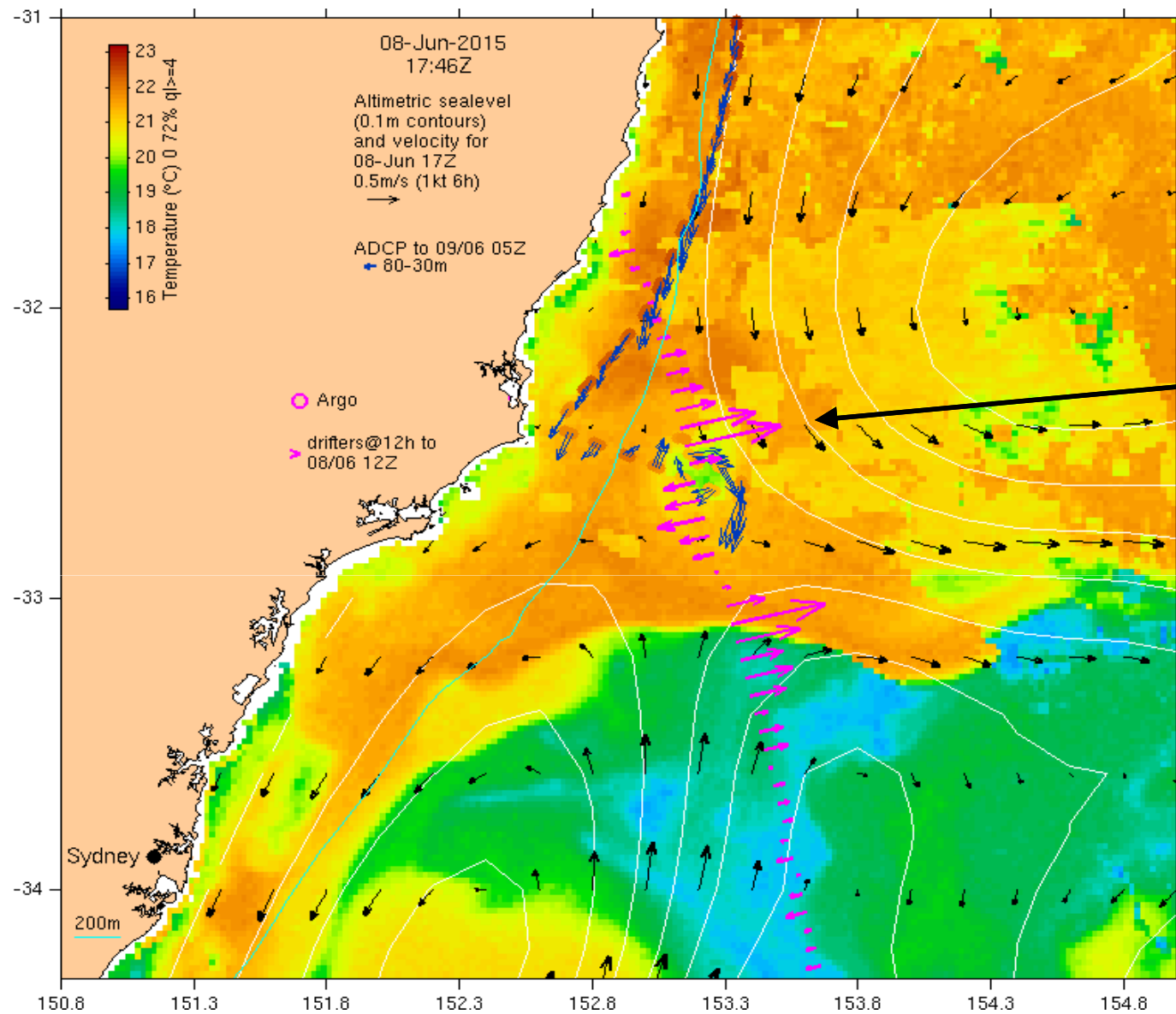








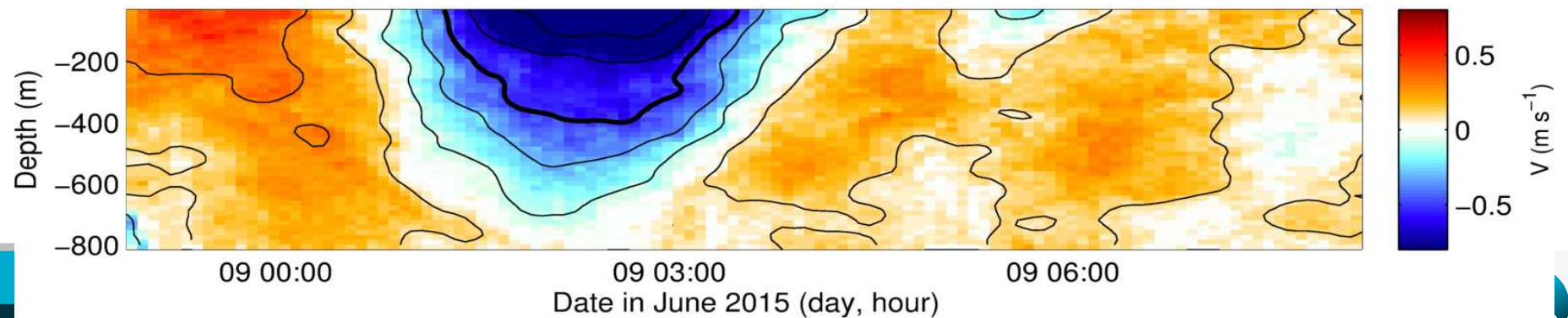
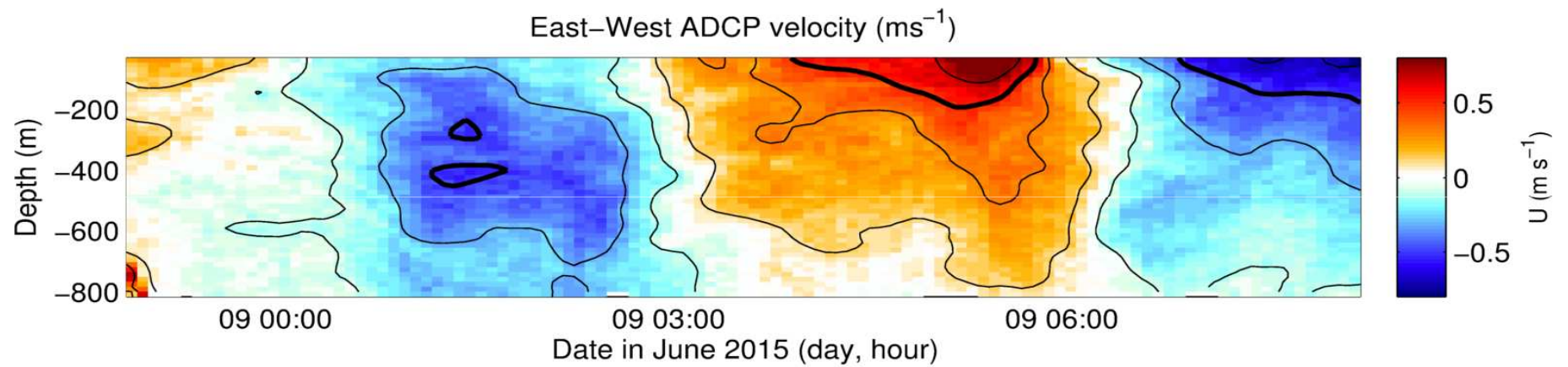
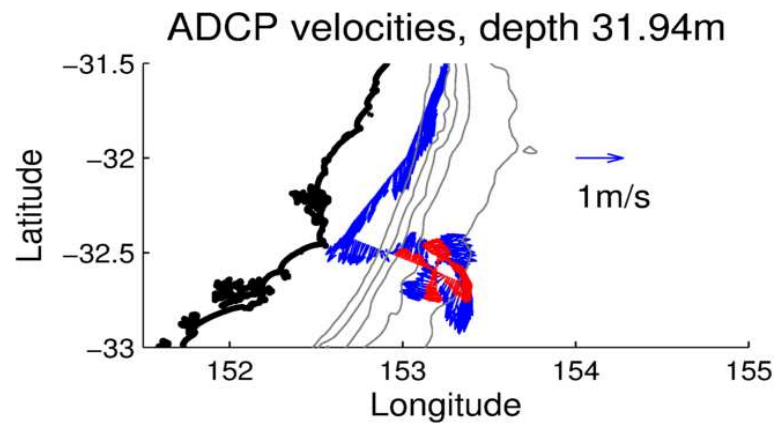




$$V_{\text{geo}} = 1.5 \text{ m/s}$$

$$V_{\text{ADCP}} = 1 \text{ m/s}$$

© IMOS 15-Oct-2015 15:26:37 Hobart time

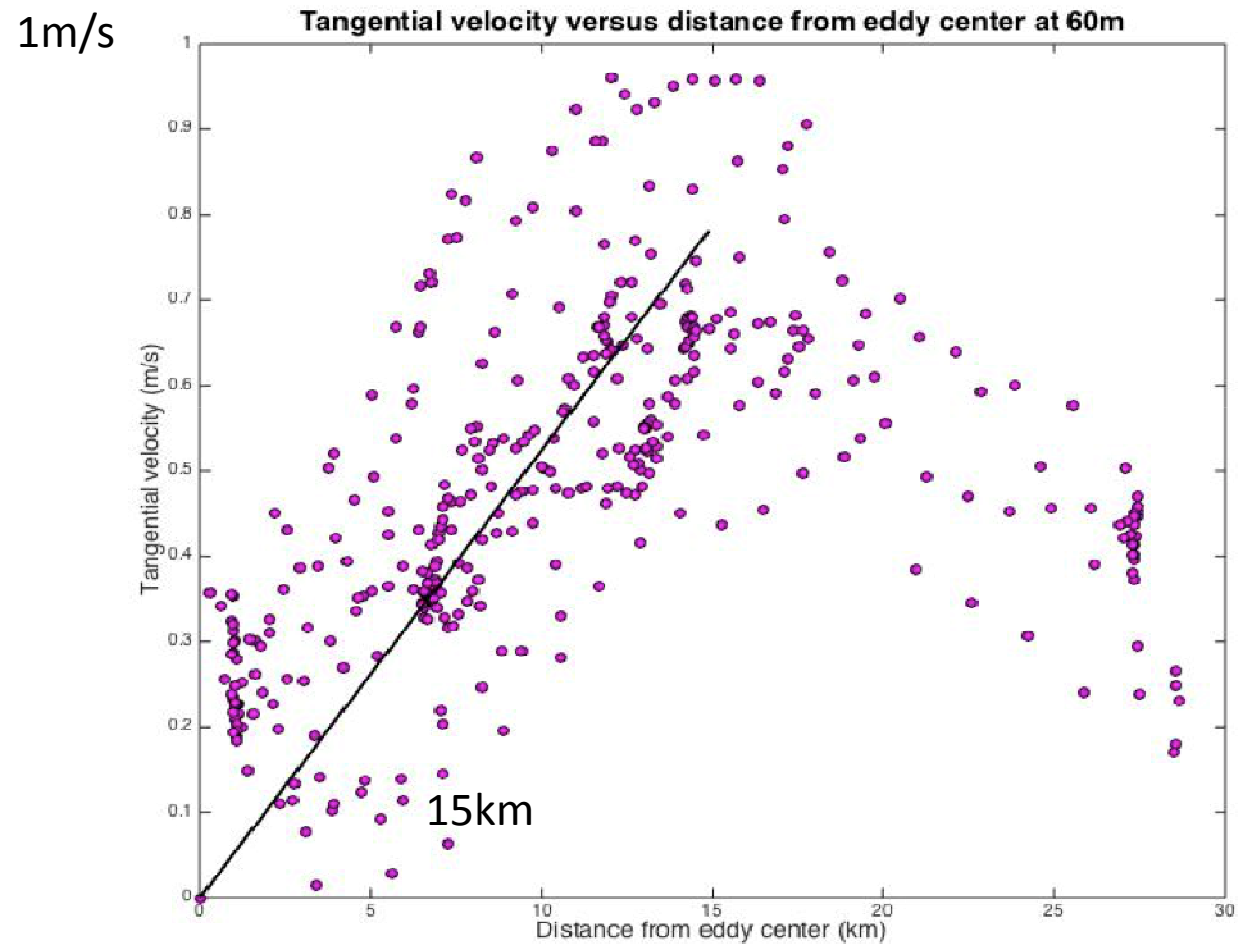




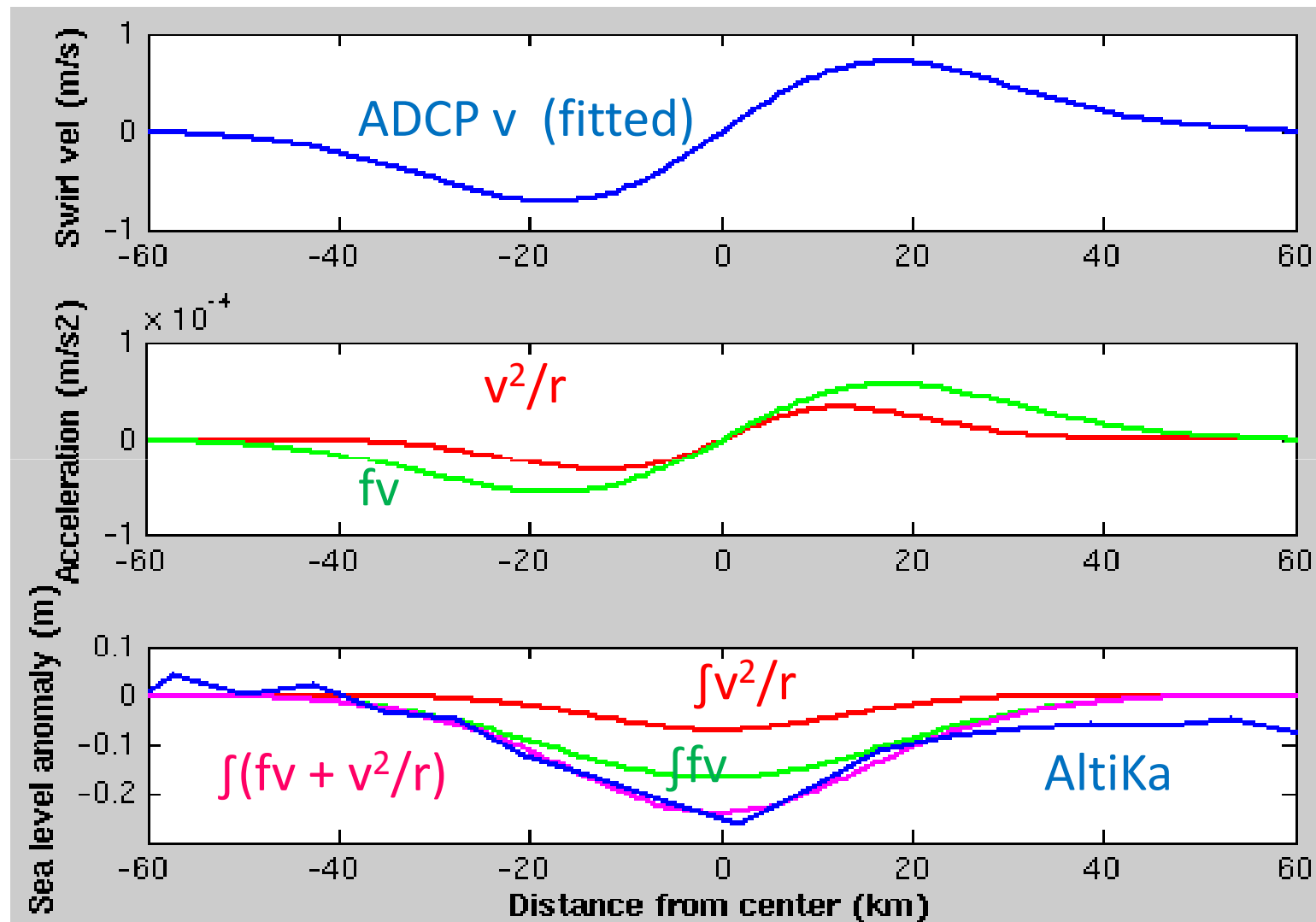
## ADCP at 60m:

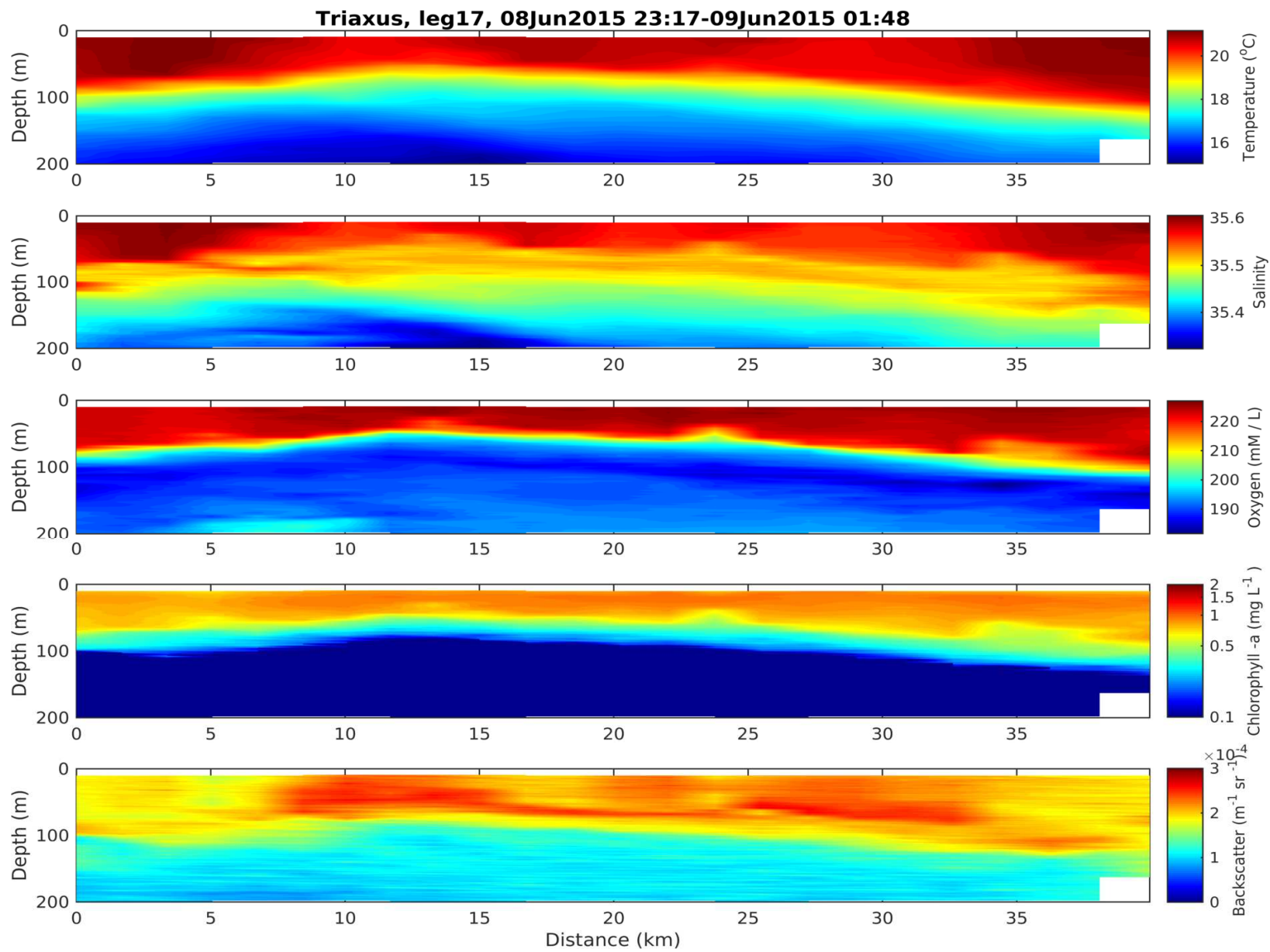
### Swirl velocity 0.5-1m/s at 15km radius

- Solid-body rotation
- $T=1\text{day}$ .  $R_o \approx 1$
- Cannot infer velocity from SLA using geostrophy

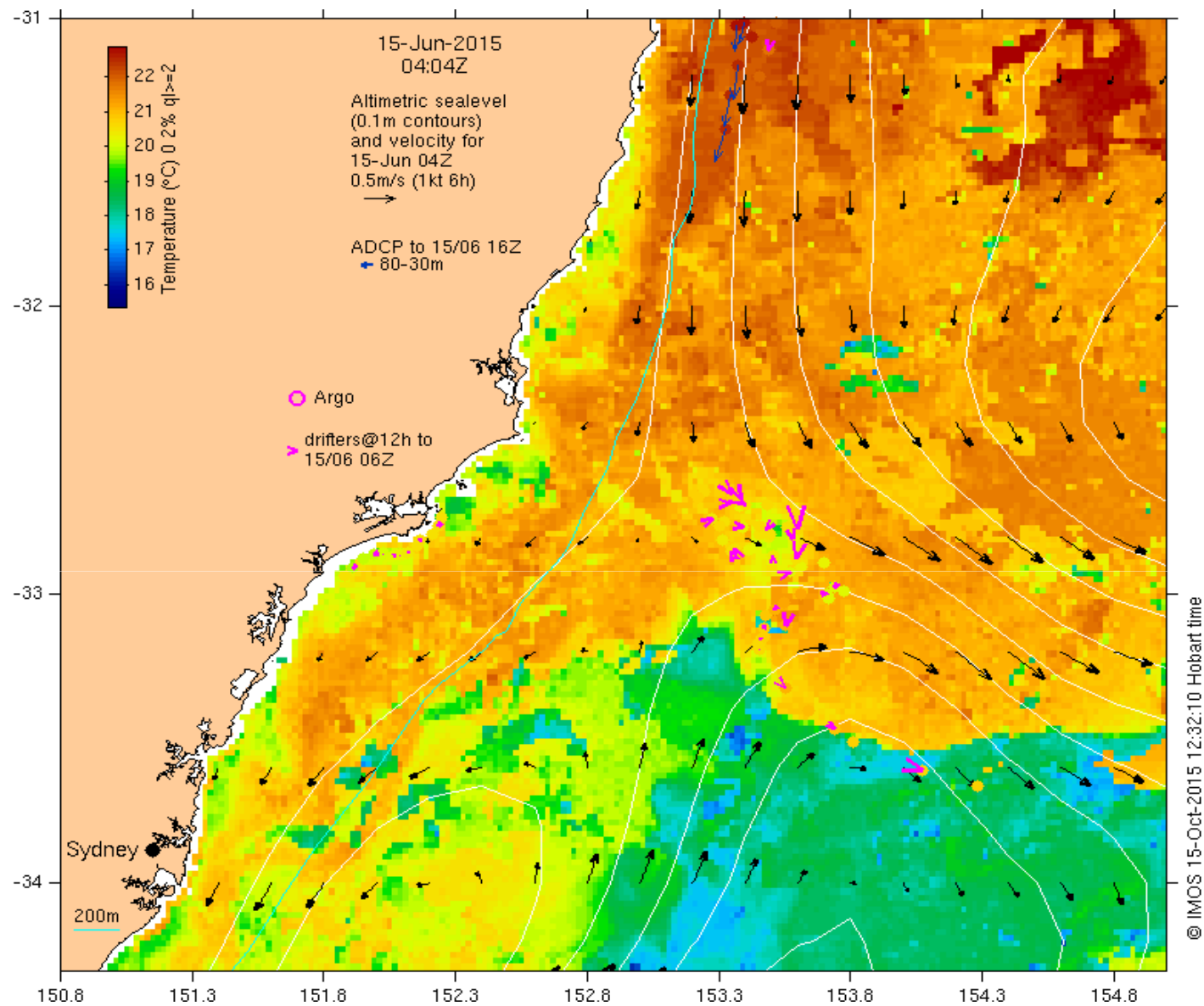


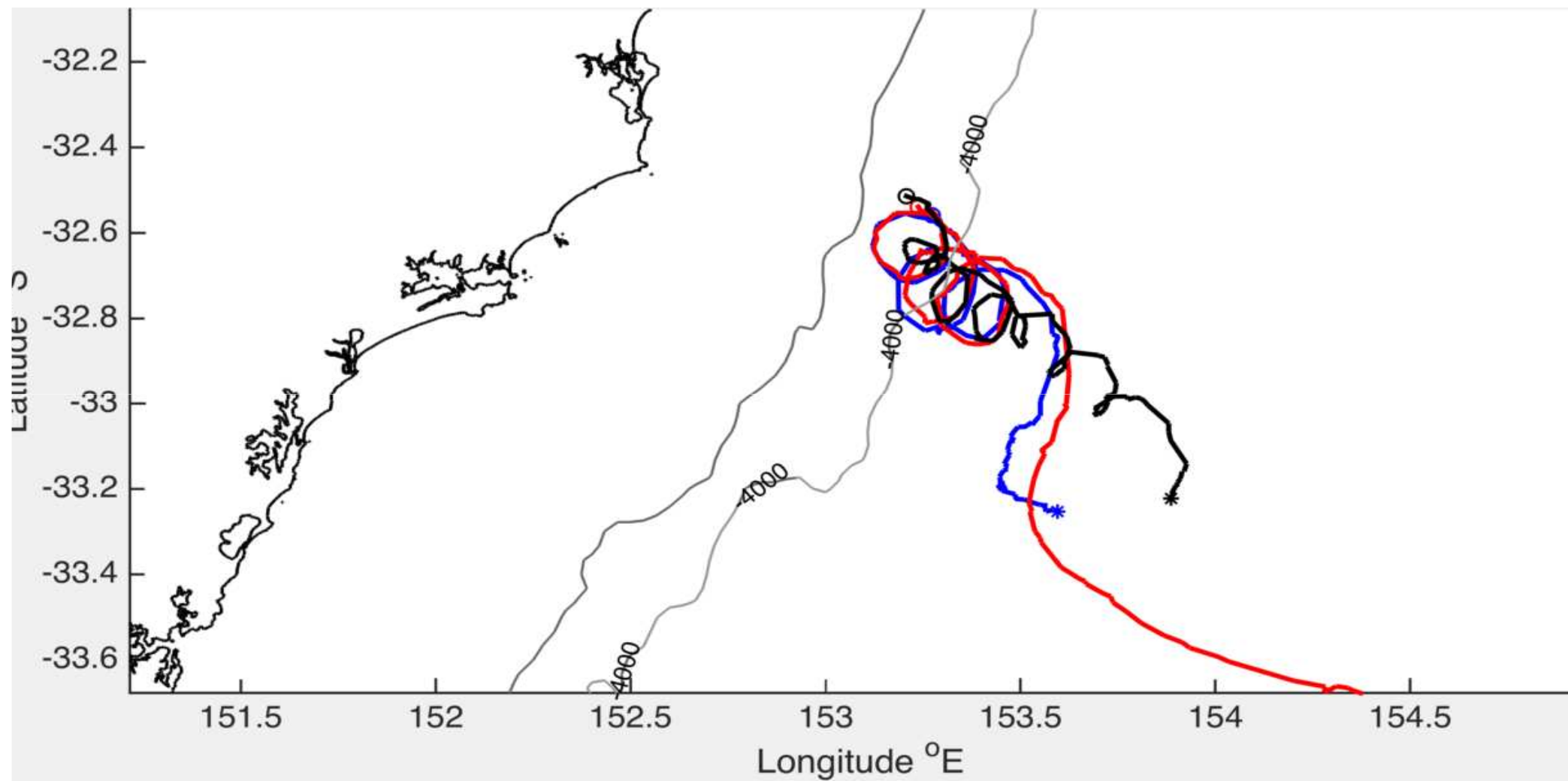
# Sub-meso cyclonic, so observed SLA gradient > $f v$











# Conclusion

- Sub-mesoscale eddies are often seen in imagery but rarely sampled so intensively.
- Their physical properties and ecological significance are the subject of speculation. Further analysis of the cruise data will shed some light on these questions.
- By amazing coincidence, AltiKa sampled the sea level anomaly through the centre of the eddy, allowing direct comparison with the in situ observations.
- Having a radius of 15km and rotation period of 1day, the centripetal acceleration accounts for about 1/3 of the SLA.
- This is not a calculation that can be done confidently in reverse with nadir altimetry. Possible with 2d (e.g. SWOT)? Hope so!





# Thank you

[DAVID.GRIFFIN@CSIRO.AU](mailto:DAVID.GRIFFIN@CSIRO.AU)  
[www.csiro.au](http://www.csiro.au)

[WWW.MARINE.CSIRO.AU/~GRIFFIN](http://WWW.MARINE.CSIRO.AU/~GRIFFIN)

