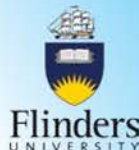


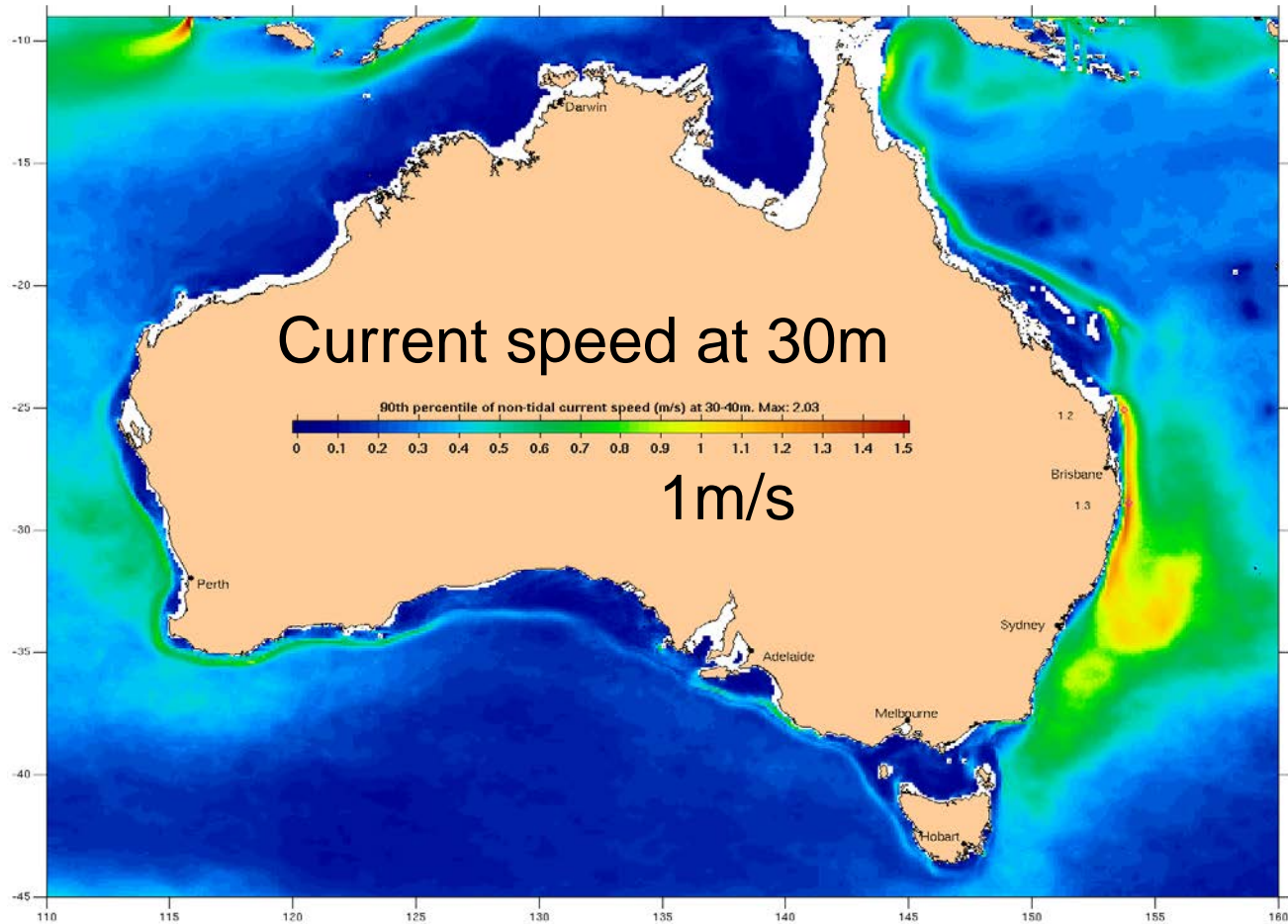
# GREAT AUSTRALIAN BIGHT RESEARCH PROGRAM

David Griffin  
Mark Hemer  
Mike Herzfeld  
Charles James  
Peter Oke

Circulation of the Great Australian Bight:  
The influence of waves and the Leeuwin Current

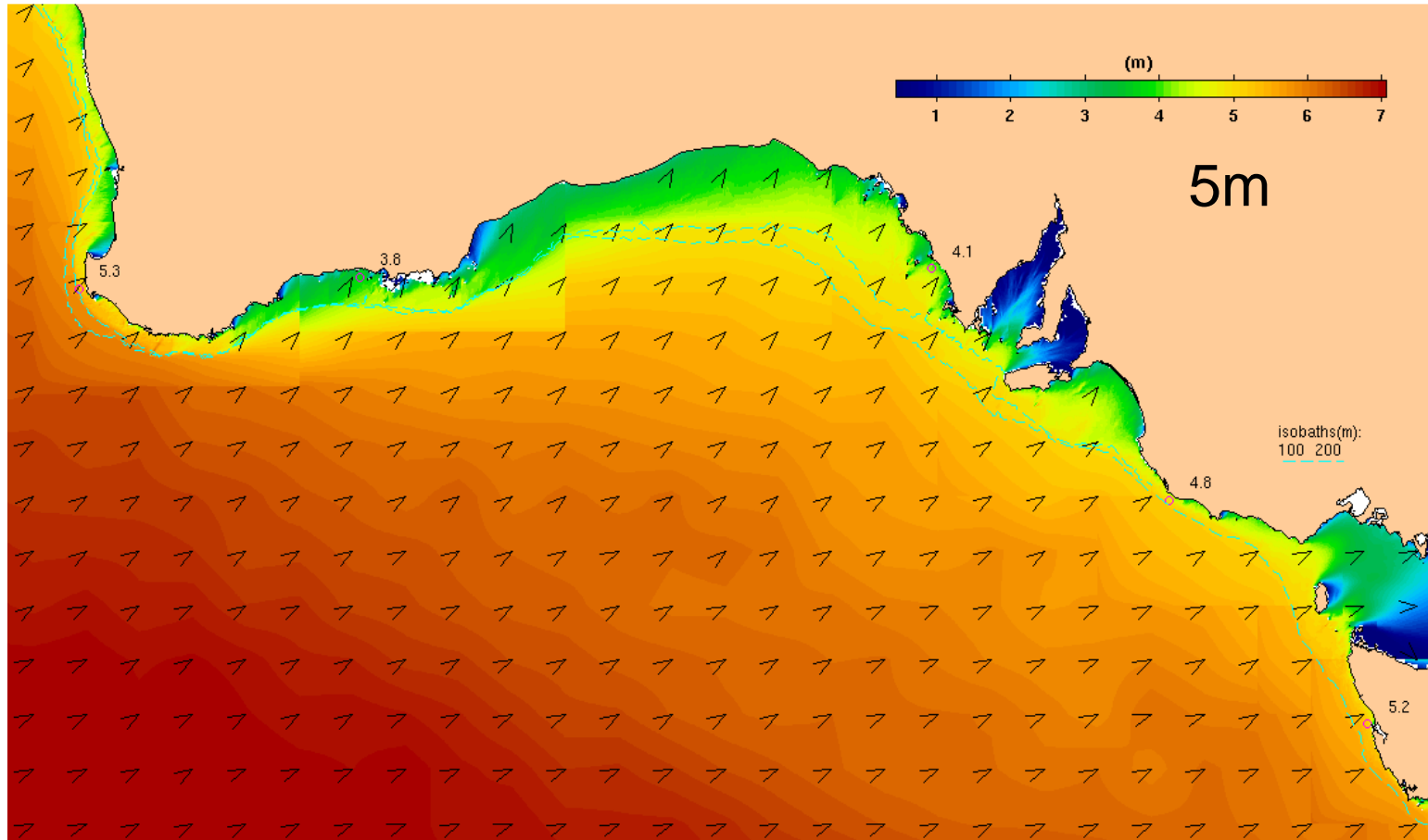


# The GAB is characterised by relatively weak circulation

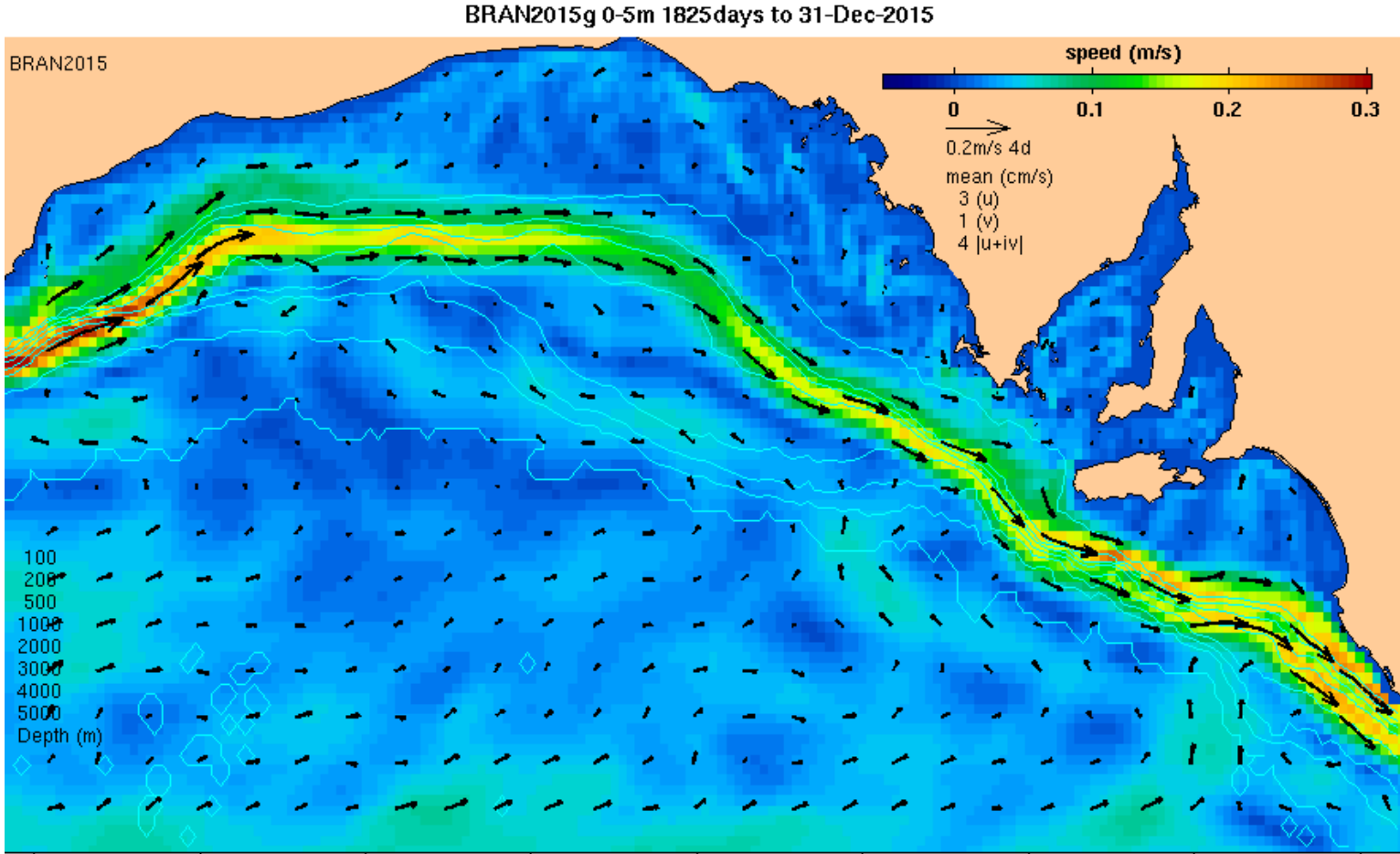


# But large waves

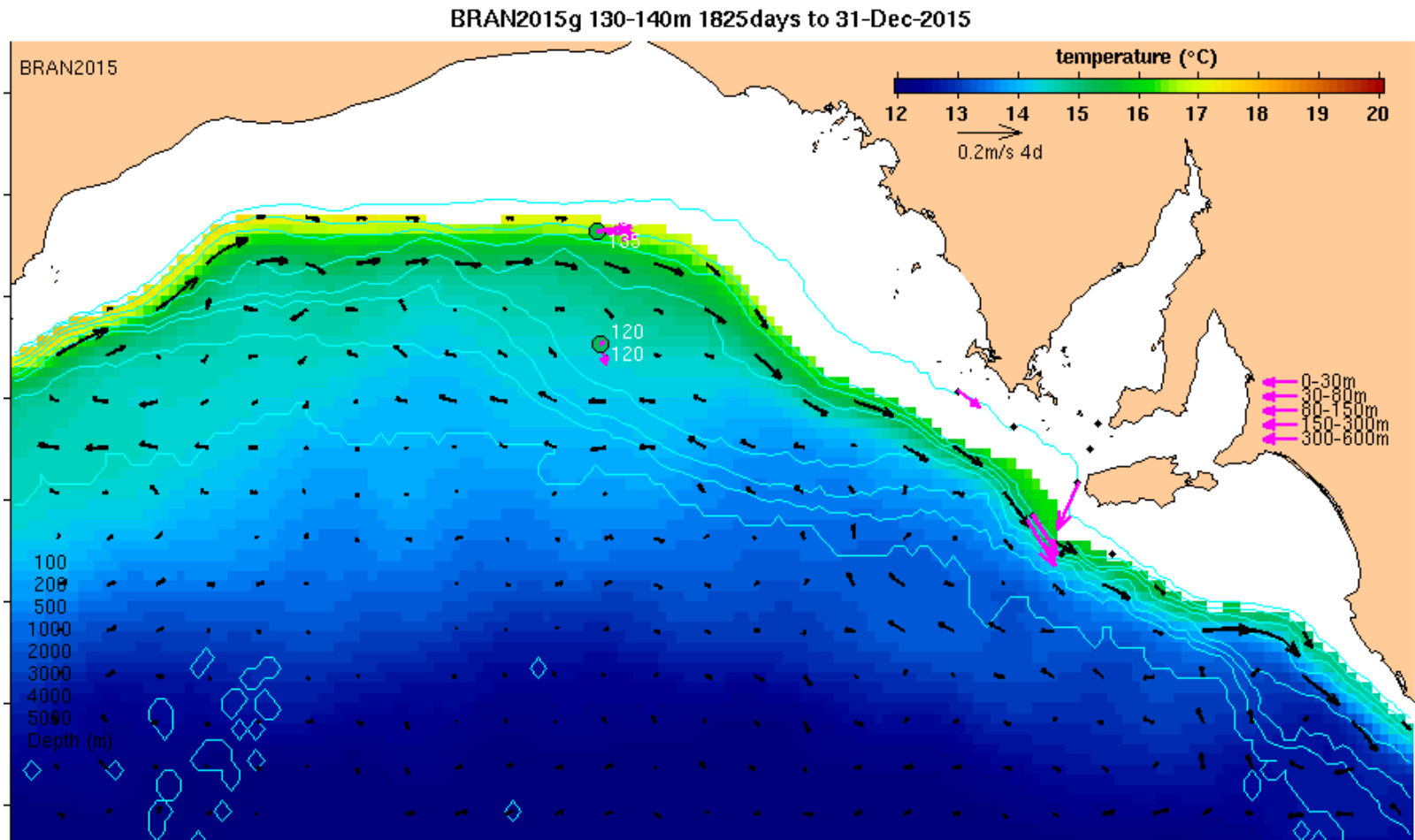
90th percentile significant wave height for August



# Long-term mean 0-5m velocity– Leeuwin / S.A. Current dominant

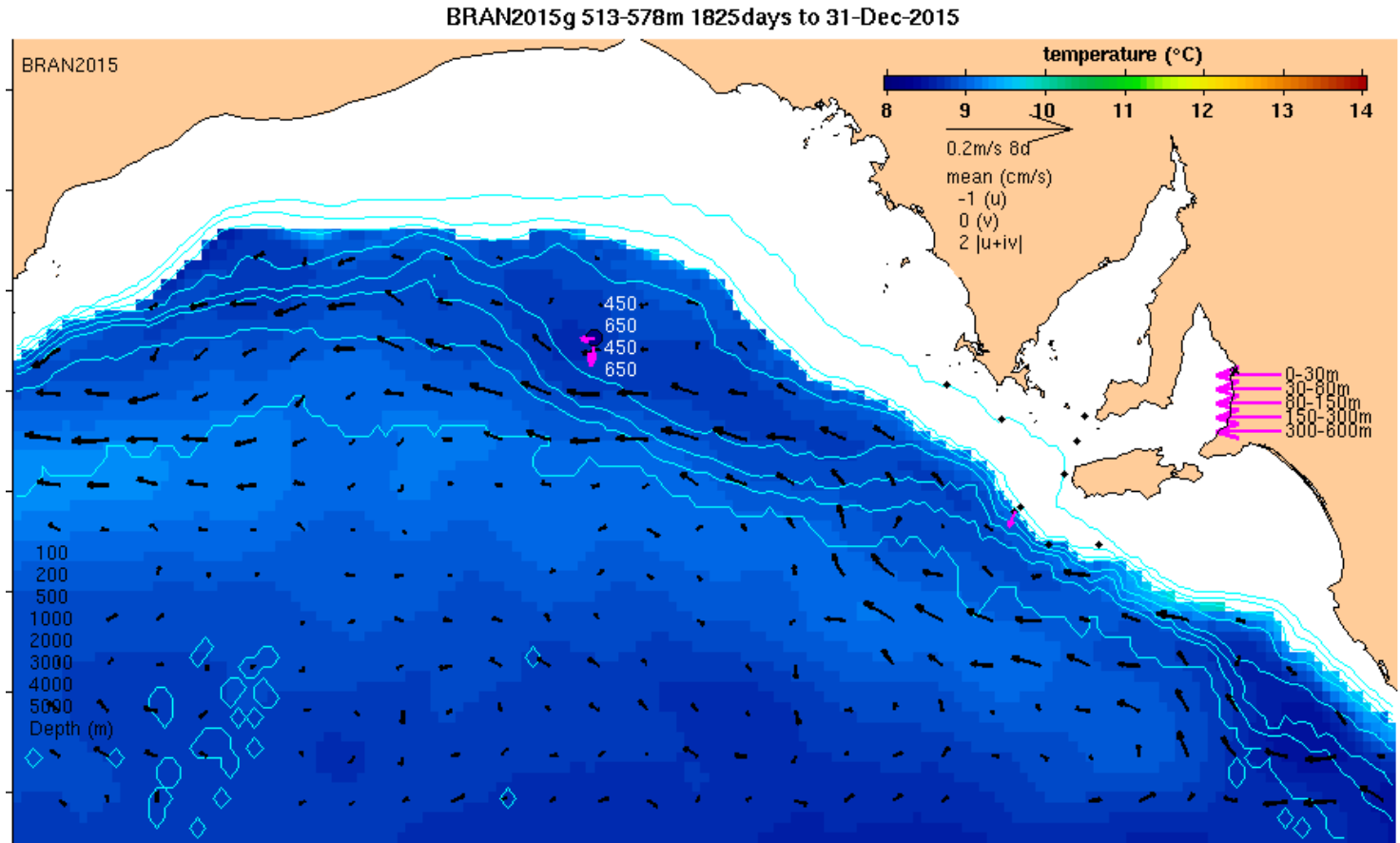


# 130 m - S.A. Current water is warm for depth



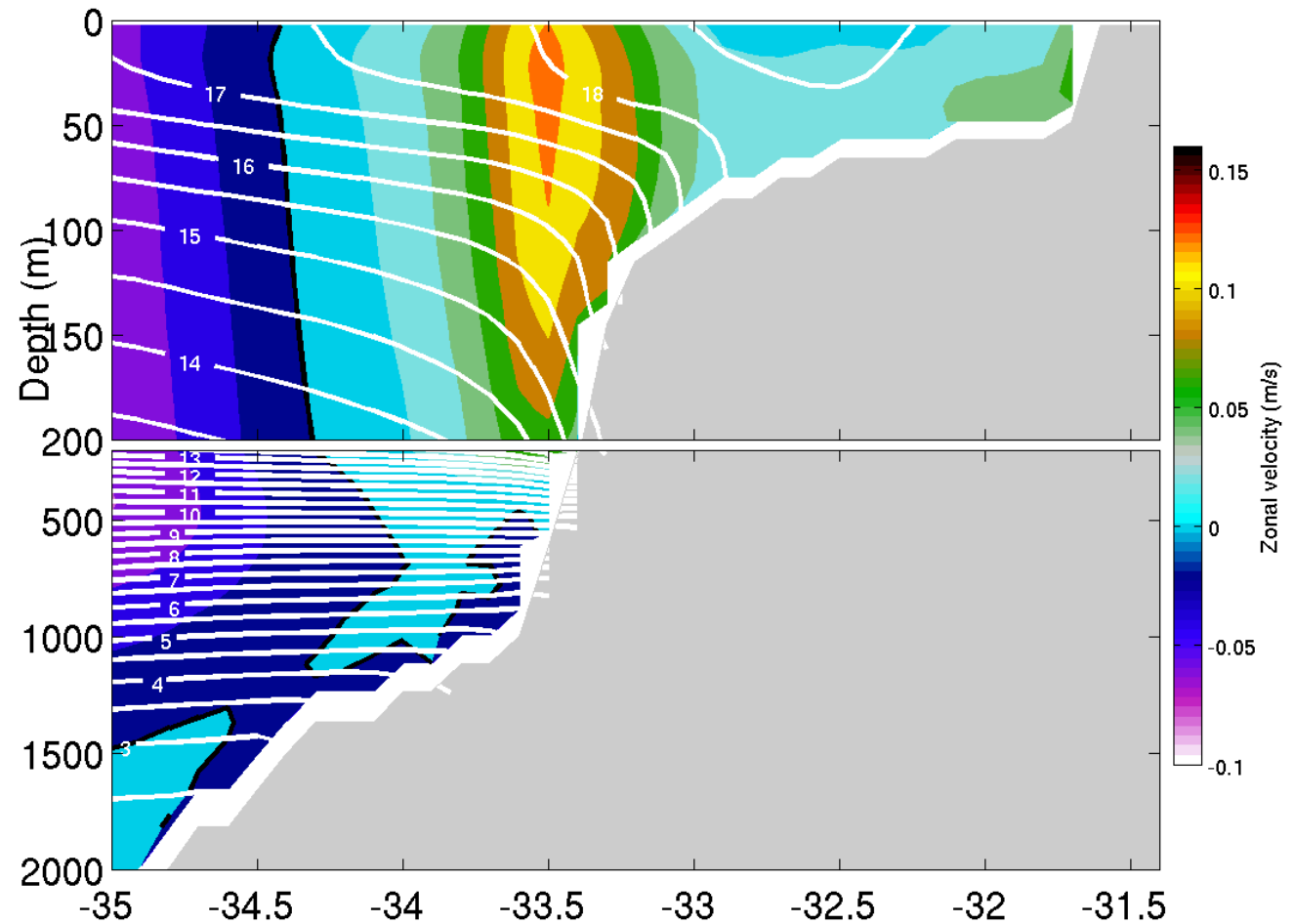
# Westward Flinders Current at 500 m on outer slope

Misses BP mooring in 1,450 m

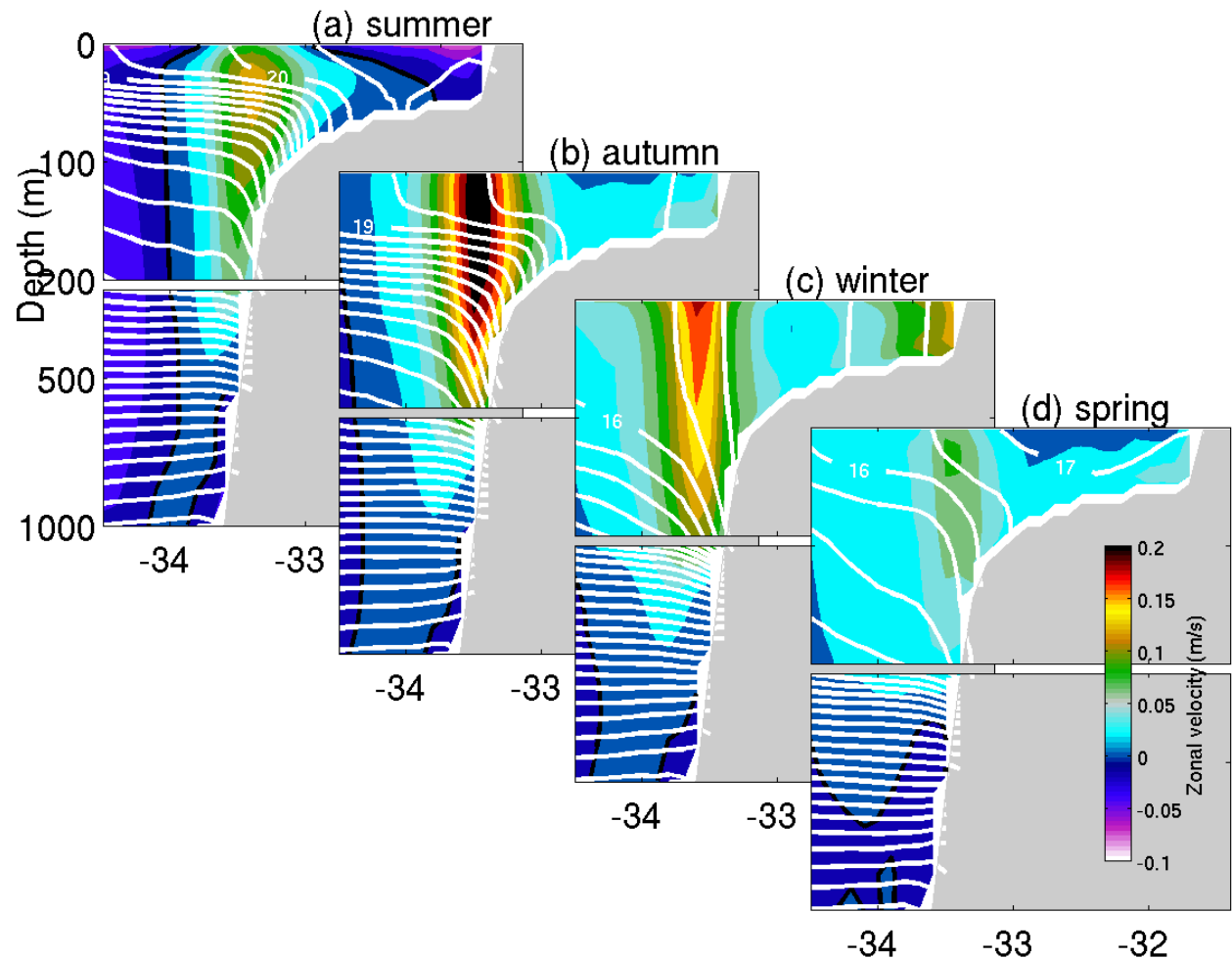


# Time-mean zonal velocity and temperature at head of Bight

Warm S.A.  
Current 12  
cm/s, deep  
Flinders 7 cm/s



# Seasonal cycle

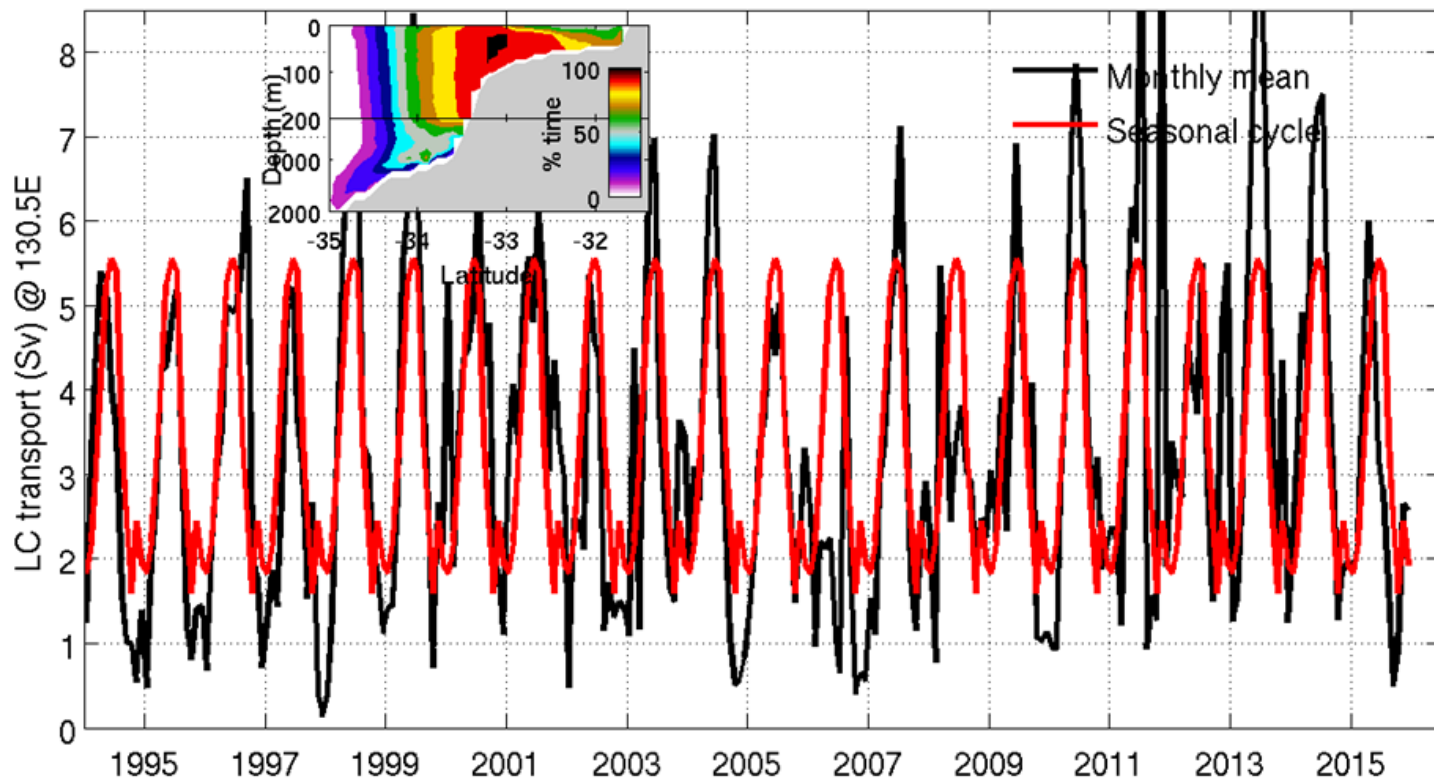


Summer: coastal  
counterflow  
Autumn: S.A.  
Current max flow  
Winter: ML  
deepest  
Spring: Nothing

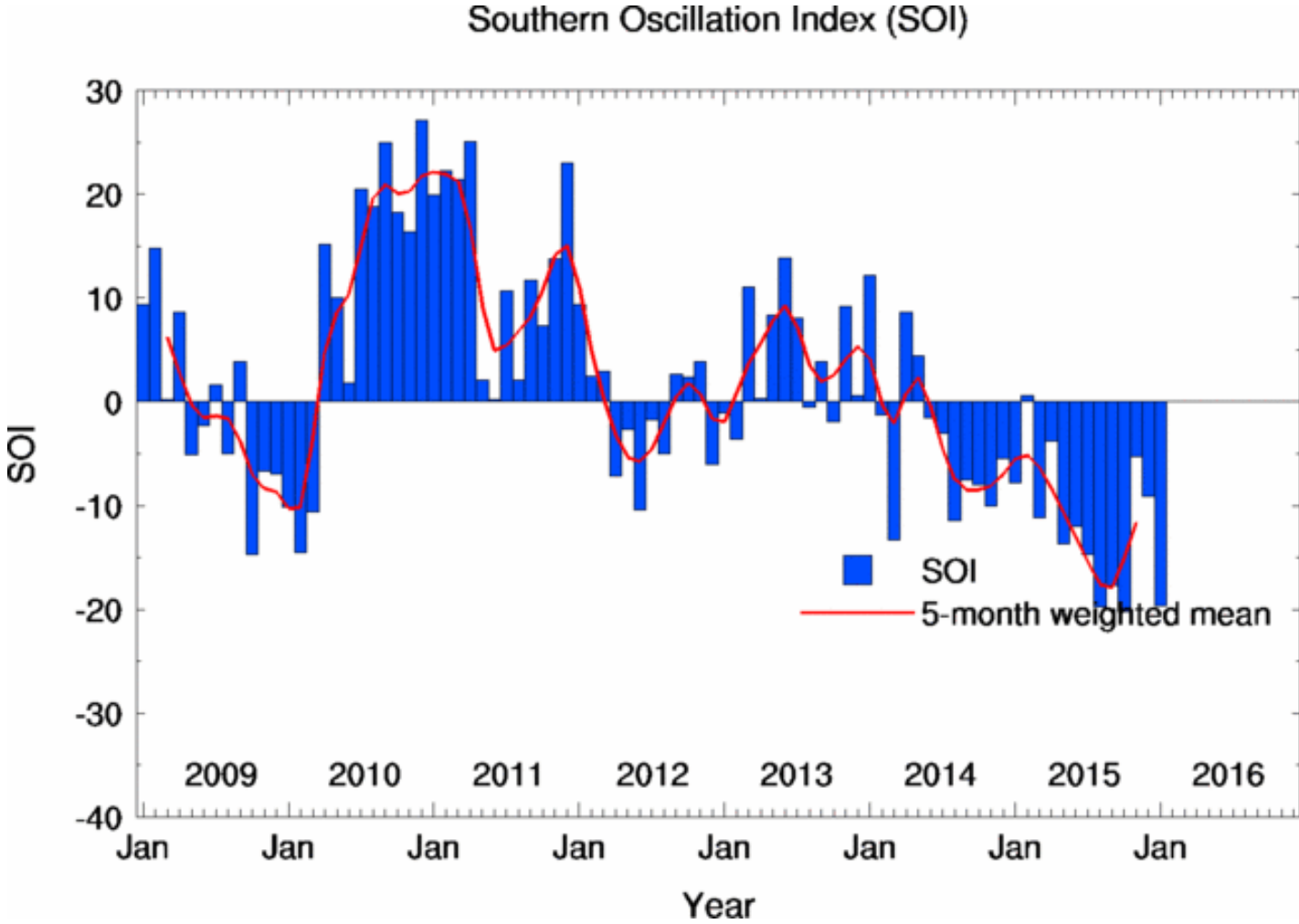


# 23 years of S.A. Current transport: 0 to 9Sv but usually 2-5.5Sv

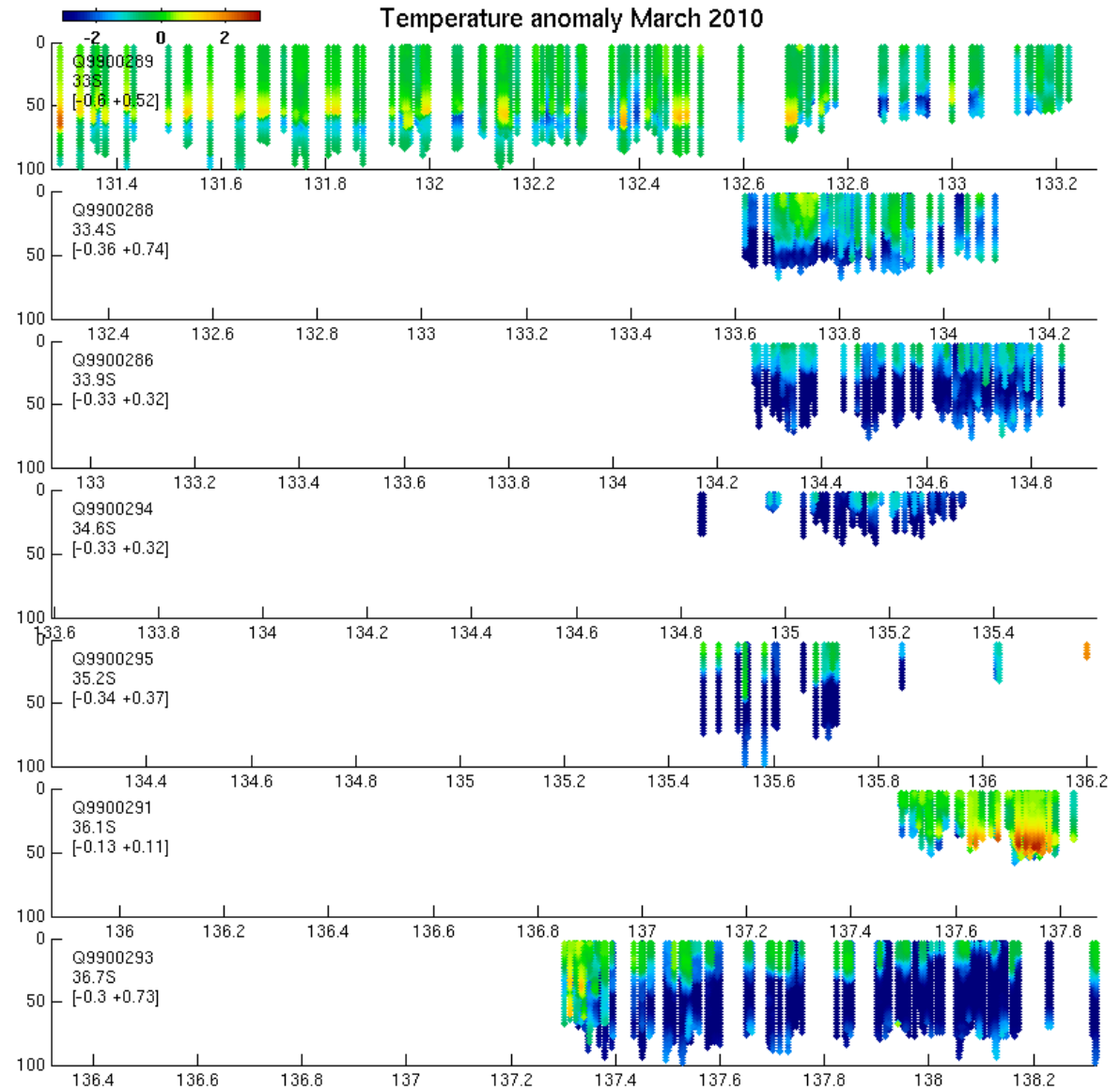
Dec 2006,  
Jan 2010,  
Dec 2015,  
v. weak!



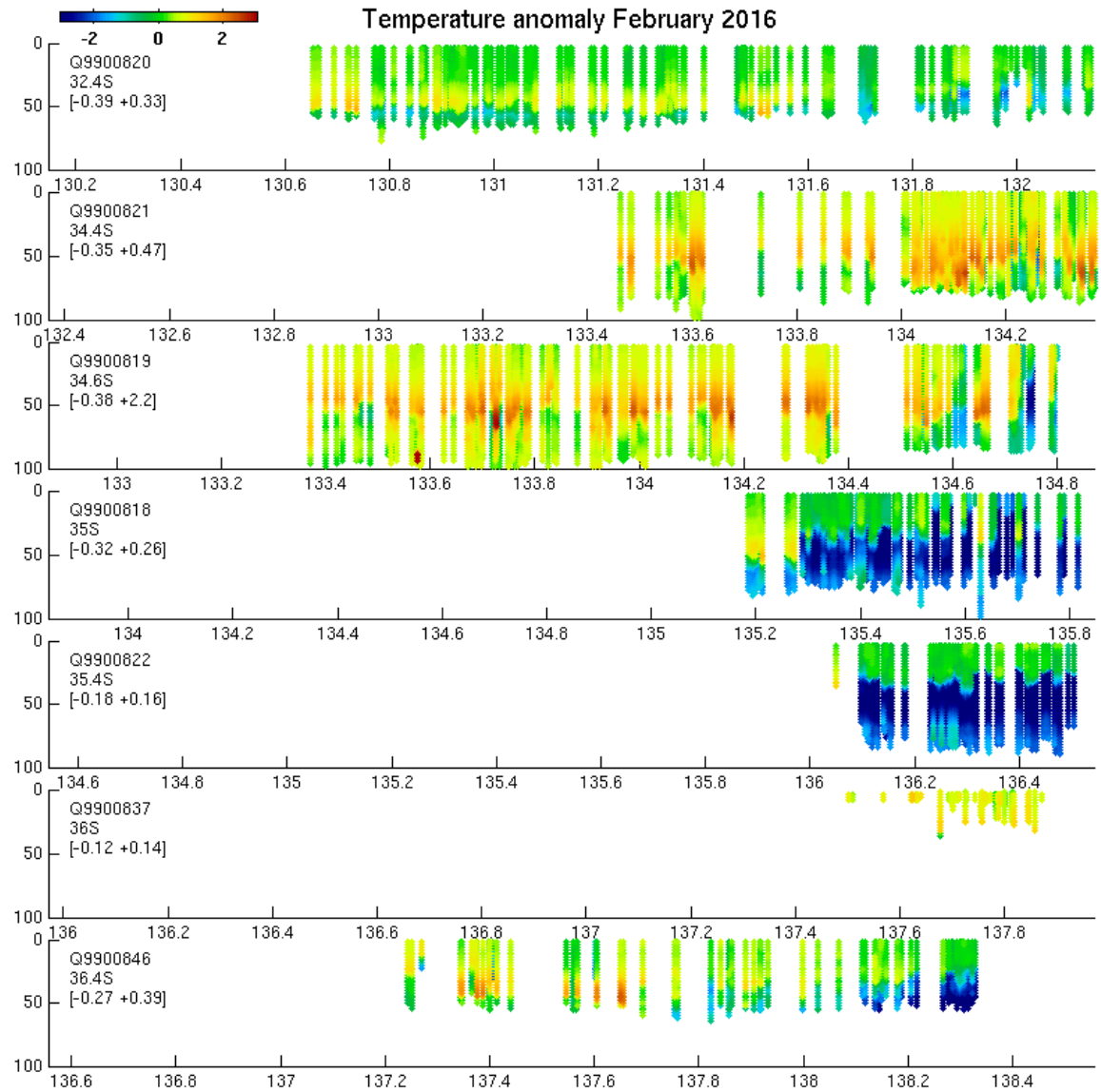
# As anticipated: relates to SOI



**Seals:  
“tell us about it”**

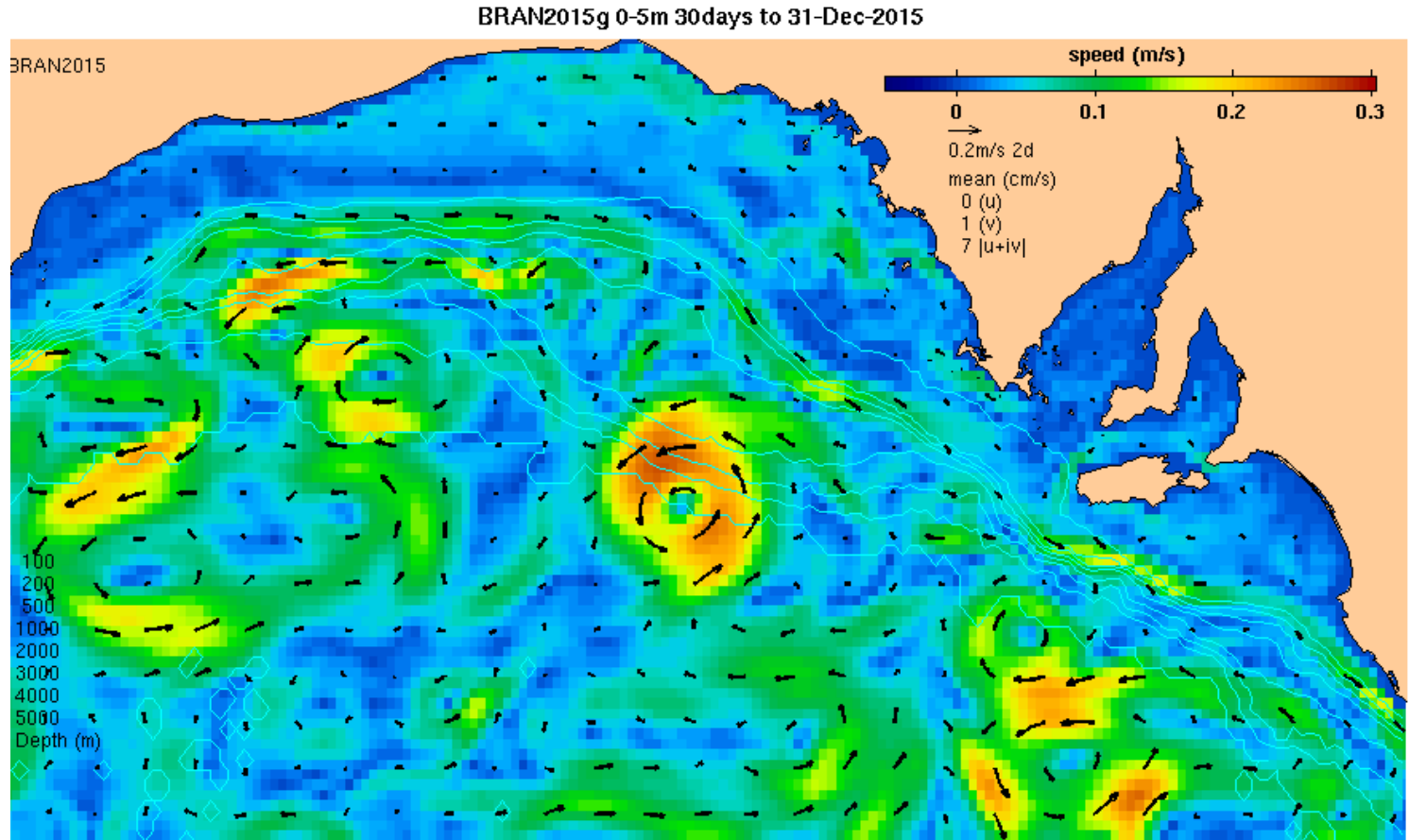


# Feb 2016



# Dec 2015

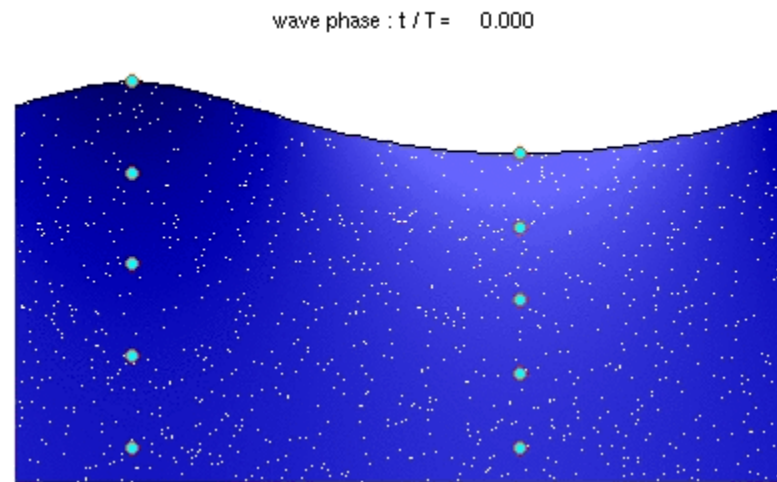
Investigator  
voyage – no  
S.A. Current  
at all, just  
eddies



## Part 2: the effects of waves on the circulation

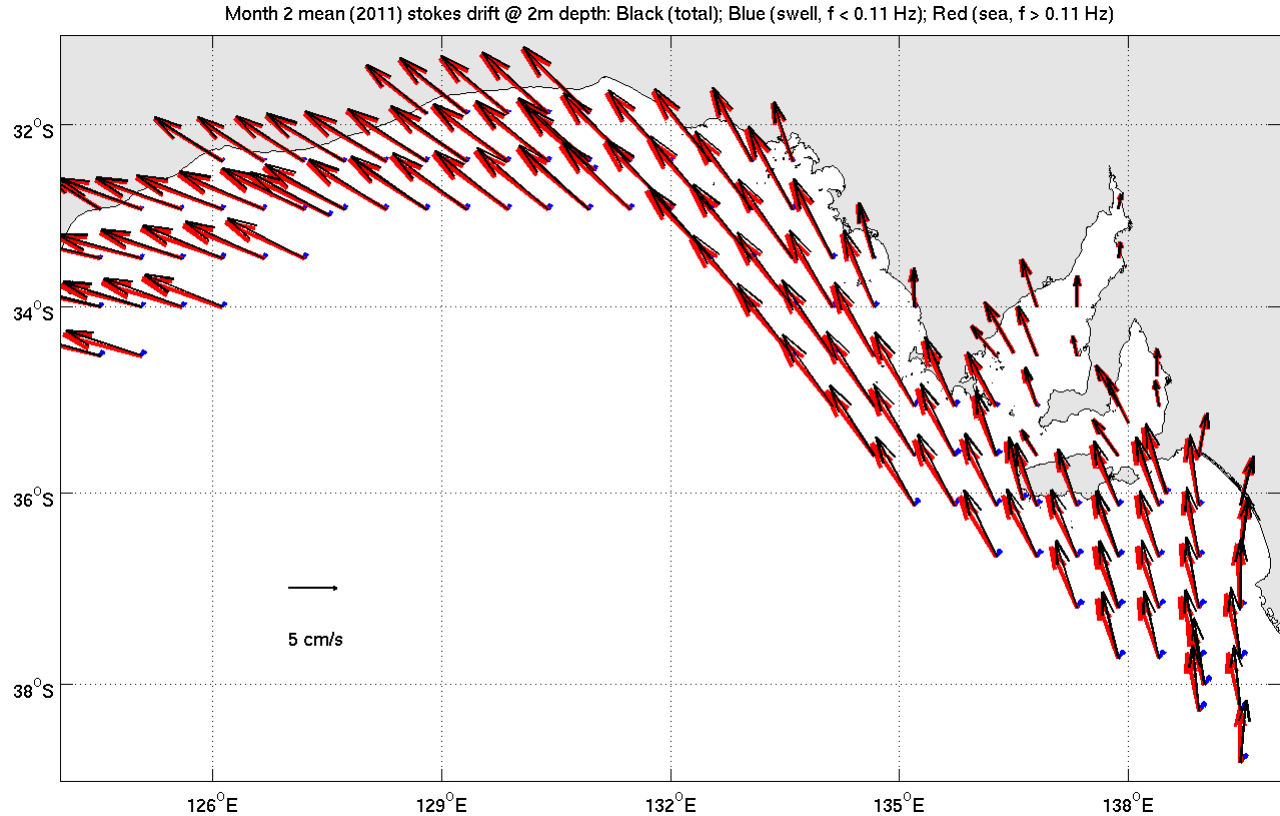
Hypothesis: here, of all places, waves must be taken properly into account, because they drive  
1) mixing and 2) surface drift.

# Stokes Drift



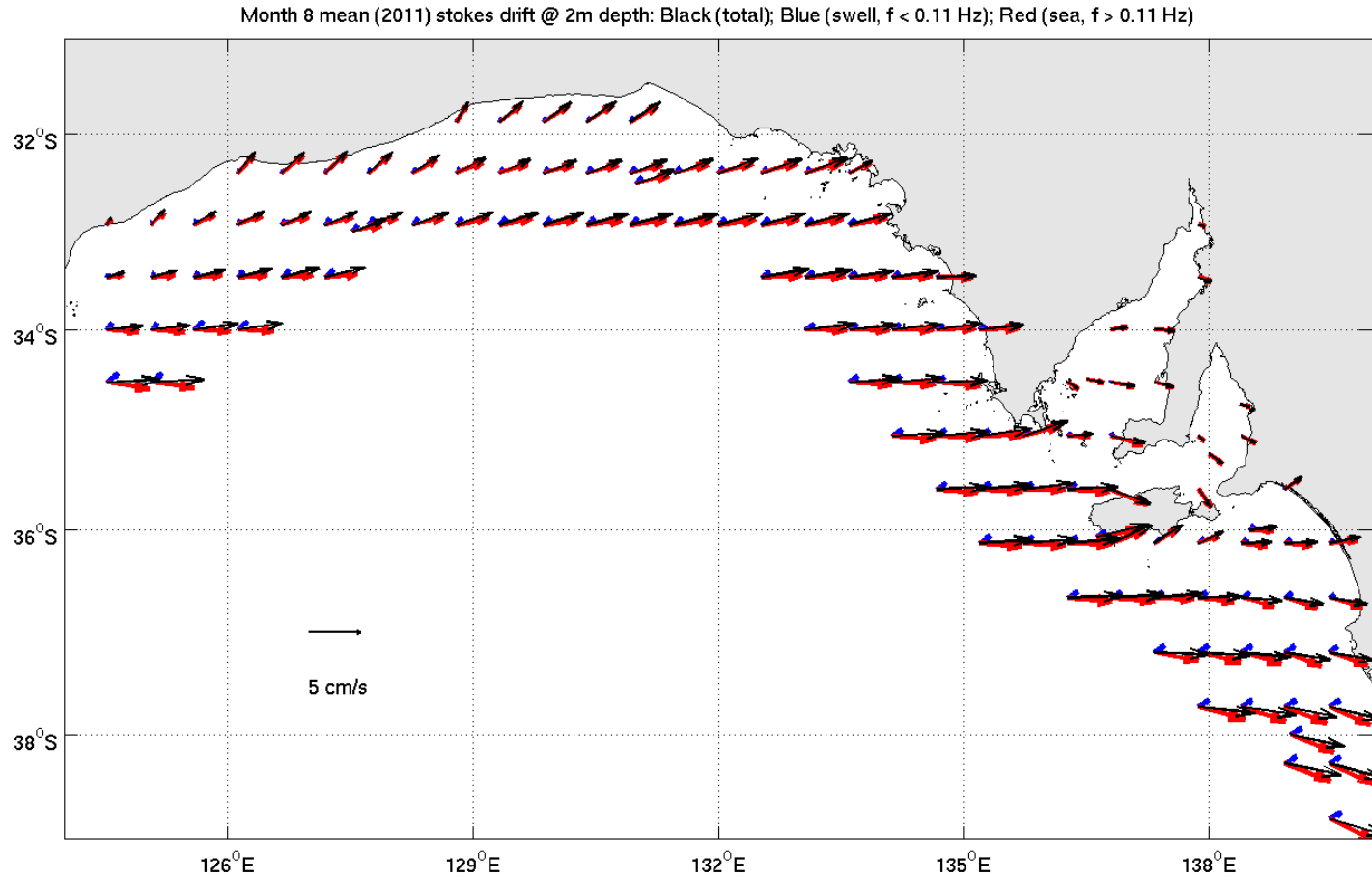
# Feb 2011 Stokes Drift

Contribution from swell is negligible





# Aug 2011



## Lessons:

Stokes Drift is mostly due to locally generated wind waves, not the big waves from far away.

So it is a fair approximation to just add 1.2% of the wind velocity to an ocean model of surface current.

See Theme 5 drift of asphaltites.

Impact on mixing: small compared to other processes.



# Conclusions

South Australian Current varies from 0 to 9 Sv. (2-5 normal range). Max flow in May.

Major impact on shelf dynamics. Cold in El Nino years.

RV Investigator cruise happened during a rare example of zero South Australian Current flow.

