1. Introduction

- The Agulhas Bank is a continental shelf that extends south between Port Alfred and Cape Town.
- The Agulhas Bank is very productive and is an important commercial fishing ground.
- Due to the widening of the shelfal shelf, meanders in the Agulhas Current often form at the eastern edge of the Agulhas Bank.
- Solitary meanders, also known as Natal Pulses, are thought to form off the northeast coast of South Africa and propagate downstream at a speed of about 20 km/day.
- Natal Pulses occur about 1.6 (Rouault and Penven, 2011) to 6 (Lutjeharms and Roberts, 1988) times per year and their frequency is thought to vary on interannual timescales (Krug and Tournade, 2012).
- Despite the importance of the Agulhas Bank, little is known about how mesoscale physical mechanisms influence both phytoplankton blooms and larval dispersal.

2. Data and Methods

- A dedicated winter cruise from 31 August - 22 September 2010 allowed the joint collection of physical (CTD and ADCP), chemical (nutrients, and biological (fluorometer, transmissometer, and mussel larval abundance)) data. See Figure 1 for station locations.
- Results from the cruise were enhanced with satellite (SST from remote sensing systems, the absolute dynamic height from AVISO, and chlorophyll a from MODIS Aqua) and meteorological (wind speed and directions from the NCEP/NCAR reanalysis) data.

3. Results - Observation of a Natal Pulse and Agulhas Current Meander

- Satellite data show that there was a Natal Pulse on the southern end of sections 1-3 and an Agulhas Current meander at the southern end of sections 4-6 (Figure 1).
- The ADCP data show that the current was northward at the edge of the cyclonic Natal Pulse (Figure 2).
- The ADCP data show that the current was northward and southwestward on the shelf within the Agulhas Current meander (Figure 2).
- These results suggest that a Natal Pulse can cause the Agulhas Current to cross the continental shelf as an Agulhas Current meander.

4. Internal Waves

- The depth of the thermocline varied near the shelf break along section 12 (Figure 4).
- The meridional velocity was baroclinic near the shelf break.
- The periodicity of the vertical displacements suggest the passage of internal waves with a wave height of about 50 m and a wavelength of about 50 km.
- Fluorescence (and larval data - see Porri et al., 2012) data show that the phytoplankton were concentrated at the crest of the internal waves, suggesting the crests are biological hotspots.

5. Model Results

- The high-resolution nested ocean model INALT01 (Blastoouch et al., 2009; Durgaadoo and Blastoouch, 2012) was used to study Natal Pulses (Figures 5 and 6).
- Similar to Rouault and Penven (2011), the model showed that there were about 1-2 Natal Pulses per year (Figure 6).
- Agulhas Current meanders were defined as when the core of the Agulhas Current moved inshore of its mean position.
- An Agulhas Current meander almost always preceded a Natal Pulse.
- Agulhas Current meanders occur more frequently than Natal Pulses.