NATAL PULSE

The Natal pulse is the collective name for large, solitary meanders that progress downstream along the east coast in the Agulhas Current. These pulses are believed to originate in the Natal Bight as cyclonic, trapped lee eddies. They progress downstream consistently at rates of 21 cm/s until the shelf broadens at Algoa Bay, where they slow down to 5 cm/s. On average, they extend offshore by about 170 km, and as they move downstream they show continuous lateral growth. Inshore of the Agulhas Current, intermittent coastal counter currents are observed, and are thought to be caused by the passing of these Natal pulses (Lutjeharms and Roberts, 1988).

A trapped cyclonic eddy is topographically induced in the Natal Bight and is energetically driven by the Agulhas Current. Spasmodically, these eddies escape and progress down the inshore edge of the Agulhas Current. A suggested triggering mechanism for the formation of a Natal pulse is the adsorbtion of deep-sea eddies onto the seaward side of the Agulhas Current (Lutjeharms and Roberts, 1988). De Ruijter et al. (1999) argued that the formation was related to barotropic instability of the strongly baroclinic Agulhas Current.

It has been hypothesized that Natal Pulses may trigger the spawning of Agulhas rings once they reach the retroflection region. They force the core of the Agulhas Current offshore, sometimes resulting in an upstream retroflection of the current, and thus lessening the amount of water available for exchange with the South Atlantic Ocean. This offshore forcing of the Agulhas Current core can possibly have a significant effect on the local weather conditions as well as on the global climate, as coastal rainfall

is related to the distance between the coast and the core of the current (Lutjeharms and de Ruijter, 1996).

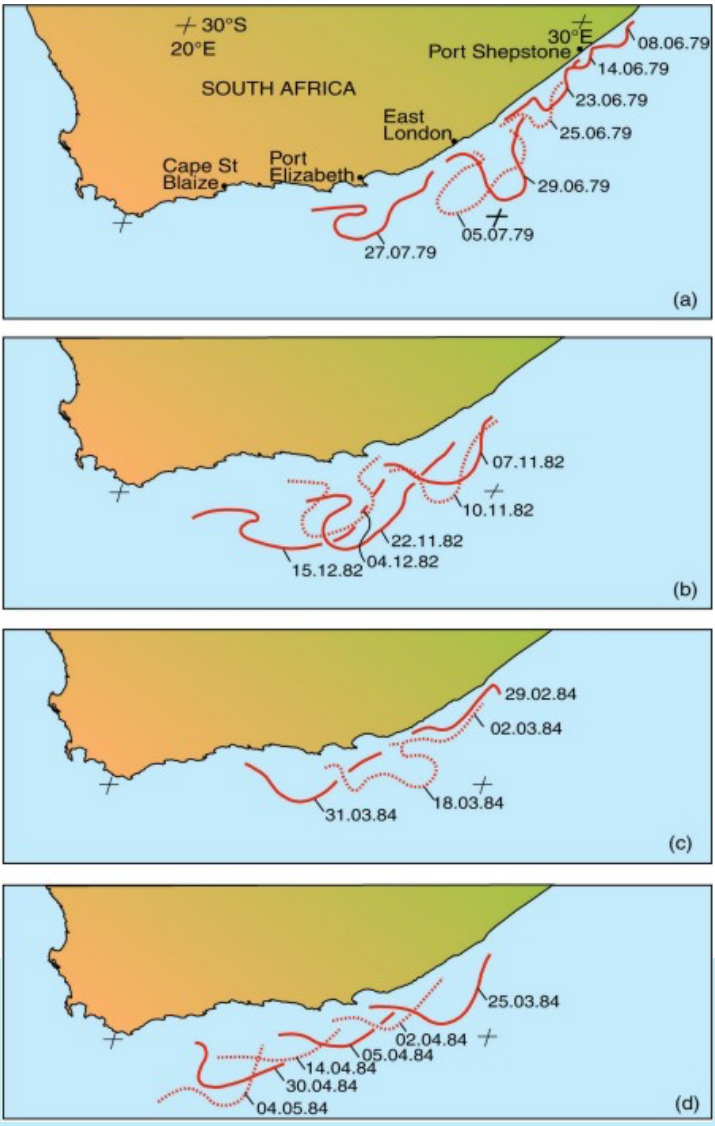

Figure 1 - Red lines show the landward front of the Agulhas Current as the Natal pulse progresses downstream (the pulse forces the front seawards). Satellite thermal infrared imagery was used to obtain the locations of these fronts. Each panel shows the progression of an individual Natal pulse. (Diagram adapted from Lutjeharms and Roberts, 1988).

CLASSIC PAPER

Lutjeharms, J. R. E. and Roberts, H. R. (1988). **The Natal Pulse**. Journal of Geophysical Research, 93, 631-645.

Bibliography

- de Ruijter, W. P. M., van Leeuwen, P. J. and Lutjeharms, J. R. E. (1999). Generation and evolution of Natal Pulses: solitary meanders in the Agulhas Current. Journal Physical Oceanography, 29, 3043-3055.
- Grundlingh, M. L. (1979). Observaton of a large meander in the Agulhas Current. Journal of Geophysical Research, 84 (C7), 3776-3778.
- Lutjeharms, J. R. E. and Connell, A. D. (1989). The Natal Pulse and inshore counter-currents off the South African east coast. South African Journal of Science, 85, 533-535.
- Lutjeharms, J. R. E. and de Ruijter, W. P. M. (1996). The influence of the Agulhas Current on the adjacent coastal ocean: possible impacts of climate change. Journal of Marine Systems, 7, 321-336.
- Lutjeharms, J. R. E., Valentine, H. R. and Van Ballegooyen, R.C. (2000). The hydrography and water masses of the Natal Bight, South Africa. Continental Shelf Research, 20,1907-1939.
- van Leeuwen, P. J. and de Ruijter, W. P. M. (2000). Natal Pulses and the formation of Agulhas Rings. Journal of Geophysical Research, 105 (C3), 6425-6436.