ABSTRACT

Roberts, M. J. and M. van den Berg (2000).

Recruitment variability of chokka squid - role of currents on the Agulhas Bank (South Africa) in paralarvae distribution and food abundance.

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Large scale, well-defined Western Boundary Currents (WBCs) play a major role in the life cycle of oceanic squids such as *Illex spp*, and consequently, anomalies in their behaviour can strongly affect squid recruitment (Rodhouse at al 1998). In general, WBCs transport eggs and paralarvae from the spawning grounds upstream to the feeding grounds down stream. Food for the paralarvae is generated along the frontal zone by the physical interaction of the WBC with the shelf waters, and is readily available.

In contrast, the life cycle of a Loliginid squid such as chokka (*Loligo vulgaris raynaudii)* is superimposed on shelf currents which are complex and not as well defined as WBCs . Unraveling the factors responsible for recruitment, and in particular, the role of currents, is therefore more difficult. Initial studies suggested that the chokka squid spawning grounds found in the eastern regions of the Agulhas Bank, were connected with the western region of abundant food for paralarvae, by a net westward flowing shelf current. This was considered an elegant spawning strategy analogous with that of the oceanic squid.

However, a composite of bongo data collected over several years, indicated that chokka squid paralarvae can be widely dispersed in different oceanographic regions around South African coast i.e. on the west coast which is cold and highly productive, but where spawning has never been observed – and on the east coast which is warm but food abundance is particularly low. Many of the paralarvae collected were found on the main spawning ground between Plettenberg Bay and Algoa Bay – east of the “cold ridge” which supports the high abundance of copepods?

Results from two recent flow pattern studies, one using a bottom mounted ADCP deployed on the inshore spawning grounds, and a other a hydrodynamic computer model driven by wind, salinity and heat fluxes – together appear to not only explain the observed wide dispersion pattern of paralarvae, but also have demonstrated that paralarvae can be lost from the Agulhas Bank shelf ecosystem – and hence impact recruitment. Unexpectedly measurements made by the ADCP deployment indicate that a swift eastward surface current exists on the inshore spawning grounds which will transport squid paralarvae in the upper layer away from the abundance of copepod food found in the west – in contradiction to earlier understanding. This result also suggests that paralarvae in the surface layer may be lost to recruitment by way of entrapment in the frontal shear of the Agulhas Current, a powerful WBC which flows close to the east coast. Interesting, however, the data shows that beneath this surface current, flow oscillates between eastward and westward with equal frequency, with velocities typically half that of the surface. Paralarvae that remain near the bottom would therefore be retained in the vicinity of the spawning grounds, and although may not be transported into the region of greatest food abundance, would have a low risk of being lost from the shelf ecosystem.

To identify which of these processes are important for chokka squid recruitment, we need to know their vertical swimming behaviour. This information, however, is lacking but is the focus of a new study. (Preliminary results may be available before July 2000).