



Figure 16. (top) Histogram of numbers of eddies at one level which can be detected at that and all the shallower levels but not deeper levels by looking downward from the surface (a level of 400 m). (bottom) Histogram of numbers of eddies at one level which can be detected at that and all the deeper levels but not shallower levels by looking upward from the surface (a level of 400 m).

which can reach deeper than 50 m decreases dramatically. This figure also shows that cyclonic eddies can reach deeper than anticyclonic eddies. When looking upwards from the level of 400 m, the similar trend is seen: most eddies cannot penetrate to the surface.

[32] In total, there are about 2700 eddies which can penetrate to 400 m as listed in Table 1. Due to some uncertainty in the criteria of eddy drifting distance, there are slight differences in upward- and downward-looking penetrating eddy numbers. From the 400 m-penetrated eddy data, it is found that there are three types of eddies in terms of size with respect to vertical variation (see Figure 17): (1) bowl-shaped: an eddy has the largest size at the surface; (2) cone-shaped: an eddy has the largest size at the bottom (400 m); (3) lens-shaped: an eddy has the largest size in the stratification layer. Table 1 shows the numbers of three types of eddies. Most eddies (65%) are bowl-shaped and 20% are lens-shaped and about 15% are cone-shaped. It is also

interesting to be noted that 90% of 400-m penetrated eddies are cyclonic eddies, which is consistent with Figure 16.

5. Eddy Variation in the SBC during September

[33] The upwelling and downwelling associated with eddies can make significant impacts on the fine particle suspensions and chemical and biological processes in the upper ocean, which can affect the penetrating depth of visible sunlight (T. Dickey et al., submitted manuscript, 2011). Thus eddy analysis can help us better understand the data collected in the RyDyo experiment.

[34] The RaDyO experiment was conducted in the SBC in September 2008. Though the current numerical product has not yet been extended to the year of 2008. However, with the availability of external forcing information, the decade-long numerical solution does allow us to examine the eddy variation in the season of the SBC RaDyO experiment.

Table 1. Numbers of Three Types of Eddies Penetrating Through 400 m

	Bowl-Shaped			Lens-Shaped			Cone-Shaped			Total
	Cyclonic	Anticyclonic	Total	Cyclonic	Anticyclonic	Total	Cyclonic	Anticyclonic	Total	
Downward	1556	189	1745	491	67	558	367	17	384	2687
Upward	1442	185	1627	545	92	637	415	25	440	2704