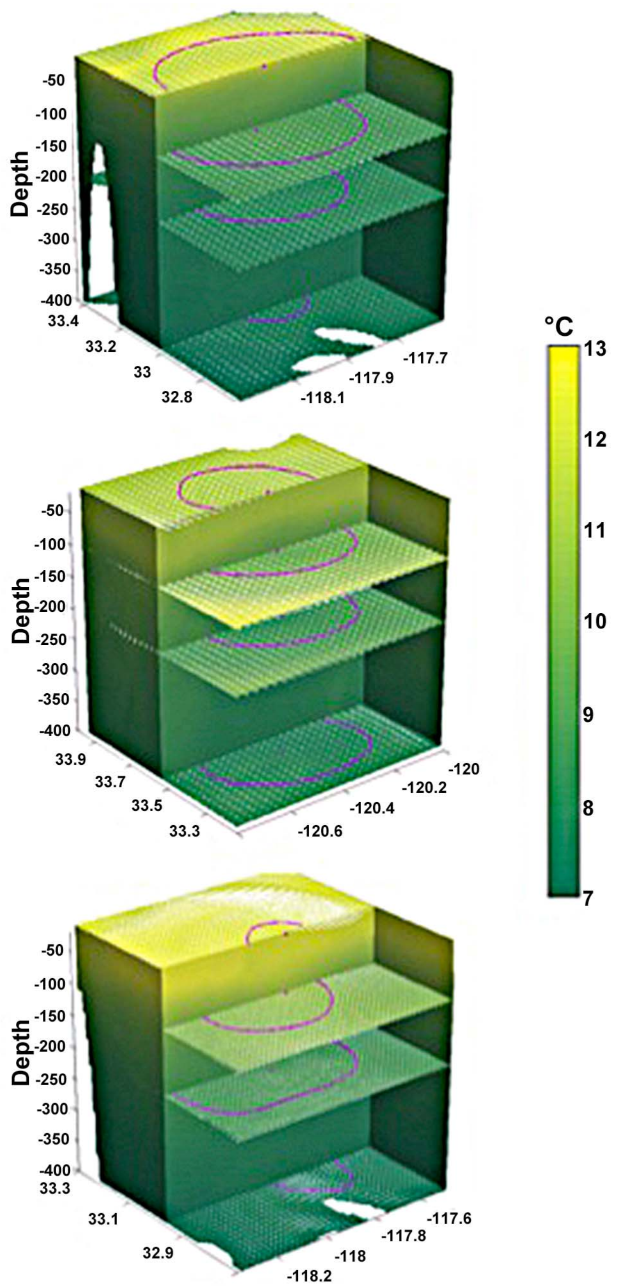

Figure 17. Examples for three types of eddies in term of their vertical structure: (top) bowl-shaped, (middle) cone-shaped, and (bottom) lens-shaped. White vectors are velocity (unit, m/s), and contours are eddy boundaries.

[35] Figure 18 shows that the SBC is one of the important sites for the generation of both cyclonic and anticyclonic eddies, especially at the eastern entrance to the Channel. Also, a persistent cyclonic eddy has been frequently observed in the western portion of the basin. In *Dong et al.* [2009a, Figure 7], in situ, drifter-derived velocity and numerical modeling data all confirm the year-around existence of this SBC-size cyclonic eddy. Figure 19 shows that the eddy generation rate in September is one of the highest for any month in a given year for both cyclonic and anticyclonic eddies. The presence of eddies in the SBC during the RaDyO experiment period likely influences the temporal and spatial variations of optical properties and light penetration, which has been reported in other articles in this issue.

6. Discussion and Summary

6.1. Eddy Generation and Termination

[36] To identify where and when eddies are generated and terminated can help to better understanding of the mechanisms for eddy generation and termination inside the domain. The first (last) record in the time series of each eddy lifetime is defined as the time and location of eddy generation (termination). As discussed in section 4.1, eddies, which move into (out of) the domain are not considered to be generated (terminated) locally. To exclude those eddies technically, we remove the first (last) records that are found within 10-grid strips along three open boundaries from the generation (termination) records.

[37] The spatial distributions of eddy generation number at four levels are plotted in Figure 18. From the surface to 400 m, most of eddy generation sites are located either around islands or near the headlands along the coastline. The distribution pattern strongly suggests that the islands and headlands play primary roles in eddy generation [*Dong and McWilliams*, 2007].

[38] Seasonal and interannual variations for eddy generation at 9 levels are plotted in Figure 19. At the surface, the cyclonic eddy generation does not show a strong seasonal variation, but during fall, anticyclonic eddies have the highest number. This is because the SCB is in an area with the strong positive wind stress curl and the positive wind stress curl is the weakest in the fall [*Dong et al.*, 2009a] which favors the generation of anticyclonic eddies. In the subsurface, the sandwiched structure shows that fewer eddies are generated in the stratified layer around years. The magnitude of the seasonal variation for cyclonic eddy generation is smaller than that for anticyclonic eddies. For the interannual variation, the eddy generation in 2001–2002 has the minimum number, which could be caused by the interannual variation in the wind curl at the sea surface [*Dong et al.*, 2009a].

[39] Figure 20 shows the spatial distributions of eddy termination for four levels. The eddy termination areas spread much wider from their generation regions. There are similar seasonal and interannual variations in eddy termination (not shown) as that for eddy generation because most eddy lifetimes in the SCB are less than one month.

6.2. Eddy Dynamical Balance

[40] There are two types of eddies in terms of dynamic balance: the one is geostrophic- balanced eddy and the other is ageostrophic-balanced eddy. The following equation can be used to determine if an eddy is in a geostrophic balance:

$$\frac{1}{\rho_0}\frac{\partial P}{\partial r} + fU_\theta + \left(-U_r\frac{\partial U_r}{\partial r} - \frac{U_\theta}{r}\frac{\partial U_r}{\partial \theta} + \frac{U_\theta^2}{r}\right) = 0 \qquad (1)$$

where ρ_0 is the reference density, P is the pressure, r is the radial distance from the center of the eddy, U_r and U_θ are the