GLIDERPALOOZA 2013: Middle Atlantic Bight Cold Pool

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During September and October 2013, MARACOOS organized a mass glider deployment consisting of nine (9) glider operations along the east northeast American coast between Nova Scotia and Georges Bank. We focus on three of those glider operations – ones whose trajectories included cross-shelf sections in the Middle Atlantic Bight (MAB; see Figure 1). The 6-26 September trajectory of glider BLUE during the MARACOOS GliderPalooza 2013 is shown in terms of two transects. This was because, even after turning westward it continued into deeper water – revealing more of the southern extension of the Cold Pool.

Glider BLUE's outbound transect and RU-23's Leg-1 were occupied nearly simultaneously; as were BLUE's inbound transect and RU-23's Leg-3 (see Figure 2). Both of these missions tested the hypothesis that triangular water property patterns in the MAB (with its 5km/day east to west flow) are particularly effective for data-assimilation numerical modeling.

The temperature sections for the outbound and inbound transects of both glider data sets in Figures 3 and 4 reveal slices through a still distinctive 2013 Cold Pool; with transect minimum temperatures (T_{min}) located at about 60m depth. There are some asymmetries however. For example, glider BLUE found the axis of the Cold Pool (actually transect minimum temperature T_{min} = 10.202°C proxy) in Transect-1 located in deeper water (~95m) than the 70m depth of the ingoing transect T_{min} (10.415°C). We hypothesize that the coldest water in Transect-2 was displaced landward into shallower water by a cross-bathymetry mixing event that is evidenced by the warm water at about 190km milepost. The RU-23 glider measurements revealed an opposite asymmetry in which the axis of the Cold Pool on the outbound Leg-1 was

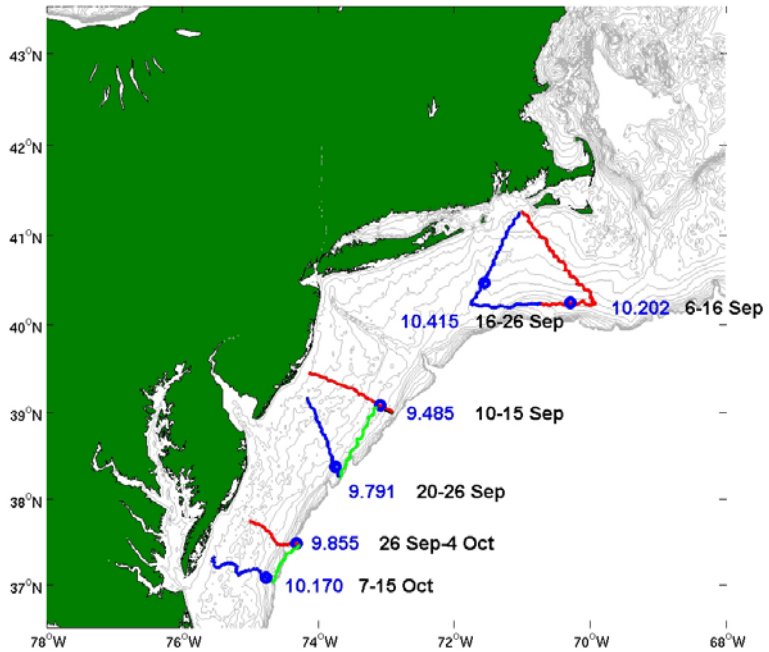

Figure 1 MARACOOS GliderPalooza-2013 was composed of glider expeditions, including glider BLUE's Transects -1 (red) and Transect-2 (blue) between 6-26 Sep ; glider RU-23's Leg-1 (red), Leg-2 (green), and Leg-3 (blue) between 10-26 Sep; and glider RU-22's Leg-1 (red), Leg-2 (green), and Leg-3 (blue) between 26 Sep -17 Oct. 2013. Transect minimum temperatures (°C) are located along with transect dates.

shallower than that of the inbound Leg-3. Further analysis will be required to test these speculations.

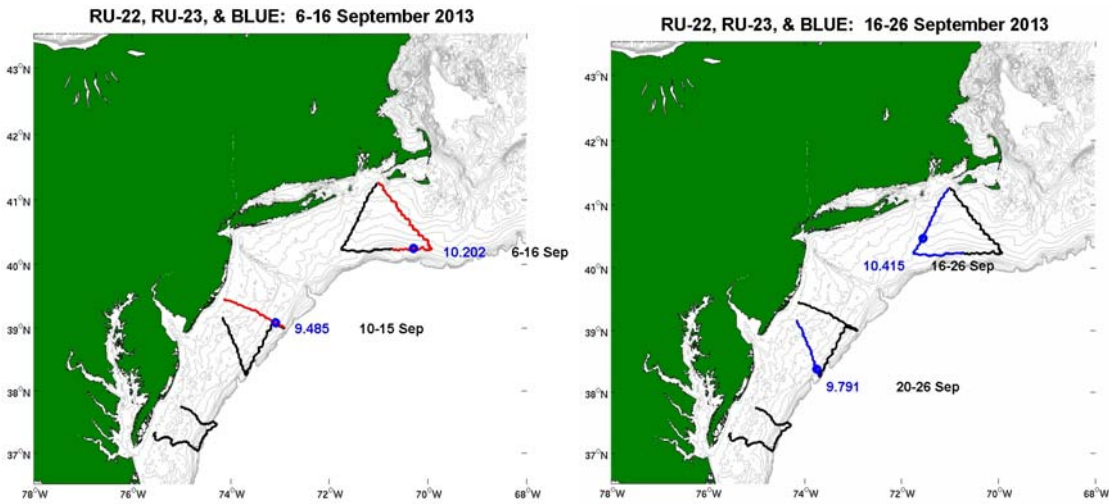

Figure 2 (left) The outbound legs (red) of both the middle MAB (RU-23) and eastern MAB (BLUE) transects were occupied almost simultaneously between 6-16 September. Transect minimum temperatures (°C) are indicated along with the actual transect dates. **(right)** The inbound legs (blue) of both the middle MAB (RU-23) and eastern MAB (BLUE) transects were occupied between 16-26 September.

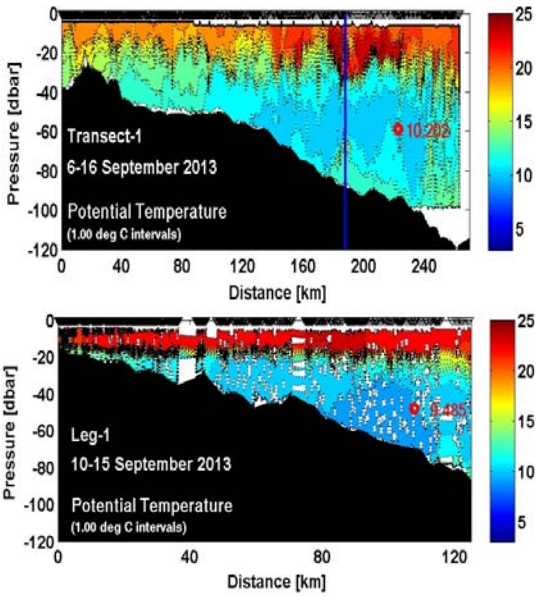

Figure 3 (above) Glider BLUE's Transect-1 and **(below)** RU-23's Leg-1 temperature sections; with section minimum temperatures located. (The blue line in the BLUE's transect locates the eastern vertices of the triangle).

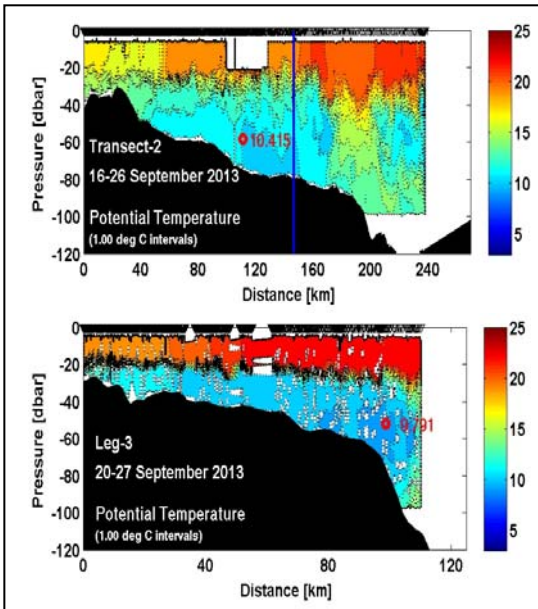

Figure 4 (above) Glider BLUE's Transect-2 and **(below)** RU-23's Leg-3 temperature sections; with section minimum temperatures located. (The blue line in the BLUE's transect locates the eastern vertices of the triangle).

Finally we present the RU-22 pair of temperature transects, which did not overlap in time with the others. Nevertheless they follow the above transects by only a week or two and will provide valuable information on the autumn demise of the Cold Pool in the southwestern corner of the MAB.

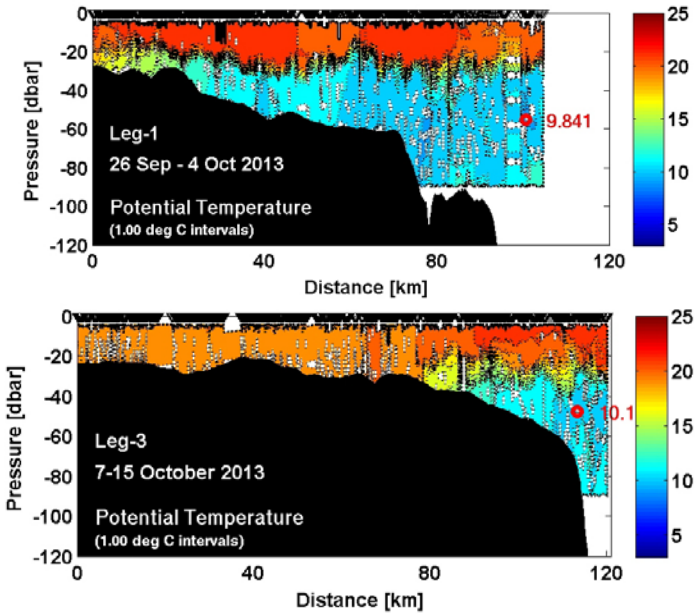

Figure 22 Glider RU-22's ***(up)*** Leg-1 and ***(down)*** Leg-3 temperature sections with the section minimum temperatures.