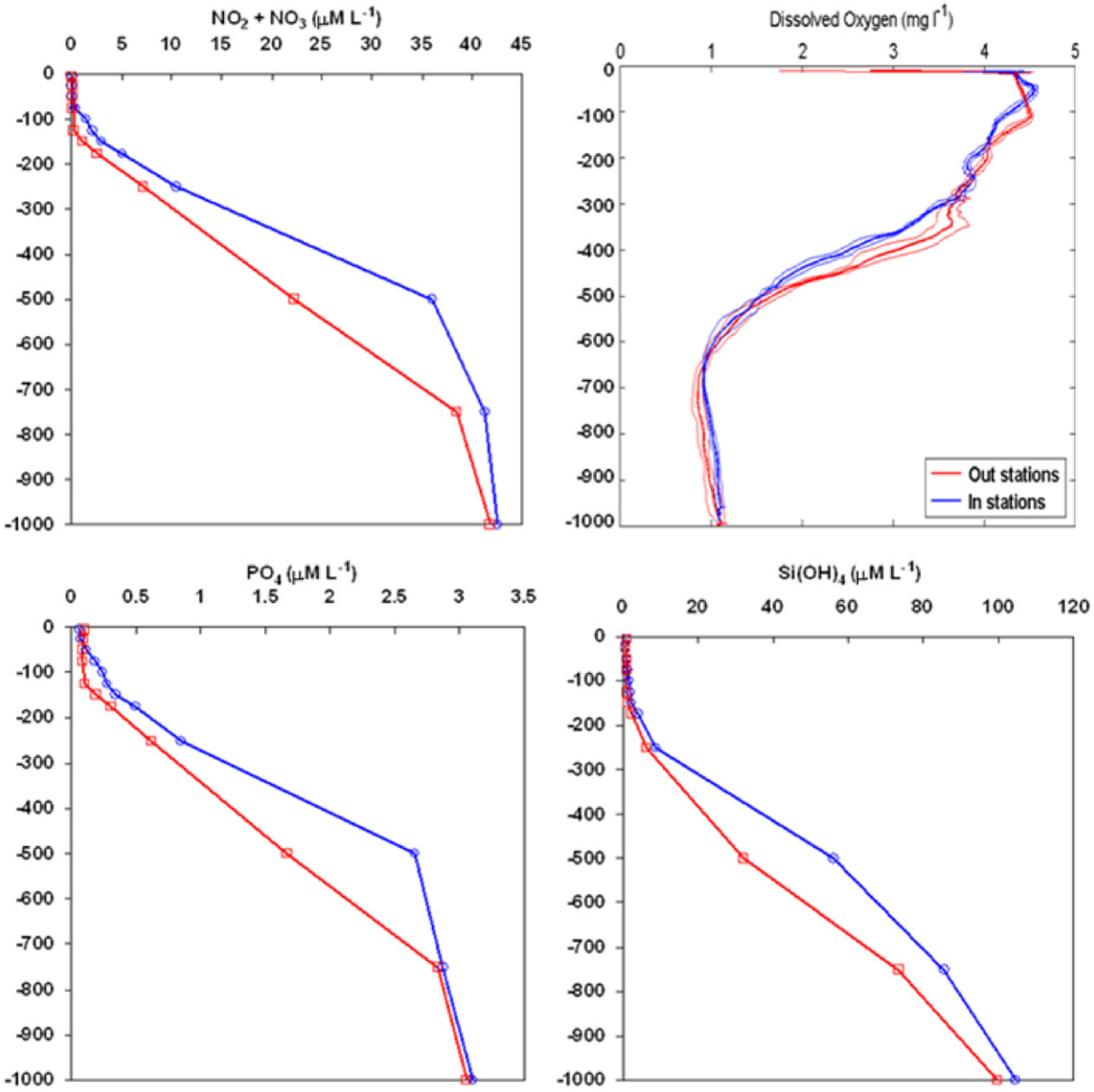

Fig. 7. Duplicate sample depth profiles to 1000 m depth of NO_3+NO_2 (N+N; μM L^{-1}), PO_4 (μM L^{-1}), oxygen (mg L^{-1}) and $Si(OH)_4$ (μM L^{-1}) from IN_{AVG} (blue) and OUT_{AVG} (red) stations. Mixed-layer depth for mean IN- and OUT-stations based on temperature gradient change were 40 and 89 m, respectively.

asymmetric nature of *Noah* along both transects where higher velocity measurements were recorded towards the northern section of the feature as seen in Fig. 8. Angular velocity contours show that the maximum is at the center of the eddy and extends to depths of about 150 m, although its horizontal extent is significantly reduced with depth. Lateral effects of horizontal shear are evidenced by the gradual decrease in angular velocity from the center.

3.4. Potential vorticity

The vertical shear and potential vorticity distributions are illustrated in Fig. 11 based on computational methods described in Nencioli et al. (2008). Contour lines of density are superimposed on each section. The results show that the highest shear zones occur around the sigma-$t = 23$ kg m^{-3} isopycnal surface at ~75 m depth and at ~40 km from the center. These shear zones are roughly coincident with the regions of high tangential velocity and steep isopycnal doming. This section is characterized by a shallow portion of extremely high values of potential vorticity located around the center of *Noah*. It extends up to depths of ~75 m with a radius of ~15 km. Potential vorticity decreases with depth and radial distance from this region. Two lobes characterized by moderate potential vorticity values extend on both sides and are confined within the σ_{23} and σ_{24} isopycnals. These vorticity lobes result from the contribution of the density gradient, which dominates the potential vorticity equation in regions characterized by small velocity values.

The relative orientation of isopycnals and isopleths of potential vorticity is an important indicator of whether lateral exchanges of water can occur. Since potential vorticity is approximately conserved as a parcel of water moves across the eddy, lateral exchange is inhibited where isopycnals and isopleths of potential vorticity cross each other (i.e. totally inhibiting if perpendicular to each other). For this reason, the region of high potential vorticity