I. Background and motivation

- Hypoxic area in the TLS is patchy & difficult to observe (DiMarco et al, 2010, DiMarco & Zimmerle, 2017).
- Ecological implications of patchiness: e.g. time of exposure to hypoxia & distance to normoxia (Zhang et al, 2009).
- High-resolution hydrodynamic model simulations (ROMS) show the formation of patches in the bottom oxygen concentration: very dynamic eddy-like features (Fig.1).
- Modeled rate of change of oxygen concentration: physical mechanisms used in the formulation of the oxygen equation (e.g. Li et al, 2015).
- Hypothesis: different mechanisms are more relevant at different time scales in the process of patch formation and displacement.

II. Methods

- Oxygen in the model: simple parametrization as by Hetland and DiMarco (2006).
- Area: constrained zonally (95°W-91°W) and by bottom depth (10-50 m).
- Volume control: Area x 10 m above the bottom.
- Oxygen rate of change: As defined in Eq 1.

III. Results

- Rate oscillates in phase with vertical advection on quasi-diurnal frequency. Similar to dissolved oxygen oscillations observed by Rabalais et al,1994).
- Quasi-diurnal convergence-divergence flux balances horizontal advection.
- Daily (not shown), weekly and monthly averages show oxygen decline (rate<0) in August, dominated by vertical diffusion. Short episodes of oxygenation (rate>0) are lost.
- Oxygenation episodes in September (rate>0) dominated by vertical advection.

IV. Conclusions and future work

- Advevtive fluxes have a strong quasi diurnal signal (~near inertial oscillations), which would be lost by lower frequency sampling.
- Current mapping strategies of the hypoxic area in the Louisiana shelf might be overestimating extent, unknown ecological interactions with dynamic field.
- Biweekly atmospheric episodes affect downward vertical diffusive and advective fluxes. Inter-annual variations in storm season would change flux balance.
- Dominant processes change between months (more data needed for comparison).
- This analysis will be extended to the existing 20 years’ simulation to investigate other scales of temporal variability.
- Following the volume of a feature over time instead of a volume control might help explain the mechanisms of patch formation and maintenance.