Review of Chrysagi et al. (Ocean Science, 2026)

The authors report findings from a high-resolution modelling study of the Baltic sea, with an emphasis on uncovering the connection between rapid wind variability and submesoscale dynamics below the pycnocline. Based on the description provided, I am satisfied that the simulations and analysis are robust. The qualitative maps largely support the authors' arguments for a topographic origin of vorticity and BBL instabilities in the subsurface layers. In my reading, the only weakness of the manuscript is that the argument for a causal link between wind events and deep submesoscales hinges somewhat heavily on snapshot comparisons. My concerns are elaborated below. The authors should address these in a revised submission before the manuscript is accepted for publication.

Major comments

- The finding that the sub-surface Baltic sea is teeming with submesoscale eddies is interesting, although perhaps not entirely unexpected. That said, I wonder if the authors might do a better job fleshing out the connection with storms. The snapshots comparisons are great for a qualitative overview, but provide an incomplete view of the dynamics. Since the mechanisms at play are likely common to other enclosed basins, some questions that are of rather broad interest include: (i) What is the typical lag time between 'wind events ' and submesoscale outbreaks at depth? (ii) What is the role of upwelling in driving the subsurface baroclinic current whose interaction with bathymetric slopes the authors demonstrate to be a major generation mechanism of submesoscales? (iii) What influence does the slope Burger number exert on the dynamics and in particular on occurence of negative EPV? I'm not saying the authors need to pursue all these lines of analysis, but rather pointing out that the present simulations and findings offer a nice opportunity to examine broader questions.

- To show that the selected wind events are reponsible for increase in Ro, the authors overlay these on time series plots of Ro at different depths (Figs. 5 and 6) and infer correlation based on the observed increase of Ro during these events (e.g. lines 280–282). It would be useful to better understand how this occurs. For example, would a cross-correlation analysis provide more insight into the time scales of the response to changing wind direction and speed?

Minor comments

- 'Since submesoscales primarily arise through flow-topography interactions '. The word 'primarily 'is debatable. There are other processes such as mixed-layer instabilities, fronts and instabilities that are arguably more important.

- Line 64–65: '. . . anoxic deeper layers of this globally largest anoxic marine system 'is a little awkward. Try 'The strong halocline acts as a natural lid, isolating the oxygen-rich surface water from the typically anoxic deeper layers of what is one of the globally largest anoxic marine systems. '

- Line 70: Contrary to this assertion, Figs. 5,6, and 7 seem to show large NIW oscillations which I would presume would substantially influence vertical mixing. Calculating the near-inertial wind work would be useful to quantify how much of the wind energy is expended in near inertial pumping.

- Lines 256–260: It is not obvious what two layer vorticity structure is being referred to in Fig. 4h,i.

- Why is $|Ro|$ in Fig. 6a almost twice the magnitudes seen in Fig. 5b along either boundary?

- Fig. 7b: What is the dissipation rate ε being computed here – mean or eddy? Is it averaged over the entire BBL? Please include these specifics either in the text or caption.