



EGUsphere, referee comment RC1
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Comment on egusphere-2022-649

Arthur Capet (Referee)

Referee comment on "How subsurface and double-core anticyclones intensify the winter mixed layer deepening in the Mediterranean sea" by Alexandre Barboni et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-649-RC1>, 2022

The authors investigate the vertical structures of Mediterranean anticyclones and in particular the temporal evolution of the mixed layer depth in their core, with respect to that of the surrounding background sea state. The major originality of this research compared to similar studies is that the authors could gather sufficient in-situ data (multi-platform) to explore this topic on individual instances, rather than adopting the usual composite framework. Free of the smoothing effect of composite approaches, they are able to demonstrate important dynamics in the anticyclone evolution through the winter deepening of the mixed layer depth. In particular, they highlight the difference between cases where MLD deepening inside eddy cores is strong enough to reconnect with pre-existing subsurface homogeneous layer and cases where the subsurface homogeneous layer remains unperturbed, leading to the formation of multi-core anticyclones, with subsurface cores piling up from year to year. In my view, this study provides fresh insight into the process of anticyclone formation and evolution from year to year, as well as new keys for the interpretation of subsurface water masses' history. The manuscript is well written, although it could certainly be streamlined for more efficient delivery of the key results. I recommend publication, after a careful edition aiming for efficient reading. Some bits of advice in that sense are provided in the attached supplement.

Please also note the supplement to this comment:

<https://egusphere.copernicus.org/preprints/2022/egusphere-2022-649/egusphere-2022-649-RC1-supplement.pdf>