Ocean Science Discussions

Ocean Sci. Discuss., referee comment RC2
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Comment on os-2021-23

Anonymous Referee #2

Referee comment on "A tidally driven fjord-like strait close to an amphidromic region" by Sissal Vágsheyg Erenbjerg et al., Ocean Sci. Discuss., https://doi.org/10.5194/os-2021-23-RC2, 2021

This study aims to explain residual and exchange flows in a fjord separating two major islands of the Faroer archipelago, North Atlantic ocean. The authors hypothesize that the residual flows are due to a fortnighly oscillation and the presented modelling results seem to support this hypothesis. This is a potentially interesting topic both to the scientific community and to local stakeholders and managers. The study is well written in terms of language, however the reasoning and methodology require several substantial decisions and revisions.

General

- not clear how geographical names are to be spelled - please provide phonetic translation; similar comments apply to maps (Fig. 1) where mesh indices are shown instead of coordinates in meters: please present information such that it is easily accessible to be memorised and interpreted by the average reader

- in the Introduction the study area is presented as an estuary or fjord, i.e. a land-ocean transition space, but obviously it is an ocean strait. Here a decent review on circulation in ocean straits is imperative, for example Danish straits and Bosporus (amongst others) have been studied well: Identify the knowledge that can be transferred from other straits to the local strait, identify the knowledge gaps and say how the gaps shall be closed using the methodology of this study.

- Model area, model validation: Why is model area so small? This creates several problems: As water level differences are substantial for the conlusions of the study, the model area should include both gauges shown in Fig. 1. Alternatively authors could validate the parent model against these gauges. Salinity validation reveals the model is too mixed - this hints at underestimated exchange flow/density driven circulation - here

the area outside the sills could be crucial but it is excluded from the model which could be a serious dynamical flaw. Although tides are important the validation considers daily scale which does not make sense. Sub-tidal flows are usually a function of both overtides and density driven flows - it would make sense to start validation at the intra-tidal scale.

- Density inversion in a hydrostatic model - how is this possible?

Recommendation: Either increase the model area to allow for a decent validation on intra-tidal to sub-tidal scales or analyse outputs from the parent model. In case your model/observations have gaps that cannot be closed easily to support conclusions, use the scientific literature on ocean straits to hypothesize and discuss how exchange flow over the sills is generated here.

Details

ll15 "results from a model" from a model simulation

ll18 a sill is an elevation, maybe say depth is 4 m **at** the sill

ll27 how large?

ll37-38 why study winter conditions when for the Stakeholders (aqua farms etc) summer dynamics are more relevant?

ll62-66 Please provide a consistent description of the aims of the study, list the research questions

Section 3: Why not use the ADCP data to illustrate intra-tidal dynamics, validate simulated currents?

ll119-120 In estuaries per definition river flow affects the salinity field, and Fig. 4 shows that freshwater input is probably significant

Fig. 2a: what is the data basis for the red and blue colors - model or observations? Specify

in caption.

Fig. 3: Consider illustration and validation on intra-tidal scales...consider showing these numbers in a table instead

ll247: "no hydrographic observations during zhe simulation period" - what about using climatological data?

ll291 please specify what is meant by highly non-linear flows

ll301 tidally-rectified currents: probably a tidal analysis of ADCP data and model results can be very helpful in this case