Earth Syst. Sci. Data Discuss.,
https://doi.org/10.5194/essd-2020-197-RC3, 2020

Open Access Earth System Science Data Discussions

Interactive comment on "Global dataset of thermohaline staircases obtained from Argo floats and Ice Tethered Profilers" *by* Carine G. van der Boog et al.

Anonymous Referee #3

Received and published: 30 October 2020

This paper describes the creation of a novel dataset to study thermohaline staircases in the ocean. It is a great example of how something new can be brought out of a widely-used dataset through a suitable data processing technique. The data processing is careful and well documented, and compares favorably against earlier regional studies. In particular, Figure 5 is impressive, where the authors appear to capture the salt-fingering and double-diffusive convection regimes based on the application of their straightforward criteria. The dataset created by the authors is quite unique and will undoubtedly be of use to others, particularly since it is distributed together with the software. I believe it should be published with minor revisions.

Printer-friendly version

Discussion paper

There are a few points I would like the authors to address.

– What is the estimated precision of the salinity, temperature, and density measurements, and how does this compare with typical step sizes? I ask because, if the precisions are coarse, or upstream rounding or truncation has been applied, a jump-like effect mimicking staircases could arise as an artifact. Here I think it is important to explicitly examine the measurement precisions and noise levels to rule out this possibility, rather than to simply argue that the final product seems to be physically meaningful.

– As the software is an important part of this contribution, I think it should be described in more detail, with language, license, and function or function names listed, together with a description of how the software is to be used and possibly listing inputs and outputs. It is important that the software is arranged as a function or functions rather than as a script, if it is to be useful to others.

–I find it conspicuous that, zooming on on Fig. 6a, I see a lot of staircases that appear to have been missed, lying just above the blue curves showing detections. Please discuss these and whether or not they are 'false negatives' that the method should detect but does not, and if they are then explain why such false negatives are acceptable.

–The problem that the authors examine is a difficult one. I am not sure that the most elegant solution has been found, as it is dependent upon the choices of a number of free parameters. Ideally, one should not have to specify a prior cutoffs; it would be preferable for these to emerge from the data based on examining statistical distributions. However, a parameter-free version of this product would probably take a great deal of more work and possibly different methods (e.g., least squares fits, statistical tests, etc.), and it is much better to have a satisfactory solution than none at all.

Because the authors have thought a lot about this problem, they are in a good position to describe the shortfalls of the current method and how it might be improved in the future. This would be a great topic to discuss at the end of the paper.

Minor comments

p 1, first paragraph, and p 2 line 31, “double-diffusive” should be hyphenated

p 1, line 14, “two orders of magnitude”

p 1, line 17, and p 5, line 93, “of the order”

p 1, line 19, “the the”

p 2, line 35, would recommend present tense

p 2, line 47, what is the gray list and where can it be found?

p 3, line 57, this is a second moving average, yes?

p 3, eqn 1, what is the meaning of the overbar?

p 4, lines 64, “the properties of any layer lying between” would be better

p 4, lines 74,75, and 76, “criterium” should be “criterion”

p 7, I believe the first paragraph is unnecessarily repeated

p 10, where are these example profiles from?

p 11 “optimalization” should be “optimization”

p 13, line 219–220, I am not sure what is being meant here. It seems a lot of physical assumptions have been made that are implicit in the parameter choices.

p 14, line 225 should say “both double-diffusive regimes” I believe

Table A1, Julian should be capitalized and density should not be

Many of the references have incorrectly capitalized titles or journal names.

Interactive comment on Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2020-197, 2020.