Manuscript title: Deep Learning for Super-Resolution of Mediterranean Sea Surface Temperature Fields
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REVIEWER #4 (Peter Cornillon)

Reviewer: This manuscript explores the use of a deep learning model to enhance the spatial resolution of L4 SST products in regions where missing data, generally associated with cloud cover, results in coarse fields obtained with objective analysis techniques. As I understand it, the model, which the authors have developed, dADR-SR, is trained with high resolution (HR, 1/16 degree) input fields and ultra high resolution (UHR 1/100 degree) target fields. It is then applied to HR fields and shown to reproduce structure at very nearly the same spatial resolution as test (1/100 degree) fields.

Response: The authors would like to thank Peter Cornillon for his interest in reading our manuscript and for his thoughtful suggestions. We think that the manuscript has been significantly improved by taking into account his feedback . Please find the detailed responses below with the reference to the revisions made in the re-submitted files (highlighted in yellow).

Reviewer: The ML model they have developed appears to perform very well for the test dataset they use but I struggled with the manuscript and I believe that it needs a fair amount of editorial work before it is ready for publication. Specifically, after reading the manuscript several times, I think that I sorted out what was done but, I must admit that I am still not sure that I have it right. I've included a figure in which I have tried to show the datasets, which I think they are using, and how these dataset relate to one another. First, there is a set of four datasets, two high resolution (1/16 degree), an L3S and an L4, and two ultra high resolution (1/100 degree) again an L3S and an L4. A subset of these datasets are used to train the dADR-SR algorithm and the HR L4 dataset is then fed into the trained model and the output is compared with an L3S UHR dataset (i.e., one built using the same algorithm as used to build the standard L3S UHR products used to train) constructed with SLSTR data from the Sentinel 3A and 3B satellites. I don't think that the SLSTR data are used in the construction of the standard products but I may have that wrong, well, I may have all of this wrong, for which I apologize. Adding to the confusion is that the authors appear to have changed the terminology they use for the datasets. In the abstract and in the Discussion section the authors refer to low resolution (LR) and high resolution (HR) datasets while in the remainder of the document they refer to high resolution (HR) and ultra high resolution (UHR) datasets. I'm guessing that LR (used in the Introduction and Discussion) is what they later refer to as HR and HR (in the Intro and Discussion) is what they later refer to as UHR.

Response: Thank you for pointing out the lack of clarity of the characterization of the different datasets used and also of the related processing chain steps. To address this point, we have added a more comprehensive description of the methodology used for each

dataset, at in lines 101-114 of the revised version of the manuscript, added the new Figure 1 and removed the acronym “LR” when referring to the first guess background field, due to the clear confusion it was creating throughout the manuscript.

Reviewer: Bottom line: I believe that a bit more description of what goes into the standard datasets that are used to train and later as input to the dADR-SR model, along with a clear description of differences, if any, between the datasets produced as input and/or evaluation for the work undertaken in this study. I also think that a figure showing the relationship of the datasets and processing steps, at a very gross level—sort of like the figure that I have attempted to put together below—would go a long way to making the manuscript easier to follow.

Response: Thank you for your suggestion.We do agree that a much more clear description of the methodology behind the creation of the datasets was necessary. We provided all these details at lines 101-114 and put a sketch describing the workflow as the new Figure 1.

Reviewer: In addition to the general concern outlined above I have made a number of editorial suggestions, which I hope will help to make the manuscript a bit easier to read. These are included in the attached manuscript either as hand-written annotations or as typed comments. Finally, I would like to apologize to the authors for the length of time that I took for this review—I had another manuscript, which I was asked to review, and which had to be completed before addressing this one as well as some family issues.

Response: We really appreciate and do thank Peter Cornilon for the attention paid to revise this manuscript. We made all corrections following his suggestions, as highlighted in yellow throughout the revised version of the manuscript.