Response to Reviewers' Comments

We would like to thank the reviewer for all the constructive comments, which have improved the manuscript significantly. A detailed response to all comments can be found below, where the comments are in regular font and our point-to-point responses are in bold font. Line numbers correspond to the revised manuscript.

Comments:

- This study aimed to produce an accurate national-scale marine aquaculture map at a spatial resolution of 16 m. I can see authors put lots of effort into data processing, experiments and comparisons. However, I do have some significant concerns.

  Response: Thanks for pointing out our main contributions and the suggestions which for sure significantly improved the manuscript.
- First of all, in the title and the abstract, it claims that this study aims to propose a new dataset of the classification results covering the entire coastline of China based on a new data source that using GF-1 and similar at 16 m spatial resolution. Yet in the text of the manuscript, most parts focused on the utilization of convolution neural networks and the classification method that is advanced than the previous methods.

  Response: Apparently, the main contributions were not clearly explained in the original paper. Our main contributions include both the new dataset and classification method.To make this point clear, we added several paragraphs to the introduction section (bellow and in the revised paper).

  Line 68-74:

  'To overcome these limitations, we proposed a novel framework for the large-scale marine aquaculture mapping. The main contributions of our study can be summarized as follows:

  (1) We present a unified CNN-based framework for national-scale marine aquaculture extraction.

  (2) A hierarchical cascade homogeneous neural network (HCHNet) model is proposed to learn discriminative and robust features.

  (3) We provide the first detailed national-scale marine aquaculture map with a spatial resolution of 16 m. '
- If the innovation part is the CNN based algorithm, a more challenging experiment (or an artificial toy data manipulation) should be select to illustrate and emphasize the classification performance results, theoretically and empirically.

  Response: Revised as suggested. We conduct more experiments based on the artificial toy data, which is called test dataset in the study, to better illustrate and emphasize the classification performance results.

  Line 207-210:

  'Meanwhile, we also conducted the area accuracy assessment (the

percentage of overlapping areas in the ground truth) based on more than 120 randomly selected 256×256 patches, which accounts for nearly 20% of the total samples.'

The results are shown in the new Table 3:

Table 3. Area accuracy assessment of different classes based on randomly selected patches.

Class	Sea area	Land area	RCA	CCA
Area accuracy:	93.6%	98.4%	81.8%	72.5%

Besides, we also discussed more about the reason why our proposed methods can obtain higher accuracy values.

Line 289-294:

'The proposed HCHNet achieved the best classification performance for three reasons: (1) all of the pooling operations were removed to avoid the shrinking of features, which helps improve the identification of smaller foreground objects; (2) the hierarchical structure was used to enlarge the receptive field to capture more contextual information, which is helpful for reducing the influence of local variance; (3) the weighted loss function was employed to solve the classes imbalance problem.'

- Currently, it is not significant to see how the algorithm outperforms previous methods from Fig.7.

Response: Revised as suggested. We revised the Fig.7 to show clearly the advantages of the proposed algorithm. As shown in the new version of Fig.7, the black solid outlined areas clearly indicate where our methods obtained better results.

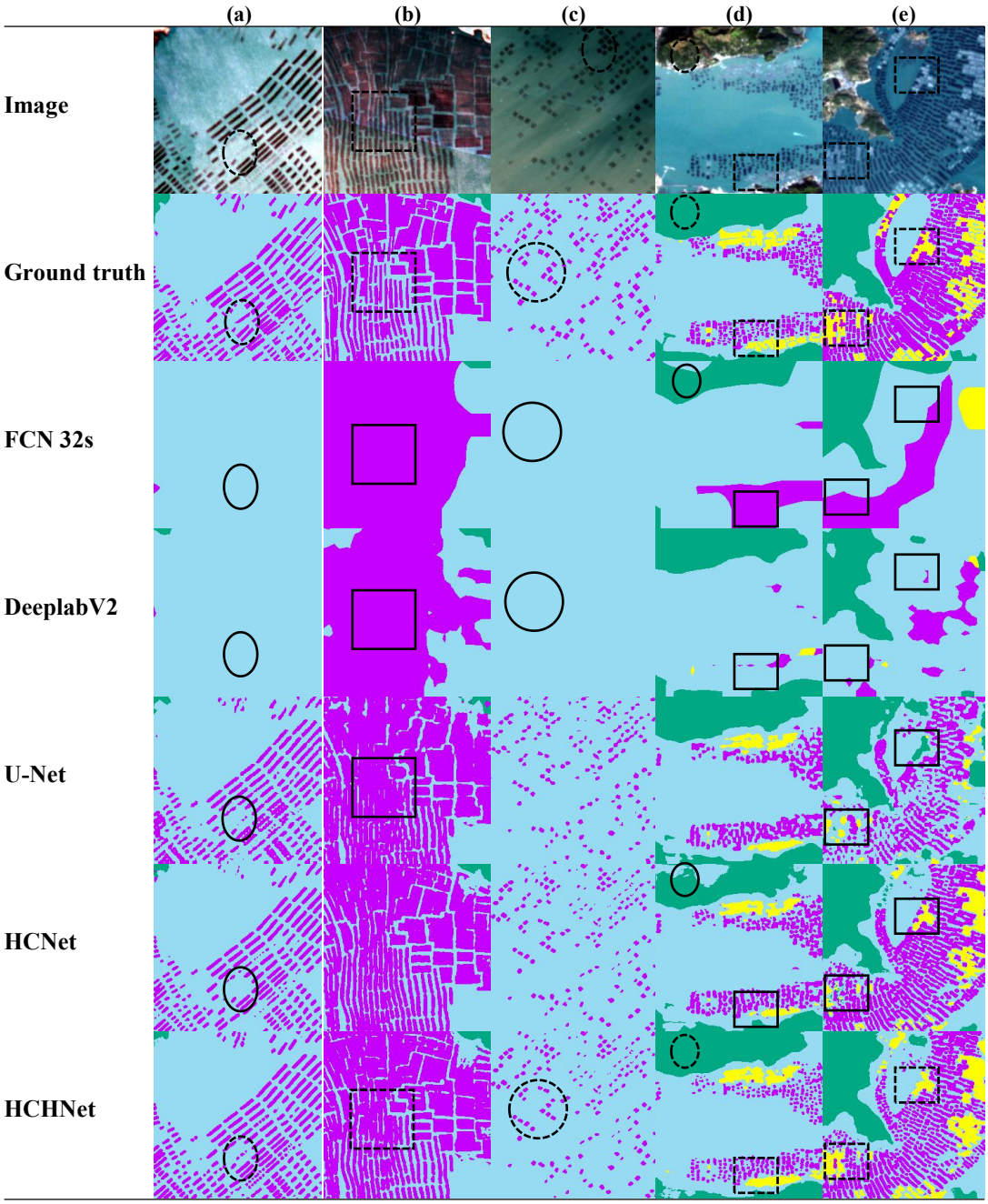

Figure 7: The classification results of MPC and MAC areas comparing the proposed HCHNet method with other approaches. The black solid outlined areas indicate where HCHNet obtains better results. The dotted line shows same locations in other images.The purple, yellow, blue, and green areas in the classification maps represent the MPC, MAC, sea, and land areas, respectively.

- The classification case selections are straightforward (the classes are obvious in the original image).

  Response: To obtain an accurate classification result, we only employed cloud-free images in this study. Thus, the original images used in this study, which also include the selected cases, are straightforward.

- The traditional pixel-based or object-based classification results might obtain

similar results if set the parameters correctly.

Response: Compared with the traditional pixel-based or object-based classification methods, CNN-based method can also achieve good balance between higher accuracy values and generality(https://doi.org/10.1109/MGRS.2016.2540798). Most importantly, such methods do not need to design complex features or set parameters for local variances as traditional methods. Thus, the CNN-based methods are more suitable for the large scale classification.

- If the new method is advanced in all cases on the coast of China, the method is appliable to the entire coast. If there are previous literature already manifested this point, to cite this in the introduction should be adequate.

  Response: To our best knowledge, we provided the first detailed marine aquaculture map at the national scale using CNN-based methods. Technically, such CNN-based method can be easily applied to larger scales (https://doi.org/10.3390/rs12010002;https://doi.org/10.1109/TGRS.2019.2904868). However, considering the local differences among countries, we will improve our method and provide new dataset across the entire coast in our future works.

- Actually, The longer coast involves lots of the local variations that could affect the image processing results. It is hardly foreseen that the new method could outperform all other methods in the coastal regions across such larger latitudes. It might be better to focus on a few specific applications for the method's better performance.

  Response: To overcome such difficulties, we made several important steps in the classification process: First, we choose to built our models based on the CNN architecture, which have a good balance between accuracy and robustness; Second, we trained our model with randomly selected samples across the coastal regions. Besides, our model are designed to have a larger reception field, which is specially helpful for a wide range of local variations; Third, we used the atmosphere correction and precious coastal line to reduce the influence of local variations. Therefore, our proposed methods can work well in the coastal regions across such larger latitudes.

- I think no need to make data availability as a single section. This can go to data, results, or appendix

  Response: As requested in the 'Submission-Get ready' section in the official website (https://www.earth-system-science-data.net/submission.html), we need to include the DOI of the proposed dataset in both the abstract and the data availability section. Therefore, we may need to remain this section as the published articles.

- L105, consider to specify the atmosphere profiles and other in situ data used in FLAASH atmospheric correction.

  Response: Revised as suggested.

  Line 117-118:

  'The "Maritime" model was set as Aerosol Model. And all the other

parameters can be automatically set by using the extension tools (https://github.com/yyong-fu/ENVI_FLAASH_EasyToUse) ’