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Ocean Science Discussions

Interactive comment on "Ecological niche of three teuthophageous odontocetes in the northwestern Mediterranean Sea" *by* E. Praca and A. Gannier

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The anonymous referee #1 underlines two principal points that need to be improved: the justification of our choice of the analytical method and the description of the validation process. We give here improvements that will be incorporated in a new version of the manuscript.

Justification of the choice of the analytical method: The goal of this work was to compare the habitats and the ecological niches of three species. For this, we used a method that can be implemented for both species data set. We agreed that presence-absence methods present advantages, models being balanced by absence data and predicting probability of animal occurrence. As cetaceans are of course potentially wide-ranging and tolerant, presence-absence methods are preferable to presence-only methods. But they were not applicable for the data sets of the pilot whale and Risso's

dolphin. First, as mentioned in the manuscript, passive acoustic could not be used on these species, leading in the use of potential false absence data. The small size of the data sets of these species (33 presence cells for the pilot whale and 23 for Risso's dolphin) was also restrictive. A model performed with a large amount of absence cells compared to the number of presence cells will tend to predict the absence of the species and will have a very low percentage of well predicted presence. Furthermore, accurate validation processes for presence-absence models (as the Receiver Operating Characteristic plot, Boyce et al, 2002) need to split the data set in calibration and validation data sets, reducing the number of presence cells once again. So we chose ENFA because it was a new presence-only method, introducing ecological meaning in the calibration of the factorial axes and, as suggested by our results, it seemed quite robust to model a first attempt to estimate the suitability of an area, with a small data set. Concerning the variables used in the analysis, they were averaged for close months and featured close characteristics. Furthermore, it seemed sound to compare the distribution of the cetaceans and environmental variables of the same time period.

Description of the validation process: We first would like to thank the anonymous #1 for his/her different edit suggestions. The evaluation of a model go through the evaluation of is statistical accuracy and its ecological meaning from previous studies on the species distribution. A good model is statistically significant and coherent to what is known on ecology of the species studied. With the method we used in this work, a k-fold cross-validation, the model is evaluated by the trend of the p/e curve and the continuous Boyce index. The p/e curve has to be the more monotically increasing, a perfect model having a strait increasing line p/e curve. The continuous Boyce index is a Spearman rank correlation between Fi (predicted-to-expected ratio) and the average HS index of the different windows. A perfect model will have a B=1. However, Hirzel et al (2006) compared the accuracy of different validation methods and found that a B˜0.6 correspond to an Area Under the Curve of ROC plot $>$0.9. That was why we considered the model of the sperm whale (with a B=0.61 and a quasi-monotonic p/e

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curve), as "a highly fitted model" and the model of the pilot whale (B=0.58 and a less monotonic p/e curve) as "a well fitted model". For the more specific points, Ai is the number of cells belonging to the same HS window i than Oi, regardless they contained a presence cell. That is why, for a good model, Fi is expected to increase with the upward movement of the window. Concerning the effect of spatial pooling of presence data in the NWMS (p12, paragraph 2), it is a matter of spatial extend of the study area. The sentence will be rewritten in order to be clearer. Although, the fact that the model of the sperm whale did not highlight a more suitable habitat in offshore waters (away from topographic features) is due to the low number of presence cells in this area. As they are less represented than presence cells on the continental slope, they are not considered statistically as important as the cells on the slope. A presence-absence model would not better emphasize such habitat, because absence cells are mainly located in these offshore waters. However, Gannier and Praca (2007) succeeded in highlighting this influence of thermal fronts, only using smaller time scale (week) and a smaller study area.

For the technical details, we will try to add the observation sequences on the HS maps, but in an early attempt the resulting maps were not very clear to read.

Interactive comment on Ocean Sci. Discuss., 4, 785, 2007.