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Interactive comment on "Spatially explicit estimates of stock size, structure and biomass of North Atlantic albacore Tuna (*Thunnus alalunga*)" *by* P. Lehodey et al.

B. Galuardi (Referee)

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General Comments As the authors note in the abstract, this discussion paper provides "the first spatially explicit estimate of albacore density in the N. Atlantic by life stage". This represents a major advance in understanding spatial aspects of albacore population dynamics. The Seapodym model has been used extensively in tuna fisheries of the Central and Western Pacific, and it is encouraging to see its use in the Atlantic, which has generally been lacking in biophysical interpretation of tuna (and other highly migratory) fisheries. The quality of this article is good and the general approach has been vetted in several previous works. While Seapodym is somewhat unique in that it

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incorporates trophic interactions with life history and catch data, it, like all models, has certain assumptions and constraints which through which the results must be viewed. In the case of albacore in the Atlantic, the data are at differing temporal resolutions and the primary fisheries have changed both in gear type and location over the time series. Further constraints from the spatial resolution of the physical forcing model makes coastal areas more difficult, or impossible, to obtain results. This renders biomass estimates with higher variance near coasts and where data quality (in terms of spatial disaggregation) is more lacking. These issues are not unique to the current study and have been noted in detail by the authors, and are far from prohibitive for meaningful utility. Furthermore, the authors provide spatially explicit variance estimates for the reported results. This work will hopefully serve to add a bio-physical component to stock assessment of albacore tuna in the Atlantic and promote basin scale ecosystem modeling as intended.

Specific Comments The Seapodym implementation for albacore tuna in the Atlantic is only as good as the inputs available. The authors provide an adequate accounting of limitations and effects from lack of samples, discrepancies in size at age estimates, variations in fish measurement, areal binning of catch data, differential catchability etc. The straightforward work presented is clear and does not warrant extensive comments. A few minor details:

Page 172 lines 15-20: I did not find any netcdf files in any of the links provided for data. Source data was, however, present and obtainable (and extensive!).

Page 174 line 20-25: Who did the extrapolation in this case? Is this an ICCAT product of some sort?

Technical Corrections The writing and layout of the paper is very good. The format is a bit strange to me (Methods+Results are basically the same), but I assume this is a journal requirement. It does not reduce the readability but rather lends itself akin to a technical document. There are several areas where some sentences should be

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re-worded. Mostly, this is use of prepositions.

Page 172 lines 8-13: "These models have been extensively validated elsewhere and demonstrated good skills . . ." models do not demonstrate skill. Please rewrite.

"However, this configuration. . .as well as coastal upwelling regions" please rewrite this sentence

Page 173 lines 3-5: change 'targeting on' to 'targeting of' Change "1960ies" to '1960s' to be consistent with previous time periods

Page 174 lines 5-12: "For this latter, the change also was associated to a spatial shift of fishing grounds." change to "For the latter, the change was also associated with a spatial shift of fishing grounds."

Change "The fishing ground of the surface fisheries in the North-east Atlantic showed a tendency to retract and concentrate in the Gulf of Biscay. To keep the most possible homogeneous definition of fisheries in relation to their fishing gear catchability the Asian longline fisheries have been subdivided into two periods"

To "The fishing grounds for the surface fisheries in the North-east Atlantic tended to retract and concentrate in the Gulf of Biscay. To keep the most homogeneous definition possible for fisheries in relation to their fishing gear, catchability for the Asian longline fisheries have been subdivided into two periods"

Page 178 lines 3-5: Please change "The predicted catch fitted very well observed catch over the historical fishing period used for the simulation both spatially and temporally"

to "The predicted catch fit the observed catch very well, both spatially and temporally, over the historical fishing period used for the simulation"

Lines 20-22: please change "However, researchers involved in these developments have not necessarily the background in fisheries sciences and the detailed knowledge on the history of the fisheries that is required to understand and use these data cor-

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rectly."

To "However, researchers involved in these developments do not necessarily have the background in fisheries sciences nor the detailed knowledge of the history of the fishery that is required to understand and use these data correctly."

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