

Hierarchical Bayesian computing of 3-dimensional whale trajectories from electronic tags

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Abstract: Researchers mainly consider electronic tagging and passive acoustics to study the underwater behavior of whales in the field. Both approaches share the common features of processing noisy data collected on a network of sensors which are representative of the whale movements. A hierarchical Bayesian model (HBM) has proven to be an efficient framework to compute 3-dimensional whale trajectories from passive acoustic recordings (Laplanche, 2012). We show that an identical approach can be used to compute 3-dimensional whale trajectories from electronic tag data. Such tags could include part or all of the following sensors: depth-meter, accelerometer, magnetometer, speedometer, gyroscope and GPS. This Bayesian approach has the advantages of efficiently merging different sources of data and of propagating errors from measurements to location estimates. We illustrate the capabilities of the approach by reconstructing 3-d trajectories of beaked whale from simulated and field tag data.

References

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