Abstract

Many time series models in movement ecology are often based on the assumption that the random variables follow a Gaussian distribution. It is well known that empirical data sets have infrequently occurring rare events and cannot be modelled with the Gaussian distribution. Such data sets can be described by ARMA-GARCH models with an appropriate underlying distribution that can cater for skewed and heavy tailed distributions. In this study we compare four ARMA-GARCH models as potential candidates for modelling heavy tailed and skewed time series data of animal movement step lengths. Estimation difficulties have however hindered the use of stable Paretian distributions among practitioners in fields such as movement ecology. Four distributional hypotheses are tested: the Gaussian, Student's t, skewed Student's t and the Stable Paretian distributions and fitted to time series step lengths of single female elephant herd. We found that the stable Paretian distributed ARMA-GARCH model performs better than the Gaussian and student's t distribution ARMA-GARCH models.