Geophysical Research Abstracts
Vol. 16, EGU2014-11788, 2014
EGU General Assembly 2014

Spatial characterization and prediction of Neanderthal sites based on environmental information and stochastic modelling

Michael Maerker (1,2) and Michael Bolus (1)

(1) Heidelberg Academy of Sciences and Humanities, Germany , (2) Department of Earth Sciences, University of Florence, Italy

We present a unique spatial dataset of Neanderthal sites in Europe that was used to train a set of stochastic models to reveal the correlations between the site locations and environmental indices. In order to assess the relations between the Neanderthal sites and environmental variables as described above we applied a boosted regression tree approach (TREENET) a statistical mechanics approach (MAXENT) and support vector machines. The stochastic models employ a learning algorithm to identify a model that best fits the relationship between the attribute set (predictor variables (environmental variables) and the classified response variable which is in this case the types of Neanderthal sites. A quantitative evaluation of model performance was done by determining the suitability of the model for the geo-archaeological applications and by helping to identify those aspects of the methodology that need improvements. The models' predictive performances were assessed by constructing the Receiver Operating Characteristics (ROC) curves for each Neanderthal class, both for training and test data. In a ROC curve the Sensitivity is plotted over the False Positive Rate (1-Specificity) for all possible cut-off points. The quality of a ROC curve is quantified by the measure of the parameter area under the ROC curve.
The dependent variable or target variable in this study are the locations of Neanderthal sites described by latitude and longitude. The information on the site location was collected from literature and own research. All sites were checked for site accuracy using high resolution maps and google earth. The study illustrates that the models show a distinct ranking in model performance with TREENET outperforming the other approaches. Moreover Pre-Neanderthals, Early Neanderthals and Classic Neanderthals show a specific spatial distribution. However, all models show a wide correspondence in the selection of the most important predictor variables generally showing less climatic influence in site selection criteria from Pre Neanderthals to Classic Neanderthals. Thus, the stochastic modelling approach yield information about Neanderthal site selection criteria.