Geophysical Research Abstracts
Vol. 20, EGU2018-8618, 2018
EGU General Assembly 2018

Fossil Replicants - Integrating Preserved and Theoretical Morphologies in Biomechanical Analyses

Stephan Lautenschlager

University of Birmingham, School of Geography, Earth and Environmental Sciences, United Kingdom
(s.lautenschlager@bham.ac.uk)

New methods in digital visualisation, reconstruction and computational biomechanical analysis have significantly transformed the way in which fossils can be studied in the past decade. Facilitated by the advent of new hard- and software tools, these techniques are now becoming routine techniques in vertebrate palaeontology. However, by their very nature vertebrate fossils are often incomplete, broken or distorted when they are found. Furthermore, the comparatively small sample size of most vertebrate taxa makes it difficult to account for effects of intraspecific variation, sexual dimorphism, ontogeny and allometry. This presents a significant problem for functional analysis of specific morphologies or anatomical structures and the respective comparability of biomechanical behaviour.
The integration of theoretical morphologies provides a versatile solution to this problem. Using digital modelling techniques a wide range of theoretical morphologies can be created, which can subsequently be subjected to biomechanical analyses to test the functional significance of morphological features. This approach not only permits the overcoming of limitations posed by the incompleteness of the fossil record and preservation, but can also increase sample size significantly. Comparing theoretical models with actually preserved vertebrate morphologies allows ground-truthing this approach and testing hypotheses on morphospace occupation and convergence. Different case studies (including mandibular morphology of herbivorous dinosaur, locomotion in marine reptiles) will be presented and the advantages, disadvantages and possibilities of this approach will be discussed.