
From footprints to locomotor anatomy? The contribution of geometric morphometrics to the study of the hominin footprints from the Upper Pleistocene site of Rozel (Normandie, France)

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Résumé

In recent years, different sites providing hominin footprints have been discovered such as the Pleistocene site of Rozel (Manche, France) dated to ca 80ky ago. Le Rozel delivered 290 footprints attributed to Neandertals that represent a potentially important source of biological information for this species. In that perspective, it is necessary to evaluate the impact of the substrate on the footprint morphology, and then the relation between this morphology and the anatomical features of the functional foot.

We report here the results of a geometric morphometric analysis of 39 complete footprints coming from a single occupation layer at Le Rozel. This Upper Pleistocene sample is compared with experimental footprints realised by 22 individuals on substrate conditions similar to that of Le Rozel. Our comparative sample also includes 52 3D models available online, of Pliocene, Holocene as well as experimental footprints made on different substrates. Each footprint is described by a set of 11 3D landmarks, indicative of the shape of the outline and the depth distribution (according to Bennett et al., 2009). We then proceeded to a Generalized Procrustes Analysis and a Principal Components Analysis.

The results show that the different anatomically modern footprint samples cannot be morphologically distinguished according to the substrate conditions where they have been realised. The Rozel footprints are clearly different from that of the Laetoli site. They slightly differ from the modern human samples: the heel and the midfoot are mediolaterally wider which could reflect a less pronounced plantar vault. These anatomical features of Le Rozel footprints are consistent with our knowledge of the anatomy of the Neandertal foot. Ongoing analyses of the impact of taphonomic agents on the footprints' morphology will help improving our interpretation of Le Rozel footprints.

Mots-Clés: Neandertals, footprints, Le Rozel, morphometrics, anatomy

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