

Methods

Figure 1. Overview of cortical thickness measurement protocol for a *Pan* talus. A) Segmentation of contours on an individual slice showing thresholded region in magenta (top) and subsequent yellow contour around bone (bottom). B) Contours are automatically drawn at 20-30 slice intervals throughout the bone. C) Contours are interpolated to generate a surface used as a guide for cortical thickness measurements. D) Measurement of cortical bone thickness along a line running through the cortex (top), measurement is based on the grey values shown in the interpolated data (graph, bottom). E) Cortical thickness maps are subsequently generated (left), which can be smoothed (right) to even out erroneous measurements. Thicker cortex is shown in blue and thinner cortex in red.

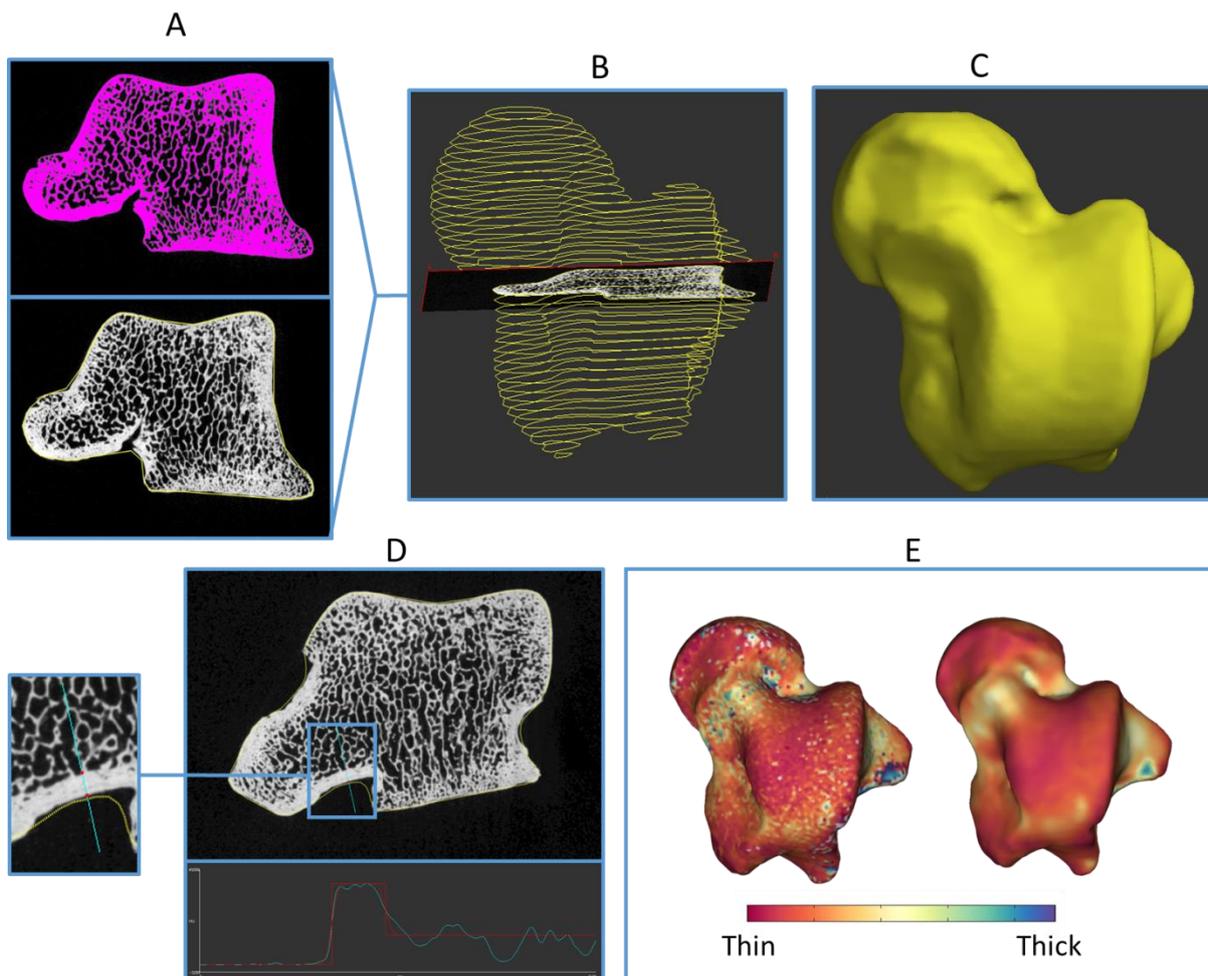


Figure 2. Overview of registration to a canonical mesh and between-group comparisons of a *Pan* and *Homo* talus. A) Surface of one *Pan* (top left) and one *Homo* (bottom left) individual. Surface files from the complete sample were used to generate an average, canonical surface (right). B) An individual surface (green) and the canonical surface (red), before (left) and after (right) the registration. C) Mean cortical thickness maps of *Pan* (top left) and *Homo* (bottom left), both expressed on the canonical surface, and a map showing regions where there are significant differences between the two species (right). In the map of significant differences, regions in yellow-red show significant differences at each vertex and regions in blue (extending from yellow-red regions) show significant differences by cluster.

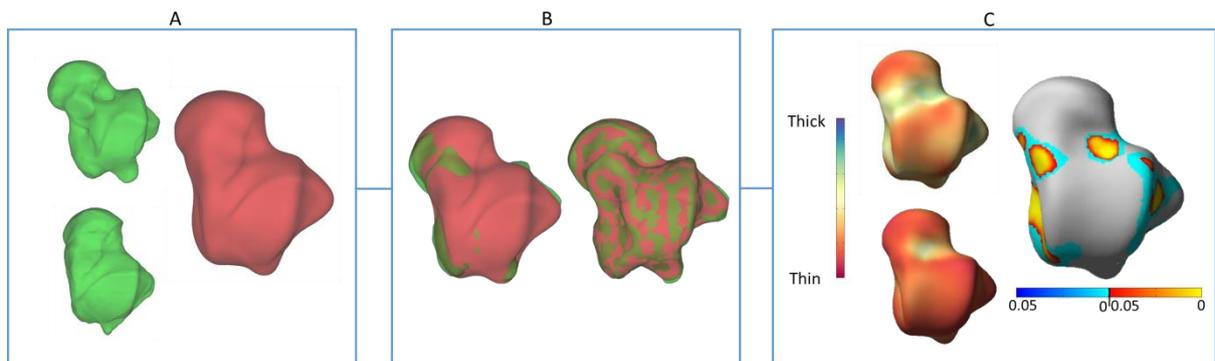
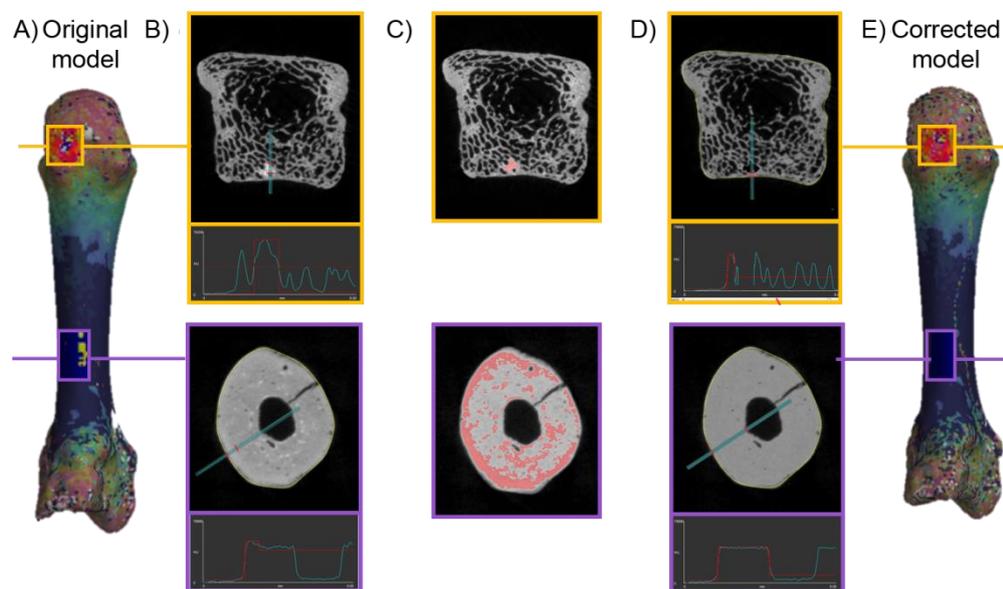


Figure 3. Protocol for processing specimens with high density inclusions. Shown here is the Mc3 of Arene Candide 2. Incorrect measurements on the original model (A) are due to high density inclusions (B top) and differential preservation (B bottom) leading to artificially thick (orange box) and thin (purple box) regions of the colour map. High density inclusions outside of the cortex are selected in the CT data, shown in magenta (C) and removed (D top), while high intensity grey values within the cortex are reduced with an arithmetic operation (D bottom) (see text for explanation), to create the corrected model (E).



Results

Figure 4. Mean cortical thickness maps of the Mc3 for each species, all mapped to the canonical mesh. From top to bottom, *P. t. verus*, *H. sapiens*, *Pongo* sp. and archaeological *H. sapiens* (Arene Candide 2). Thicker cortex in is blue, thinner cortex in red. Metacarpals are shown in (left to right) lateral, palmar, distal (top), proximal (bottom), medial and dorsal views.

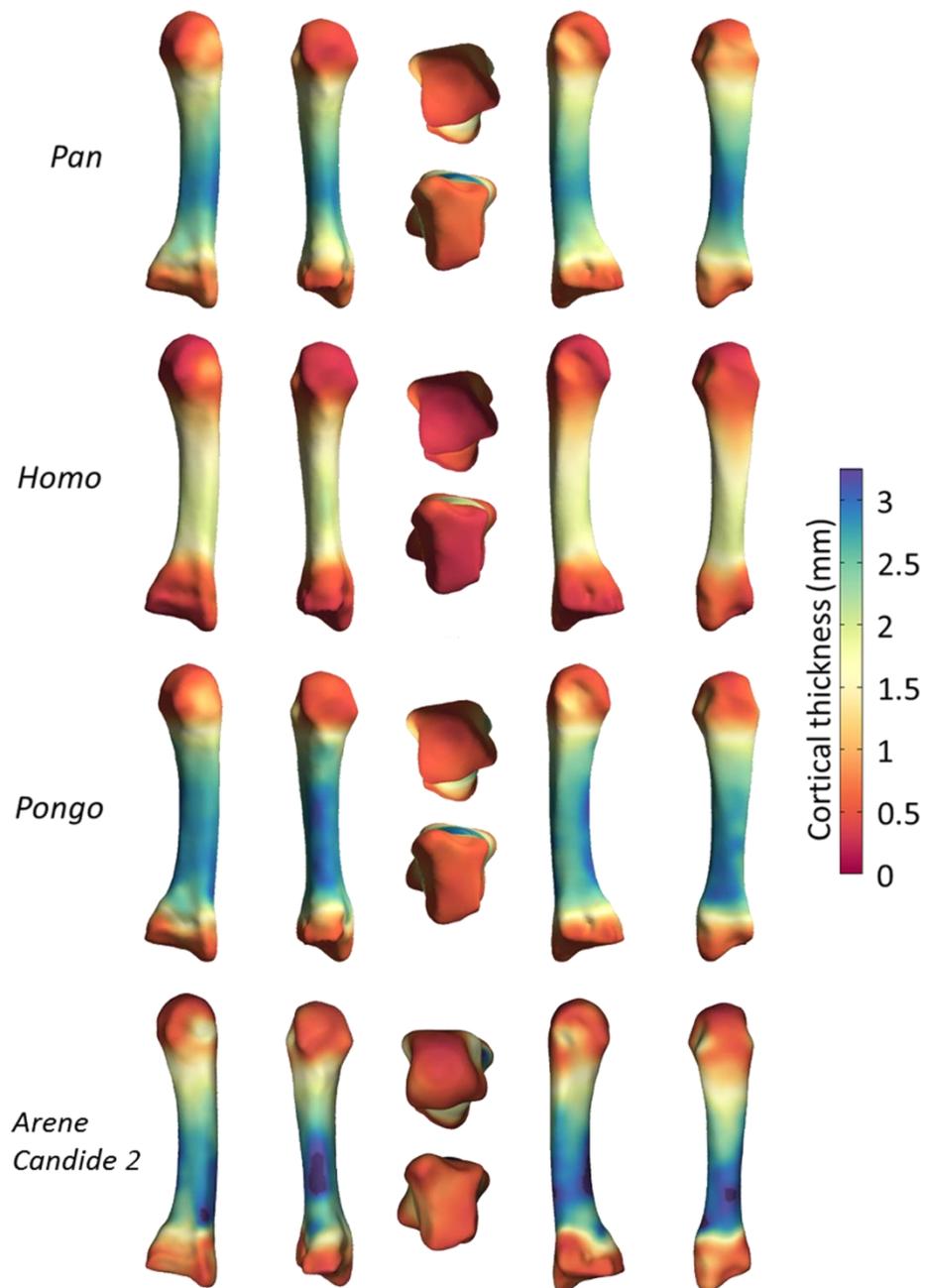


Figure 5. Colour maps of cortical thickness differences between each species (left) and statistical comparisons (right) for the Mc3 in (top to bottom) *Pongo* sp. vs *H. sapiens*, *P. t. verus* vs *H. sapiens*, and *Pongo* sp. vs *P. t. verus*. Differences in thickness between species (left) are blue where the first species has a thicker cortex than the second and red where the first species has a thinner cortex than the second. Statistical comparisons (right) show regions where there are significantly different cortical thickness values at each vertex (yellow-red), and regions where there are significant differences in cortical thickness at each cluster (blue). No significant differences were found between *P. t. verus* and *Pongo* sp.. Metacarpals are shown in (left to right) lateral, palmar, distal (top), proximal (bottom), medial and dorsal views.

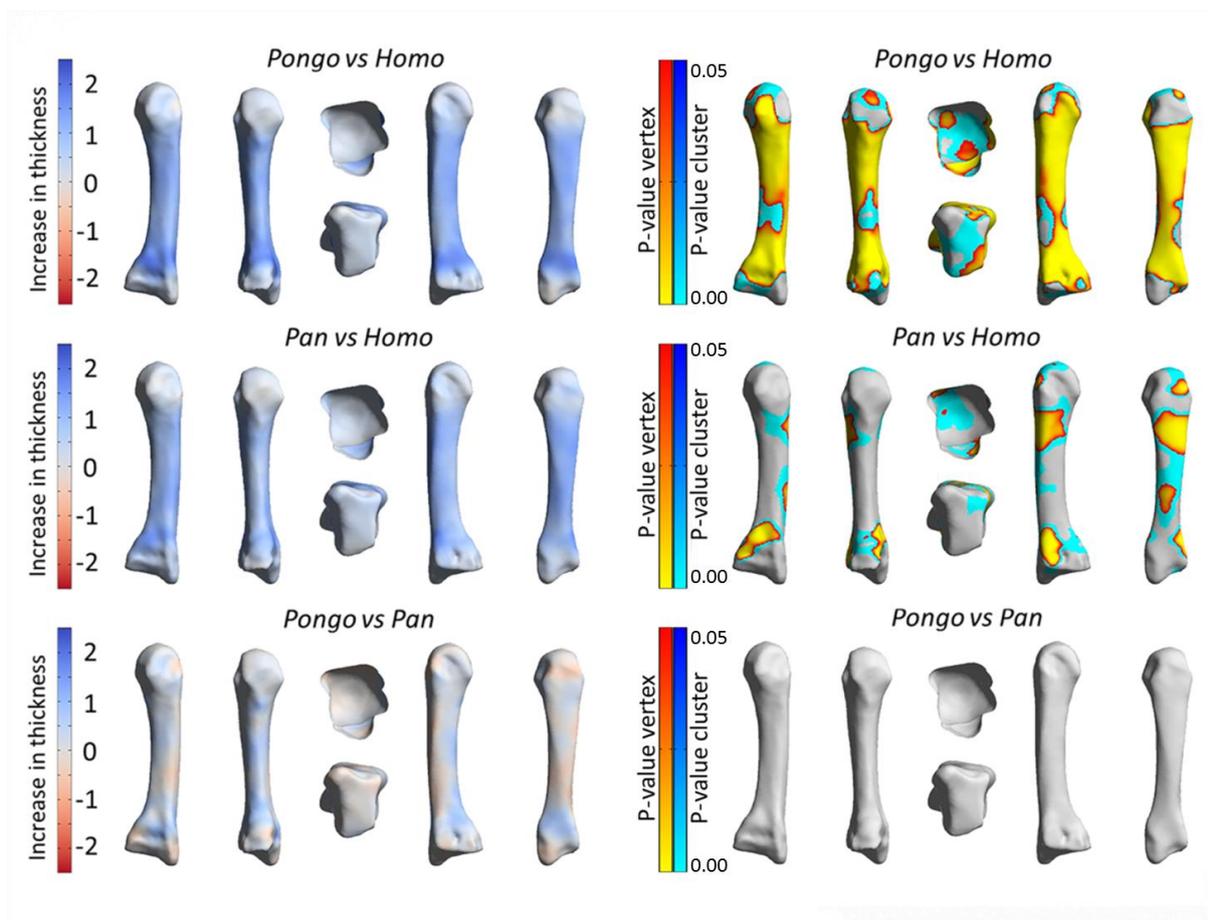


Figure 6. Mean cortical thickness maps for the *Pan* and *Homo* talus showing results for both A) absolute cortical thickness measurements and B) relative cortical thickness comparisons. For relative thickness comparisons, the mean was subtracted from every thickness measurement then divided by the standard deviation for each individual before generating species averages and conducting statistical comparisons. From top to bottom, mean cortical thickness maps for *Pan*, mean cortical thickness maps for *Homo*, cortical thickness differences between *Pan* and *Homo* and statistical comparisons between the two species. Talus is shown in (from left to right) lateral, posterior and medial views.

