Out of Africa: the importance of rivers as human migration corridors

Jorge A. Ramirez a,d, Tom J. Coulthard a, Nick Barton b, Mike Rogerson a, Tim Brücher c

a Department of Geography, University of Hull, Hull, UK
b Institute of Archaeology, University of Oxford, Oxford, UK
c Max-Planck-Institut für Meteorologie, Hamburg, Germany
d Department of Geography, University of Leeds, UK

1. Introduction

- The route and timing of Homo sapiens exiting Africa remains uncertain.
- Corridors leading out of Africa through the Sahara, the Nile Valley, and the Red Sea coast have been proposed as migration routes for humans 80,000-130,000 years ago.
- During this time climate conditions in the Sahara were wetter than present day.
- We use palaeoclimatic rainfall and a hydrological model (CAESAR-LISFLOOD) to quantitatively test the existence of three major rivers crossing the Sahara during the time of human migration.

2. Methods

1. MPI-ESM Climate simulation
   - 12 hr rainfall at 300 km grid cell resolution from climate over North Africa 125 ka BP (Fig. 1)

2. TOPMODEL hydrological model
   - Precipitation used to generate surface runoff
   - Water losses through infiltration & evap.

3. Lisflood-FP hydraulic model
   - Routes surface runoff using a 2D hydrodynamic flow model
   - Water routed over a 1km resolution DEM

4. Model outputs
   - Map of surface water probability for 25 years (Fig. 2)
   - Sahabi and Kufrah are nearly perennial, whilst the Irharhar flows for 3 months (Fig. 3).

3. Results

- Well-known Sahabi and Kufrah rivers very likely flowed across modern day Libya and reached the coast.
- Unexpectedly, an additional river crossed the core of the Sahara through Algeria (Irharhar river) and flowed into the Chotts basin.
- Support for the Irharar as a viable migration corridor is provided by its geographic proximity to archaeological artifacts (Fig. 2).
- Sahabi and Kufrah are nearly perennial, whilst the Irharhar flows for 3 months (Fig. 3).

4. Conclusions

- This study provides the first quantitative analysis of the likelihood that rivers occurred during human migration out of Africa.
- The Irharhar river is unique, it links locations in central Africa experiencing monsoon climates with temperate coastal Mediterranean environments where food and resources were likely abundant.

Further details about this study can be found in:


Contact information
email: ramirez08063@alumni.itc.nl
website: https://sites.google.com/site/ramirezresearch/