

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

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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 palaeoclimate 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

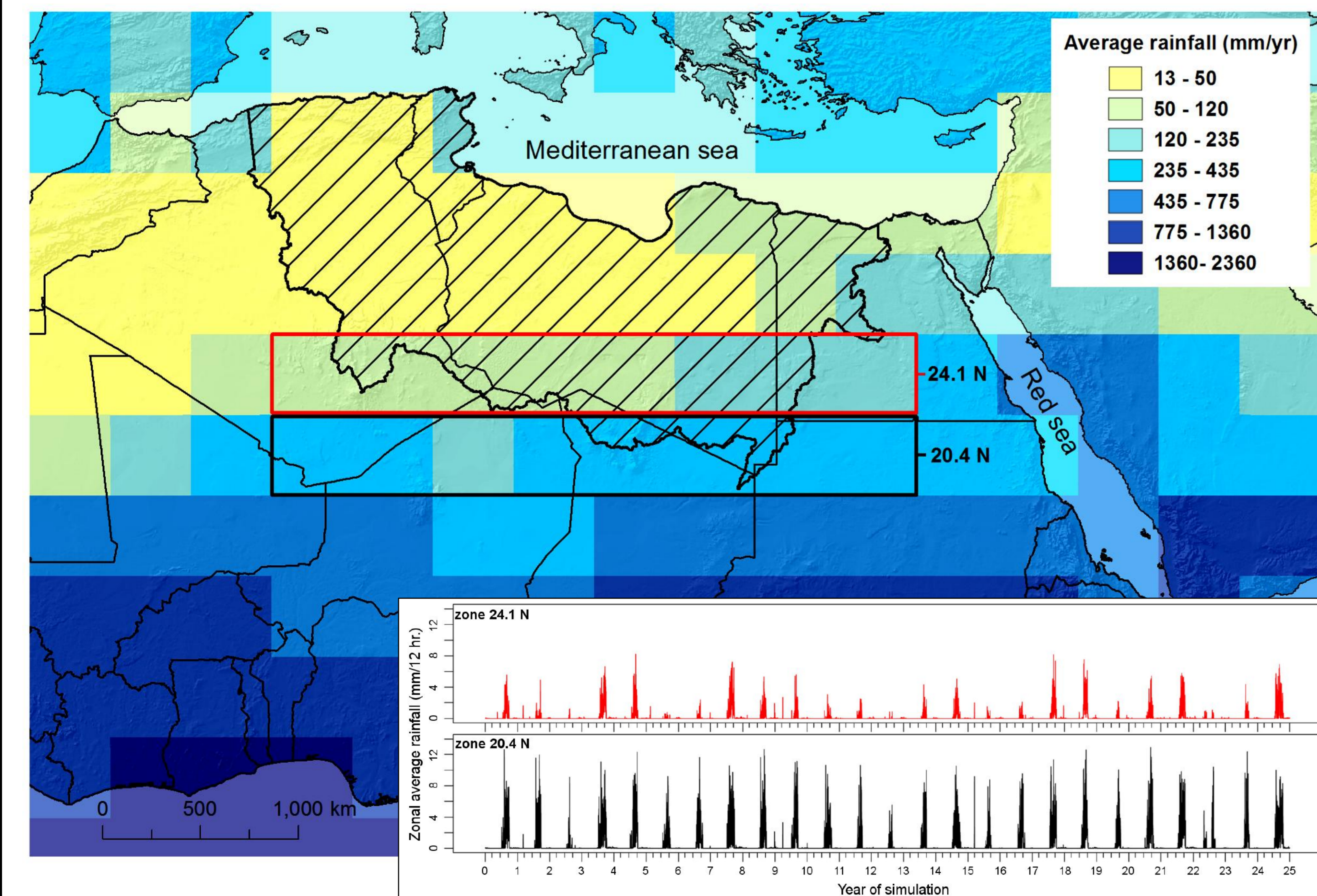
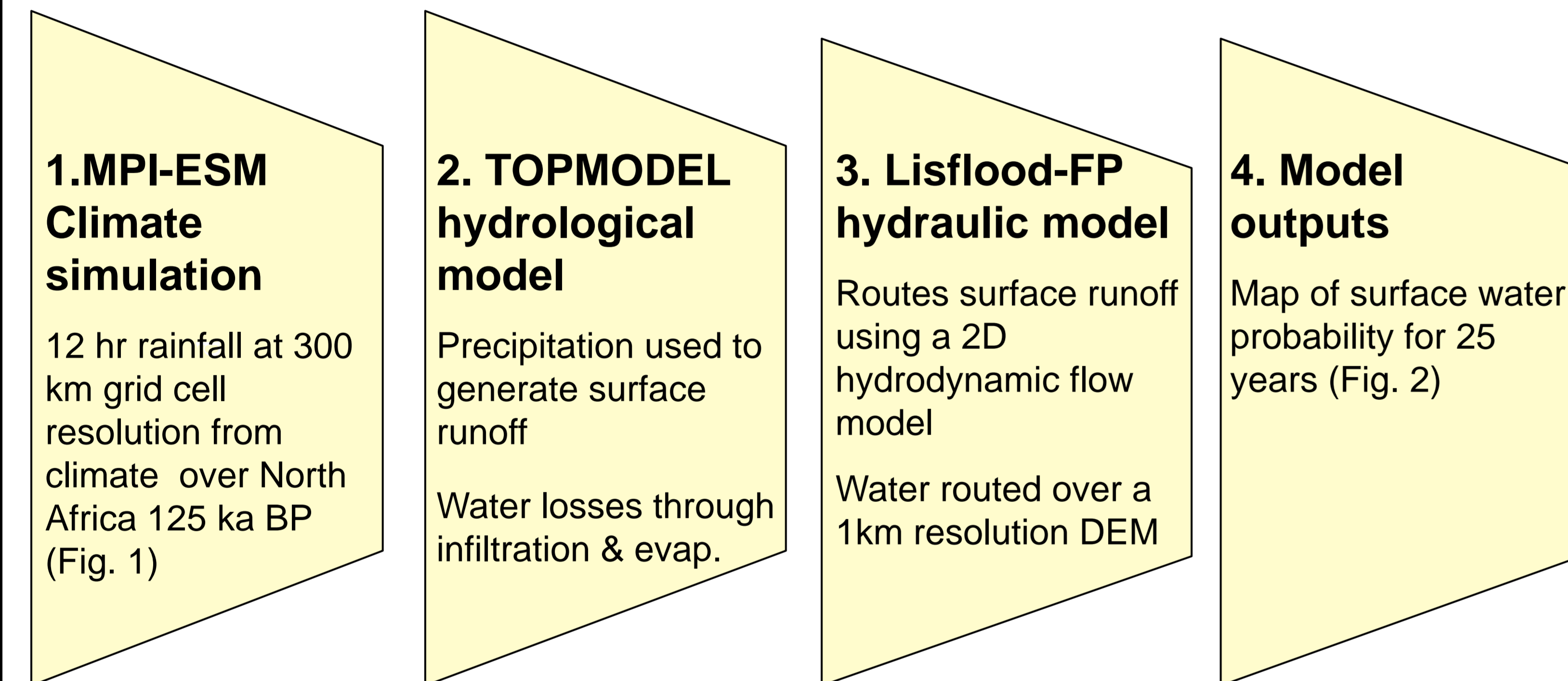


Figure 1. Rainfall from an Earth System Model simulation and time series of zonally averaged precipitation for locations south of the modelled catchment.

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 Irharhar 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).

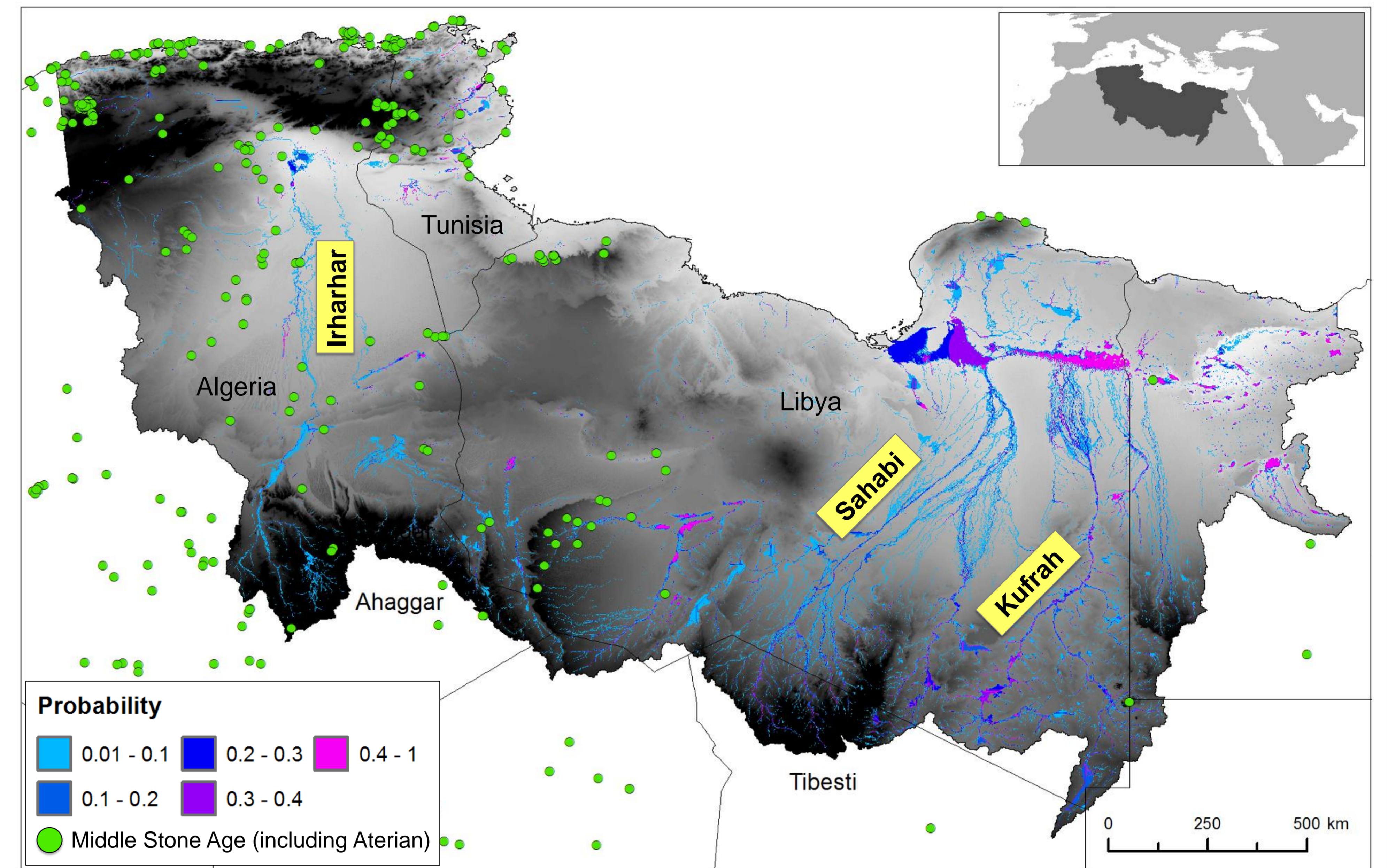


Figure 2. Simulated probability of surface water and archaeological artefacts in the Sahara.

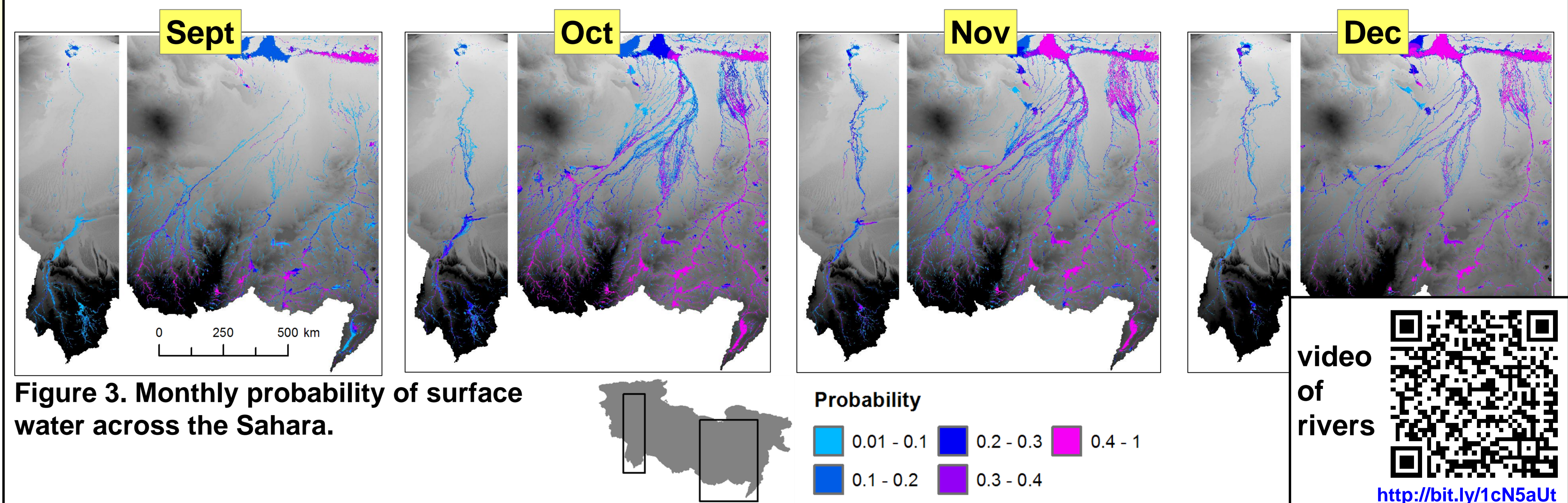


Figure 3. Monthly probability of surface water across the Sahara.

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:

Coulthard, T. J., J. A. Ramirez, N. Barton, M. Rogerson, T. Brücher (2013), **Were Rivers Flowing across the Sahara During the Last Interglacial? Implications for Human Migration through Africa**, PLoS ONE, 8(9).

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