

Early sea-crossings: Survey and comparison between *Homo* species

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Overview

Starting point:

Sea-crossings are a strong indicator of a sophisticated 'language'

Questions to address:

What do we know about early sea-crossings?

How can we analyze and interpret this knowledge?
(especially regarding the capacities of different species)

Outline

- Sea-crossings: a modern behavior requiring « language »
- Context and detection of early sea-crossings
- Comparison between *H. sapiens* and *H. erectus*
- Survey of detectable sea-crossings

Outline

- Sea-crossings: a modern behavior requiring language

As a starting point...

- We know that:
 - *H. sapiens* reached and colonized Australia around 60 ky ago
 - To do so, they had to cross a body of water of at least 90 kms (plus several others)
- 60,000 years ago, our predecessors were capable of an impressive 'tour de force'

A difficult task

- Crossing a large body of water is a dangerous task requiring various expertises
- « Long lasting buoyancy requires a sophisticated technological knowledge »
- Colonizing Australia involved a sufficient number of individuals, who therefore had to sea-cross together and were able to settle and survive in a new environment

→ Did this success require language as we know it today?

Why sea-crossings are a strong indicator of language?

- Technological development required to build robust rafts (Davidson & Noble, 1992):
 - Polyolithic assemblage, cooperation between individuals
 - Cf. putative links between language and stone tools (Leroi-Gourhan)
- Intentional process and motivations underlying the use of a raft to reach a distant island (Hombert & Coupé, 2002):
 - Distributed cognition (Strum & Foster 1999)
 - Cf. links between language and metaphysical conceptions implied by burials with offerings

Significant parameters

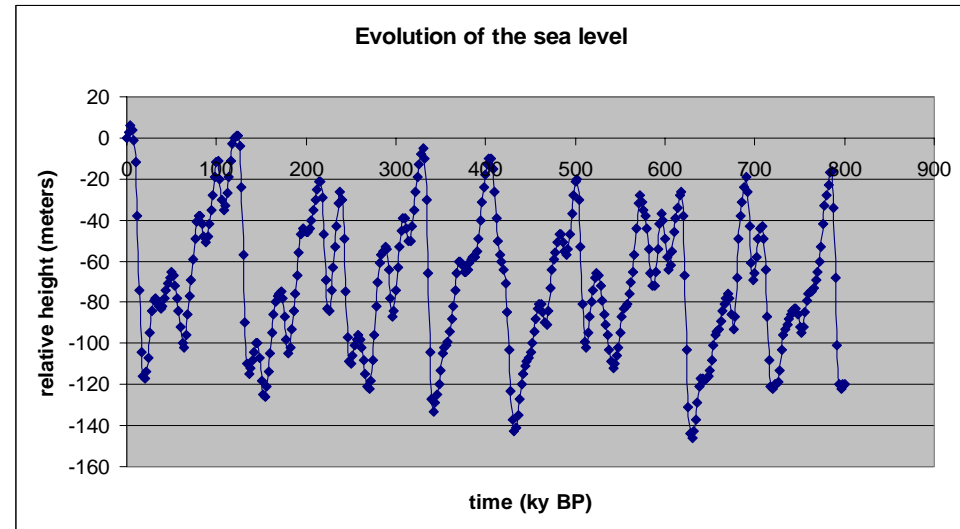
- Accidental versus intentional sea-crossings:
 - Winds, currents, size of the target
- Distances to cross
 - Small distances (few kilometers) may not require strong rafts
 - They are more likely to be crossed often and accidentally
 - More uncertainty about possible terrestrial paths
- Visibility = possibility to observe a target location over the horizon
 - A good basis for intentional sea-crossings

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Sea level

- Variations of sea level during prehistory:
 - A recurrent phenomenon during the last millions of years
 - Milankovitch's variations in Earth orbital parameters
 - Complex phenomena:
 - Non-linearities in evolution of climate
 - tectonic movements
 - Hydro-isostasy (weight of water)
- Unavoidable approximations
- More valid for 'recent times' (< 500 ky)



From (Berger & al, 1996)

How to detect sea-crossings?

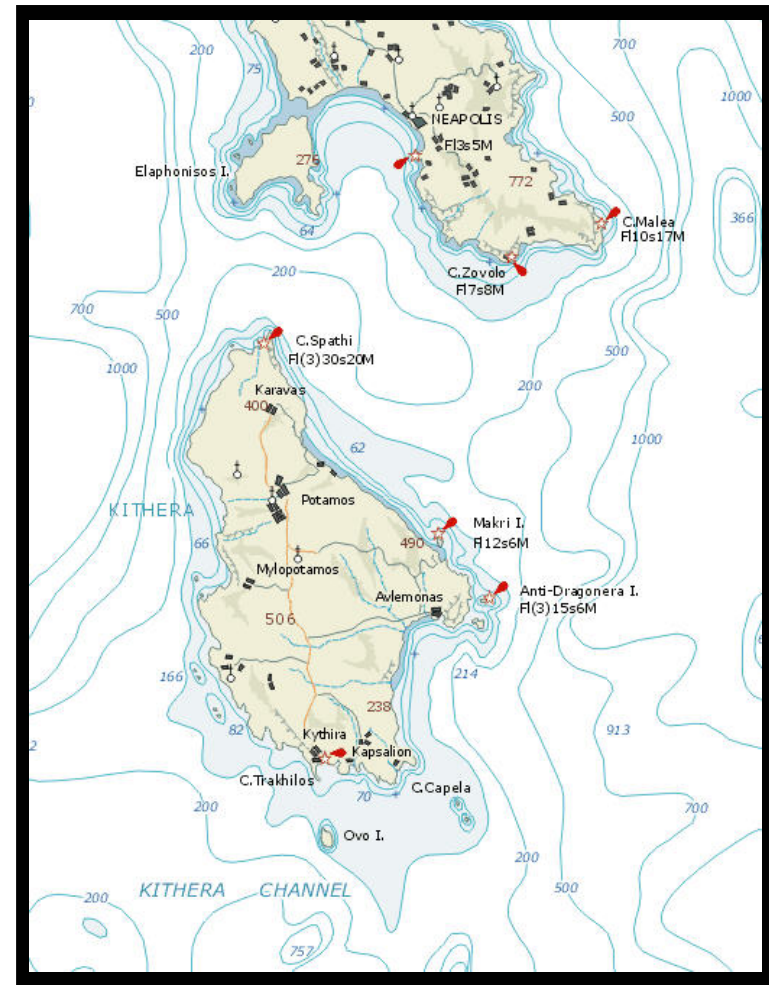
- Artefacts (specific tools, rafts)?
- Underwater discoveries?
- Another approach:
 - Consider and investigate locations only reachable by sea-crossing at the lowest sea levels ($\approx 100 - 150\text{m}$) during the last 1 My
Look for the 'best conditions' for the crossing
 - Look at colonization events in the archaeological record for these key locations

Or vice-versa...

- NB: *some (likely many) early sea-crossings cannot be detected today*

Source of data

- Numerical topographic and bathymetric global databases:
 - ETOPO 2 (2' worldwide database) (Smith & Sandwell, 1997)
 - Precision of the data
- 'Local' nautical charts
 - paper maps / digitalized charts
- Measurements:
 - Use isobath lines
 - Measure distances for shortest paths
 - Estimate conditions of visibility for target location (from sea level / neighboring higher location)



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Who crossed first?

- Are sea-crossings the restricted domain of *H. sapiens*?
- The 'classical' case: the colonization of Sahul
 - « Why the first colonisation of the Australian region is the earliest evidence of modern human behaviour »
(Davidson & Noble's paper title; 1992)
- Critics:
 - Very little attention paid to possible *H. erectus*' sea-crossings
 - (Bednarick, 1997; 1999)

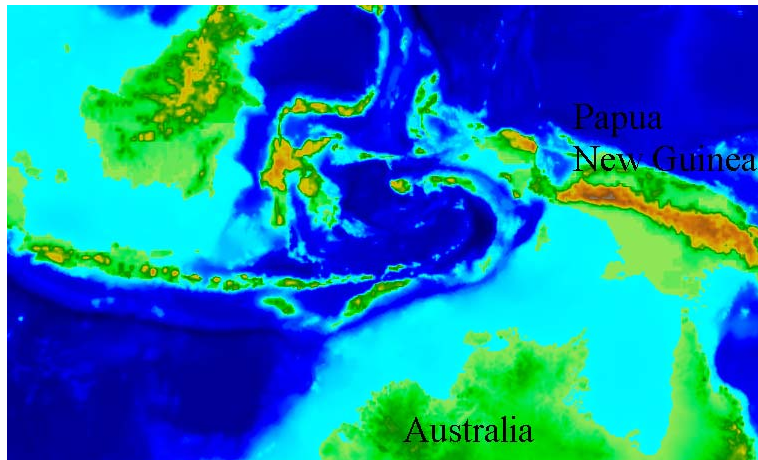
Two opposite views

- One (extreme) position:
 - Intentional sea-crossings as a recent event, restricted to *H. sapiens*
 - Accidental sea-crossings to Australia
 - Framework: behavioral modernity restricted to late *H. sapiens*
 - Another (extreme) position:
 - *H. erectus* mastering sea-crossings more than 800,000 years ago
 - Framework: *H. erectus* as 'capable' as *H. sapiens*, demonstrating fully modern behaviors (cf. debates about ritual burials and other symbolic manifestations); *regional continuity*
- Various proposals for sea-crossings, with their characteristics, should be investigated in an integrative way free of *a priori*

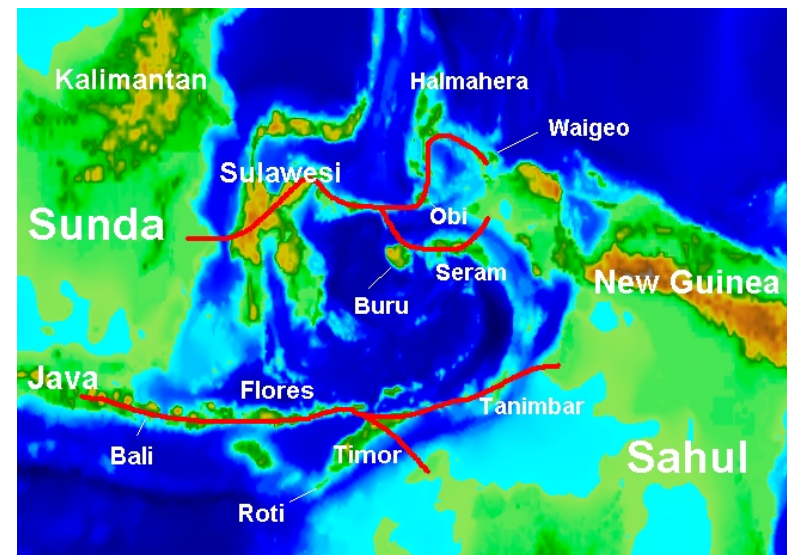
Two clear instances for *H. sapiens* before 50,000 BP

- The colonization of Sahul (60 ky BP):
 - Several sea-crossings, with at least one 90 kms wide
 - Existence of a route to New Guinea with permanent visibility from sea level (Irwin, 1992) (Hombert & Coupé, 2002)
- no need to suppose ability of crossing without visibility (Bednarick, 1998)

Modern geography



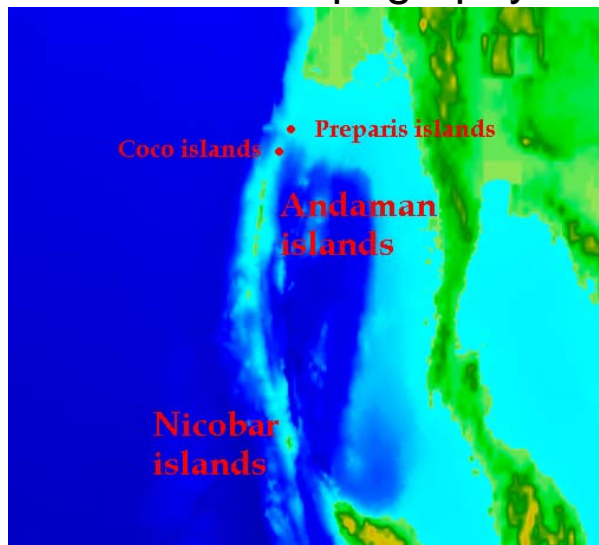
Relative sea level: -50m



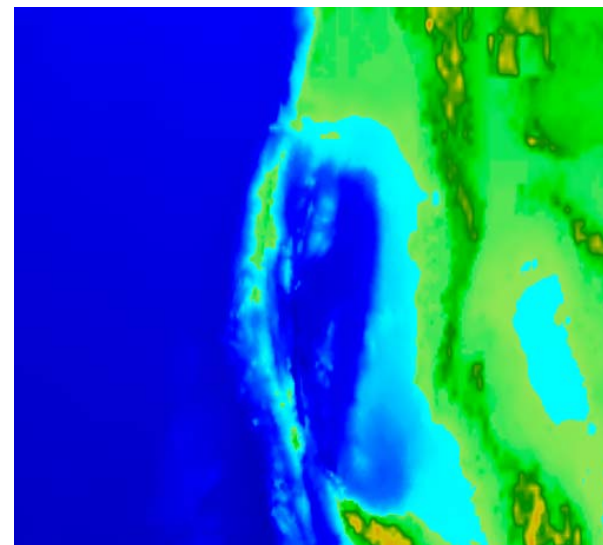
Two clear instances for *H. sapiens* before 50,000 BP (2)

- The colonization of the Andaman islands (around 50-60 ky BP, DNA analyses):
 - One sea-crossing of around 60 kms at -80m
 - Visibility, but not at sea level
 - (Hombert & Coupé, 2003)

Current topography



Relative sea level: -60m

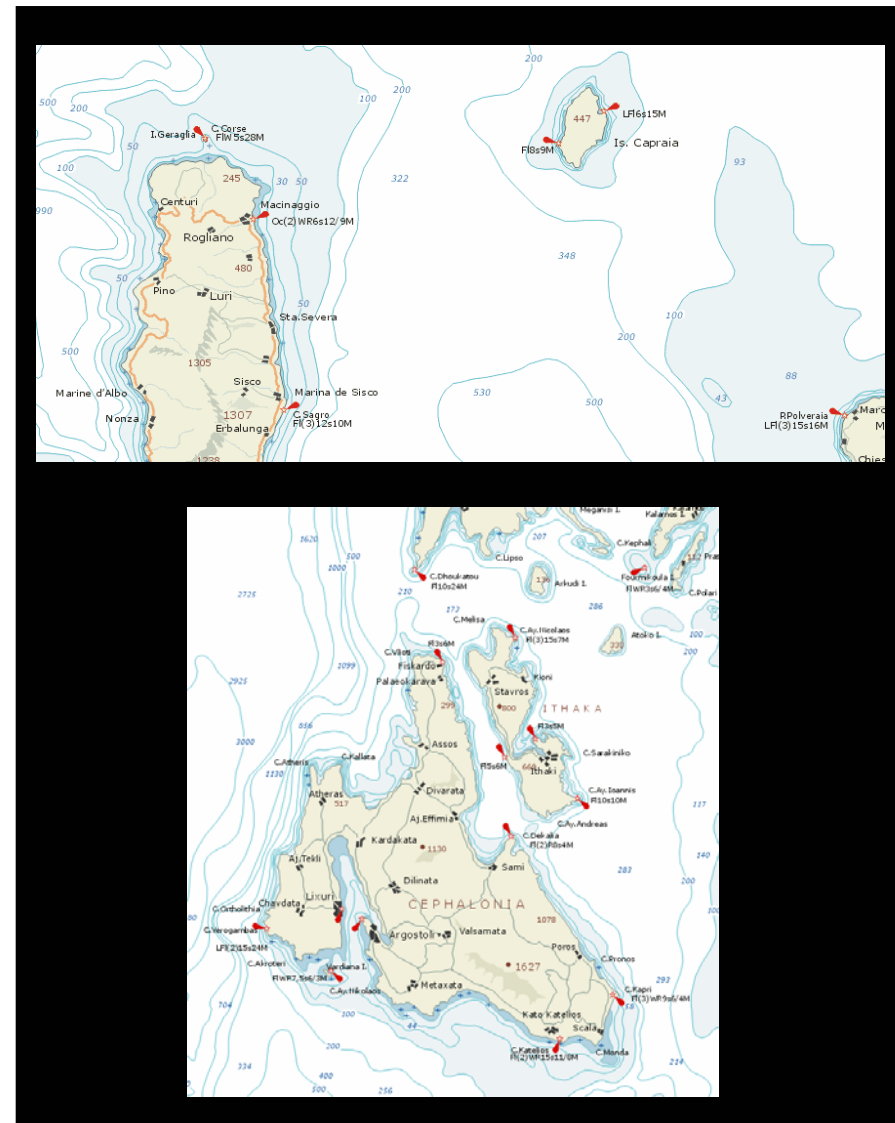


H. erectus' sea-crossings (1)

- To Flores (Indonesia):
 - Lower Palaeolithic before 800 ky (Morwood, 1998)
 - Difficult to make predictions given the highly unstable geography of the region
 - Pay attention to crossings of other animals
 - one or several sea-crossings, at least 10 kilometers wide, up to 30 kilometers (Bednarick, 2001)
- To Timor and Roti (Indonesia):
 - Middle Palaeolithic
 - (Bednarick, 1998, 1999)
 - One sea-crossing from Flores, distance around 30 kms

H. erectus' sea-crossings (2)

- To Sardinia via Corsica:
 - colonized by Neandertal at least 300,000 years ago (Bini, 1993)
 - connected to Corsica at lower sealevels
 - two sea-crossings, likely between 10 and 20 kilometers
- To Cephalonia (Greece)
 - Mousterian tools (Kavvadias, 1984)
 - one sea-crossing, likely 4-5 kms wide



Analyses: Differences between *H. sapiens* & *H. erectus*' crossings

- Distances to cross:
 - Long vs. short distances (< 30 kms vs > 60 kms)
 - Quantitative differences, but not qualitative
 - Visibility:
 - Good visibility for all *H. erectus*' crossings
 - Visibility sometimes at the threshold for *H. sapiens*, or no visibility but use of indirect cues (birds, smokes, clouds)
- No qualitative differences at first sight...

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Perspectives

- Until now, few 'early' sea-crossings detected
 - Hypotheses based on few evidences
 - A weak indicator?
 - depends partially on the number of 'detectable' sea-crossings
 - Were there many opportunities to reach close/distant islands?
- The theory is *falsifiable*:
 - any new discovery can confirm / infirm hypotheses made
 - In which locations would such discoveries be significant?

A world survey of valid traces of early sea-crossings

- In progress (access to maps)
- Investigated regions:
 - Mediterranean sea
 - African coastlines
 - Southern Asia
 - Australia / Philippines / New Guinea

First results

- Many islands are candidates as 'detectable' and valid targets of sea-crossings
 - Islands in the Wallacea regions (Sulawesi, Wetar and more eastern/north-eastern islands, islands south of Sumatra, and even Australia)
 - Islands in the Mediterranean sea:
 - Greek islands (Kithera, Skantzoura Is., Skiros, Kithnos, Andros etc.)
- Gibraltar Strait: a strong candidate (less than 10 kms to cross, with good visibility), however not clearly backed up with clear archaeological evidence
- A passage between North Africa and Sicilia?
 - Serki Channel / Serki bank, north of Tunis
 - Sea southwest of Sicilia (I. Pantelleria)

Another view at differences between *Homo* species

- *Homo erectus*:
 - A few attested sea-crossings, many possibilities
 - A large time window
- *Homo sapiens*:
 - In a narrow time window:
 - A large number of sea-crossings:
 - » limit visibility and later no visibility
 - » large distances to cross

Proposal

- No difference in technological development
- No difference in intentional capacities
- A stronger exploratory behavior for *H. sapiens*
 - will to discover new places (metaphysical beliefs?)
 - reach distant & remote islands (limit visibility)

Summary

- Sea-crossings are a strong indicator of language
- Regarding sea-crossings, *H. sapiens* & *H. erectus* do not differ:
 - in technological development
 - in intentional capacities
- Differ in their exploratory behavior
- Language may not play a significant role to this respect
- New discoveries may contradict (more ancient *H. erectus*' distant sea-crossings) this hypothesis

Thank you for your attention