

# Origin and development of the metallurgy in Western Africa: **CUPRUM project**

**Scientifically & financial supported by**  
French Ministry of Foreign Affairs  
and International Development



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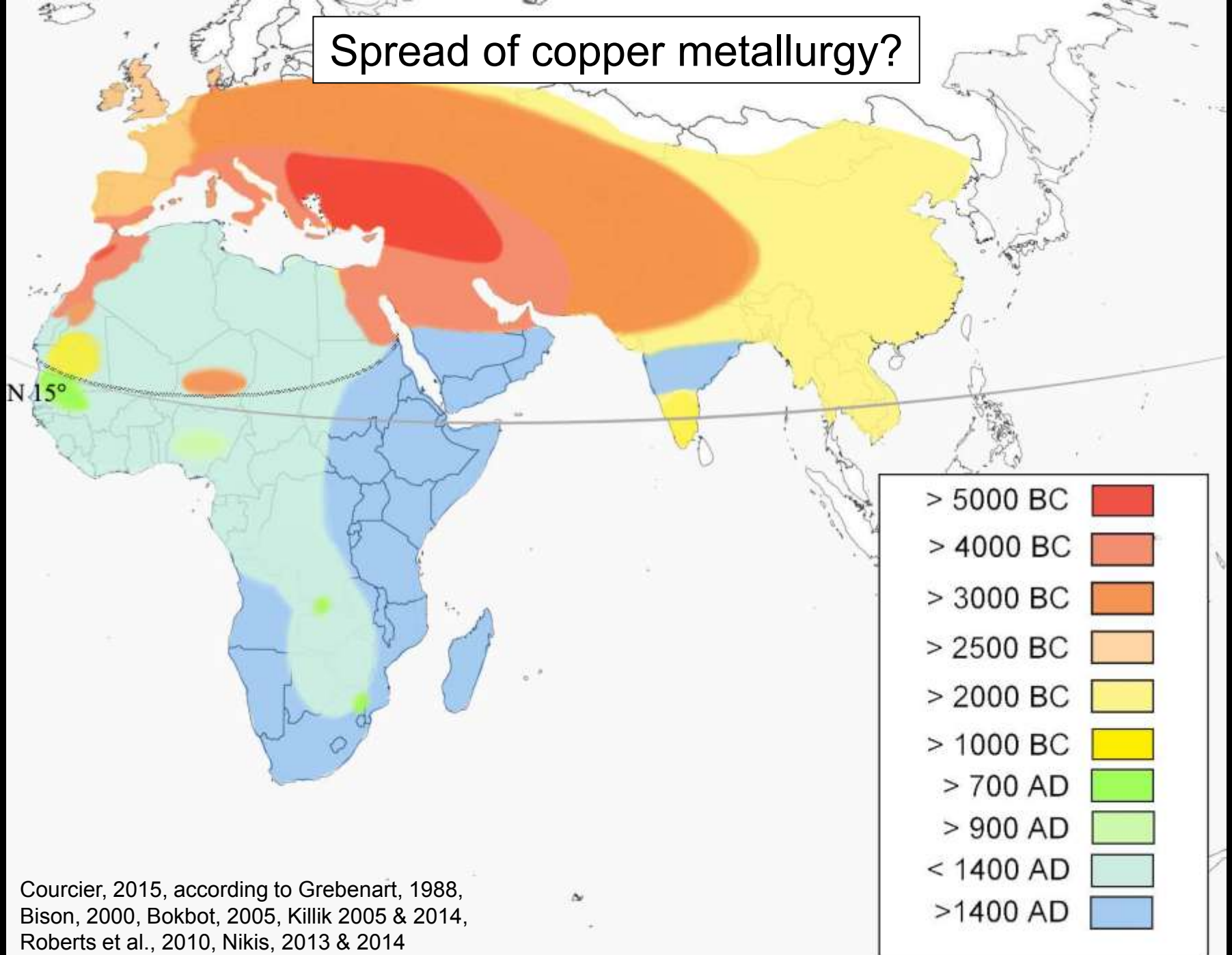
Society of Africanist Archaeologists  
23<sup>rd</sup> Biennial meeting - Toulouse, France - 26 June-2 July 2016

**CUPRUM - CUivre : PRoduction et Usages à l'Holocène en Mauritanie -**



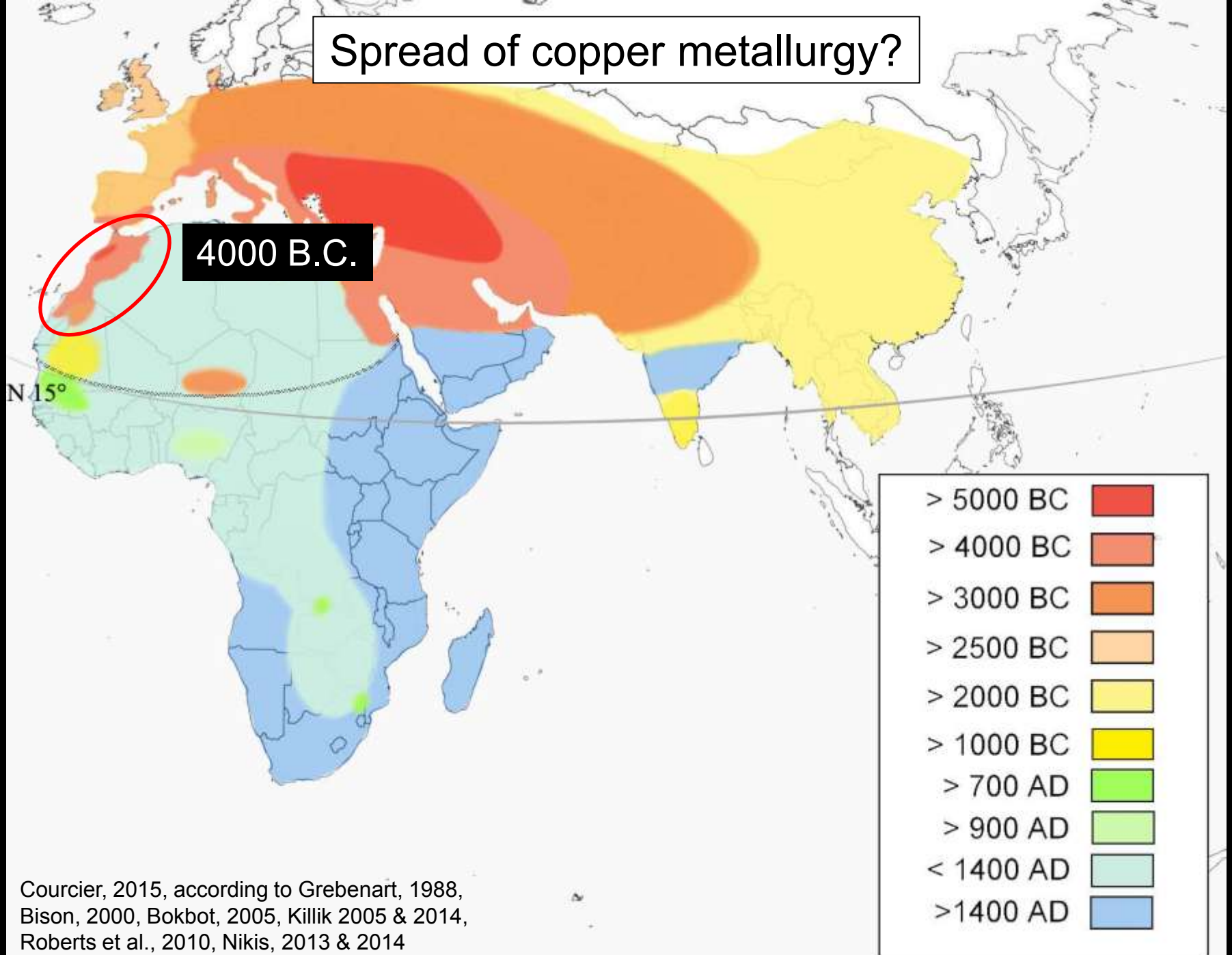
State of art

# Spread of copper metallurgy?



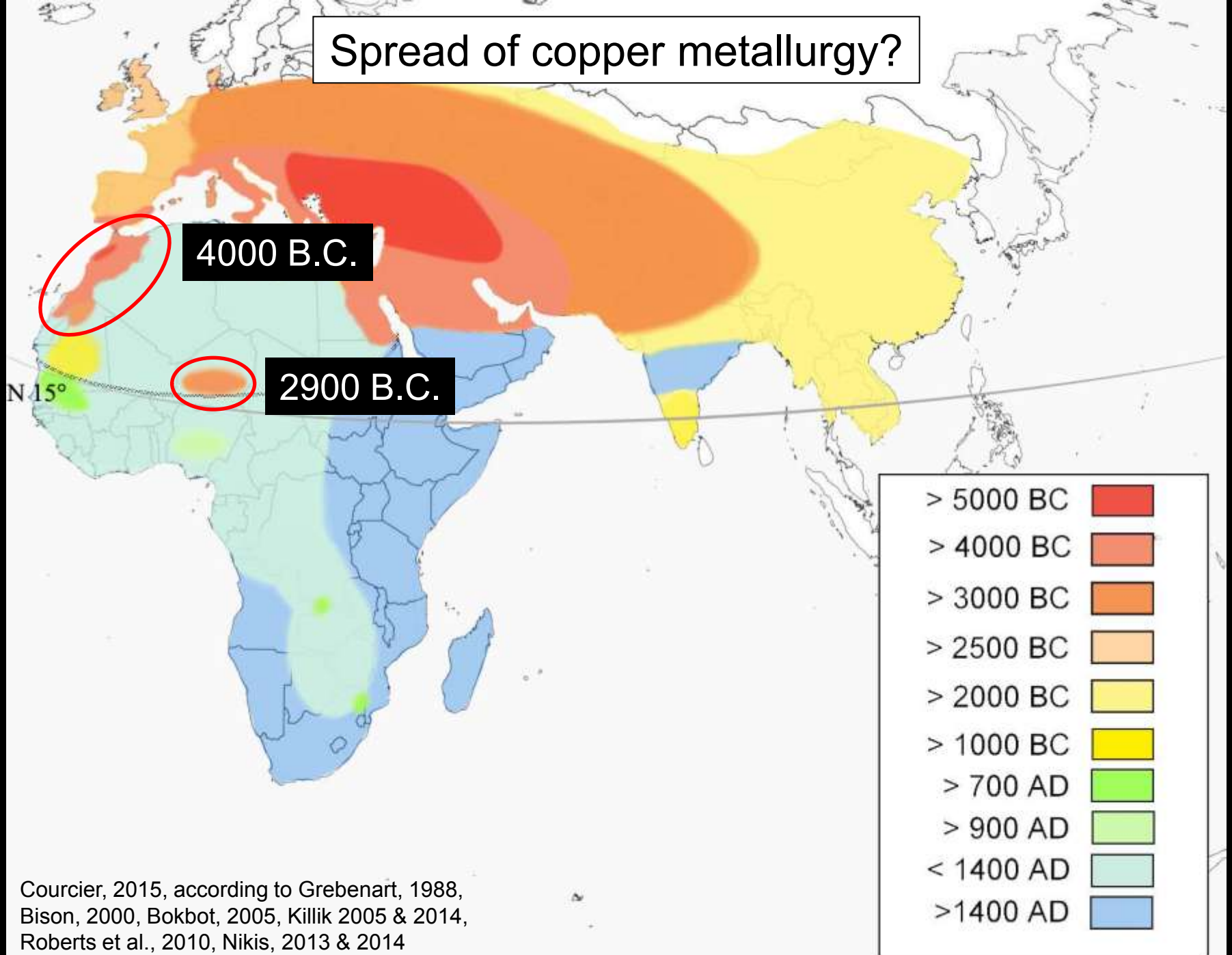
Courcier, 2015, according to Grebenart, 1988,  
Bison, 2000, Bokbot, 2005, Killik 2005 & 2014,  
Roberts et al., 2010, Nikis, 2013 & 2014  
and Bandama et al., 2014

# Spread of copper metallurgy?



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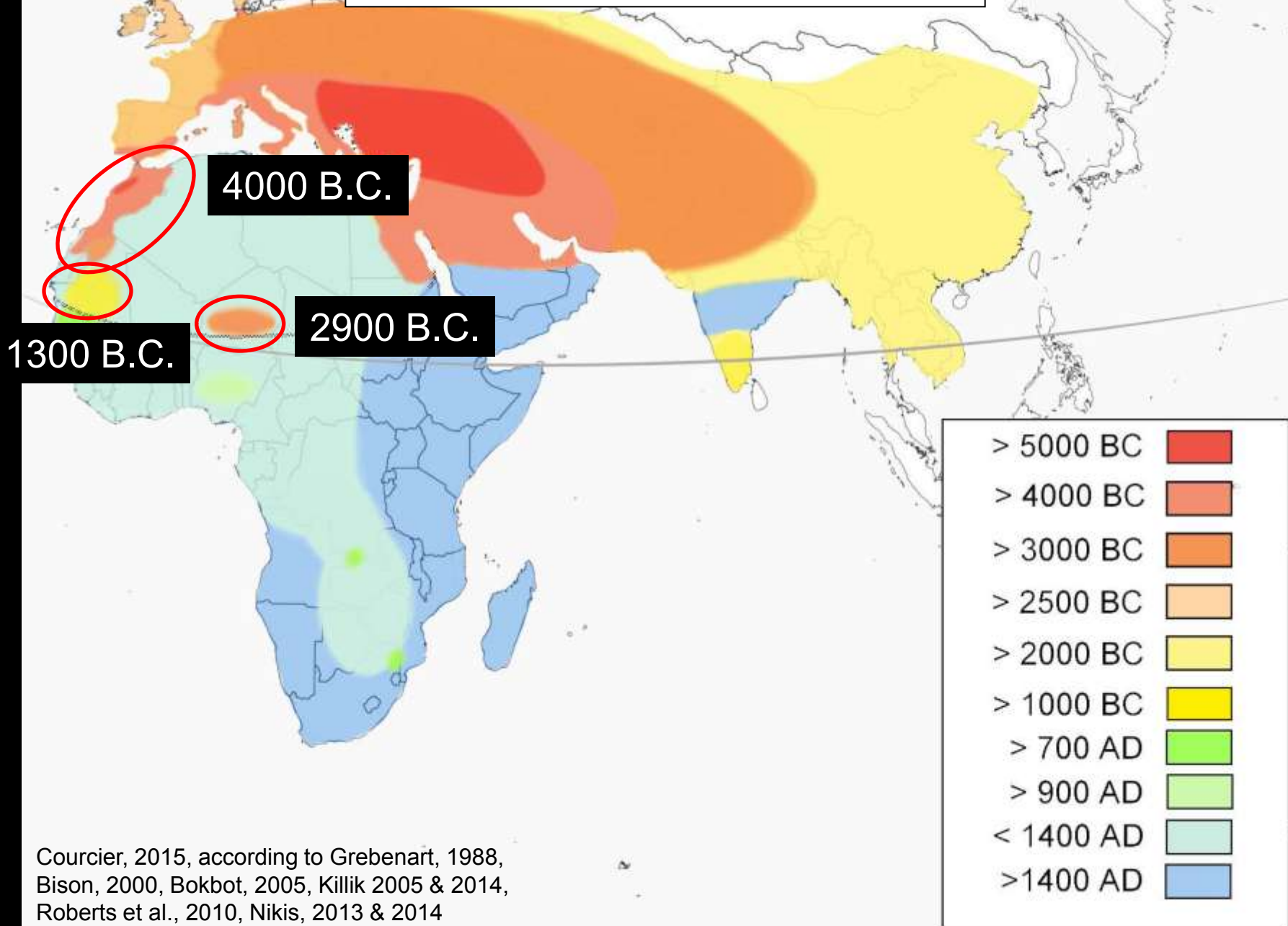
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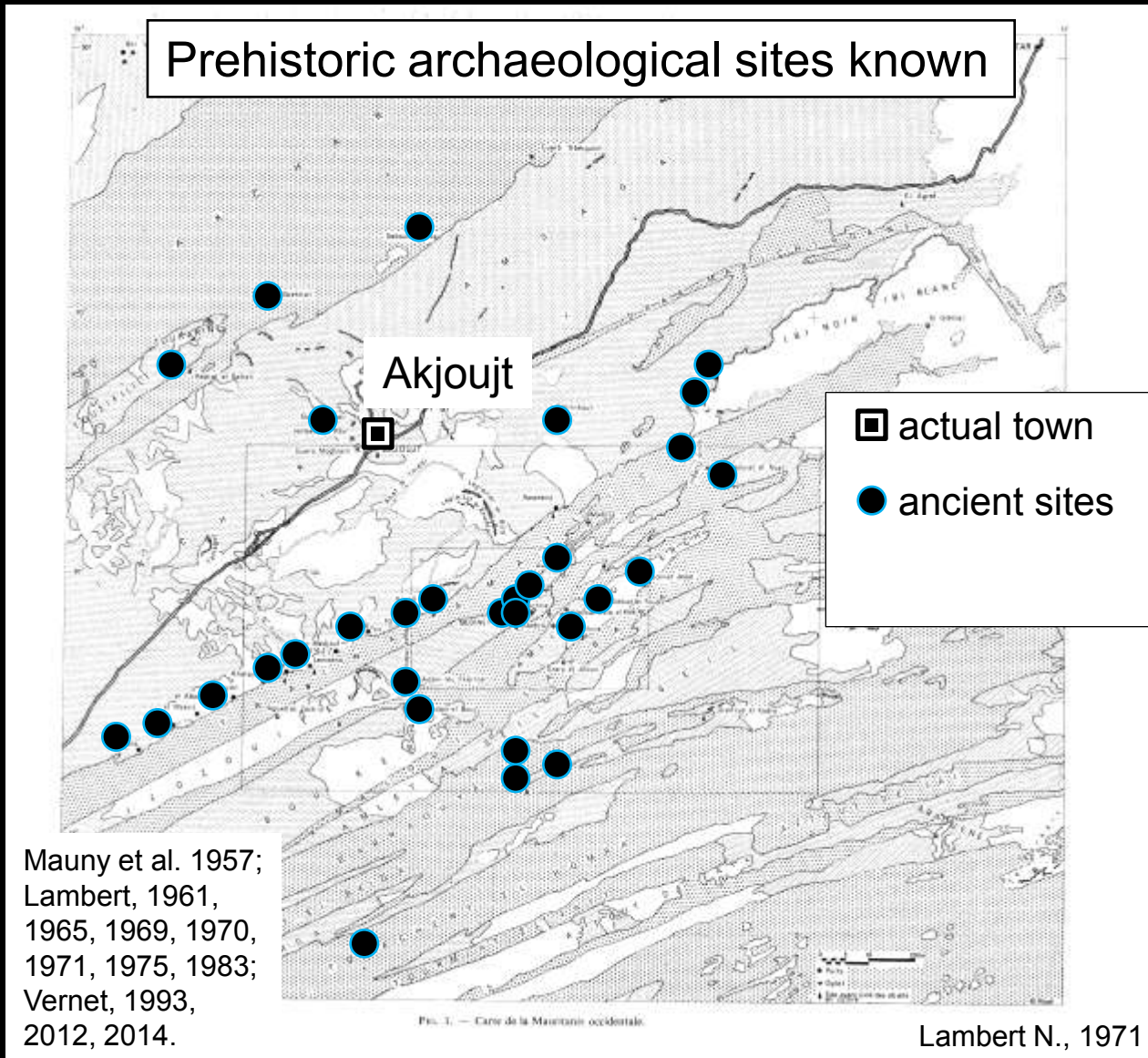


# Spread of copper metallurgy?



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and Bandama et al., 2014

# Research in the vicinity of Akjoujt (Inchiri region)



## Archaeological research:

1947-1962 : R. Mauny

1968-1985 : N. Lambert

1970-2010 : R. Vernet

Mauny et al. 1957;  
Lambert, 1961,  
1965, 1969, 1970,  
1971, 1975, 1983;  
Vernet, 1993,  
2012, 2014.



# Research in the vicinity of Akjoujt (Inchiri region)



Prehistoric archaeological sites known

- actual town
- ancient sites
- ancient mine

Mauny et al. 1957;  
Lambert, 1961,  
1965, 1969, 1970,  
1971, 1975, 1983;  
Vernet, 1993,  
2012, 2014.

FIG. 3. — Carte de la Mauritanie occidentale.

Lambert N., 1971

## Archaeological research:

1947-1962 : R. Mauny

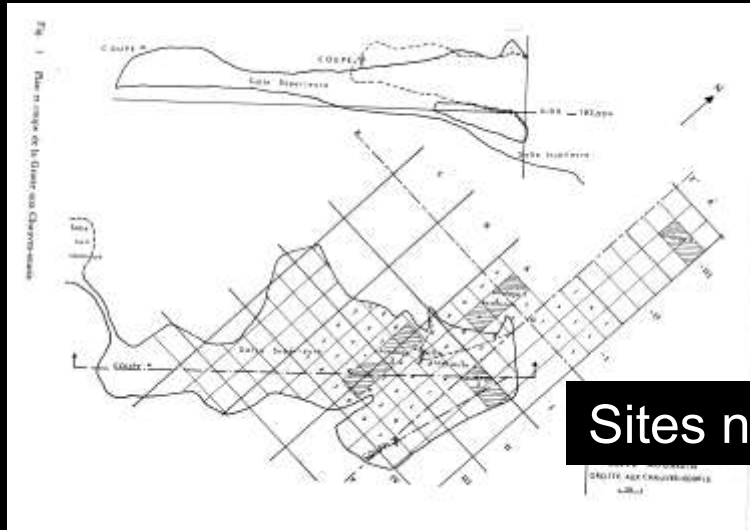
1968-1985 : N. Lambert

1970-2010 : R. Vernet



# Nicole Lambert's research

*"Grotte aux chauves-souris"* : mining cave



2776 ± 126 BP et 2360 ± 110 BP  
1378 to 203 cal. BC

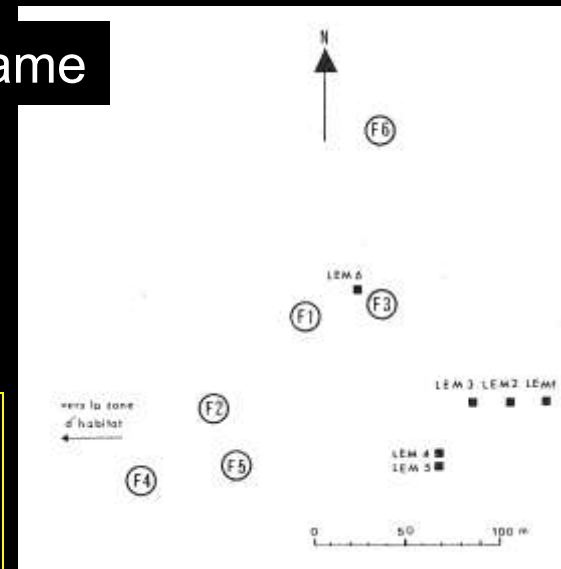
Sites not contemporary

*"Lemdena"* :  
metallurgical site

Lack of chronological frame



1760 ± 110 BP  
28 to 537 AC



Many questions still remain...

# Many questions

## Chronological

➤ Diachronical development of metallurgy in Mauritania ?

...

## Technological

➤ Extractive process ?

...

## Cultural

➤ Provenance of copper ores, raw material and contacts with adjacent region ?

...



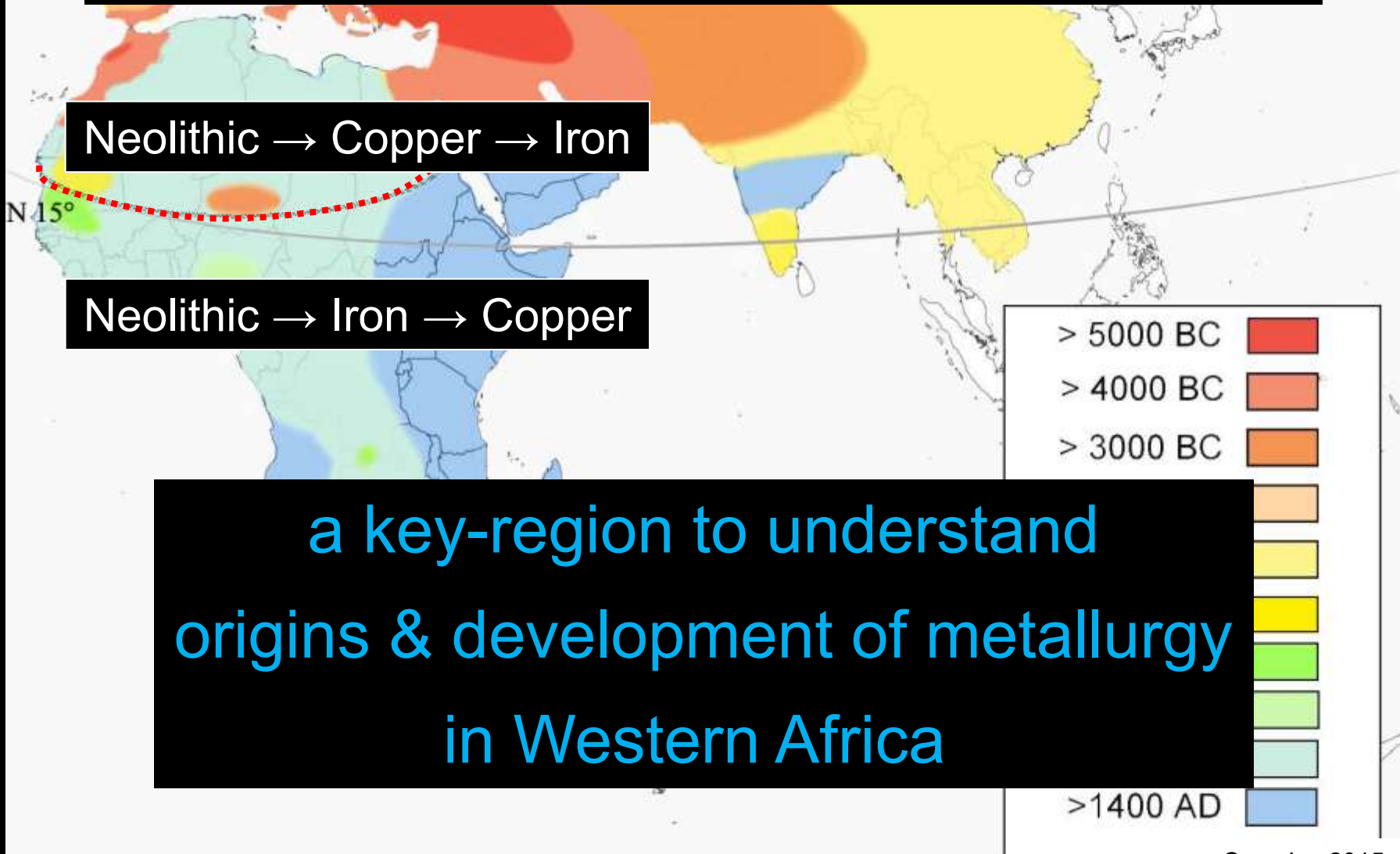
Since A. Crova, (1912)

one century of research...

... but few information

# Mauritania :

interface with two metallurgical traditions



a key-region to understand  
origins & development of metallurgy  
in Western Africa

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à l'Holocène en M**auritanie

**CUPRUM**

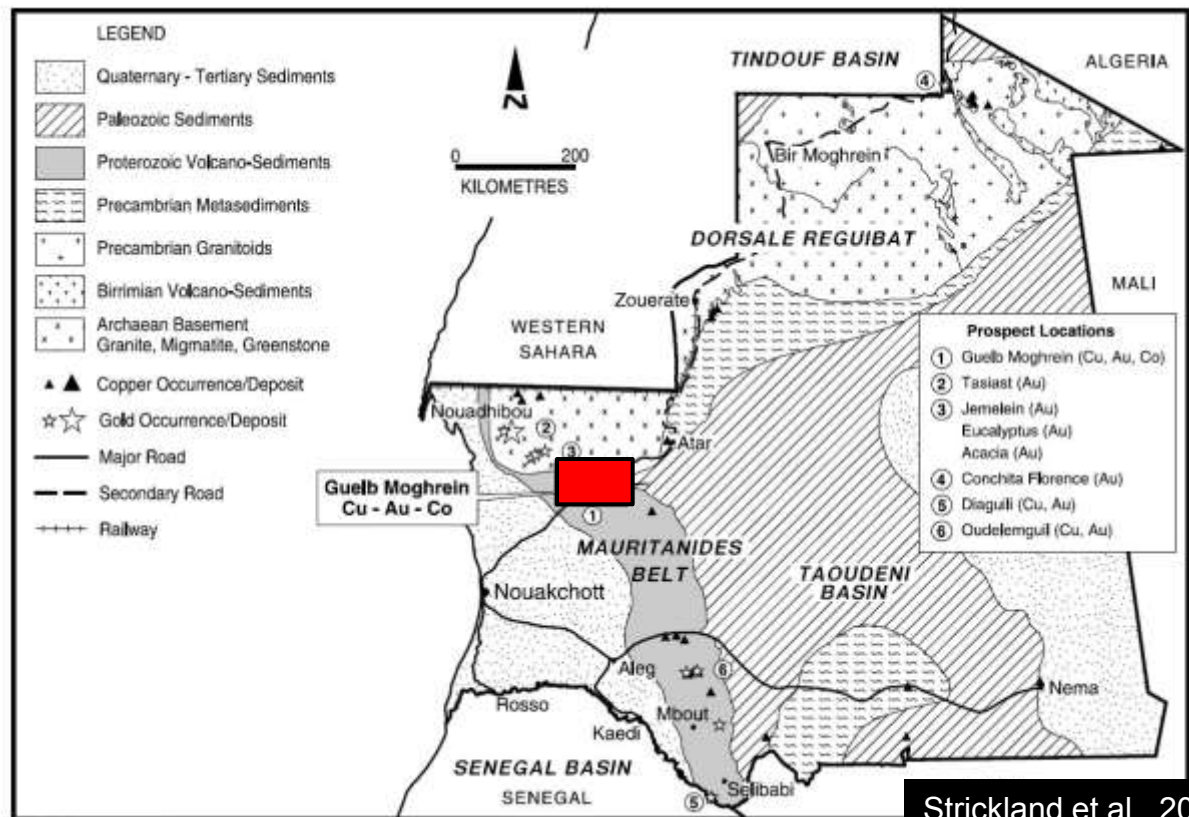
**(2016-2019)**



# Area of research

## Akjoujt Ichiri region

Copper-gold occurrences  
in a part of Mauritanides belt

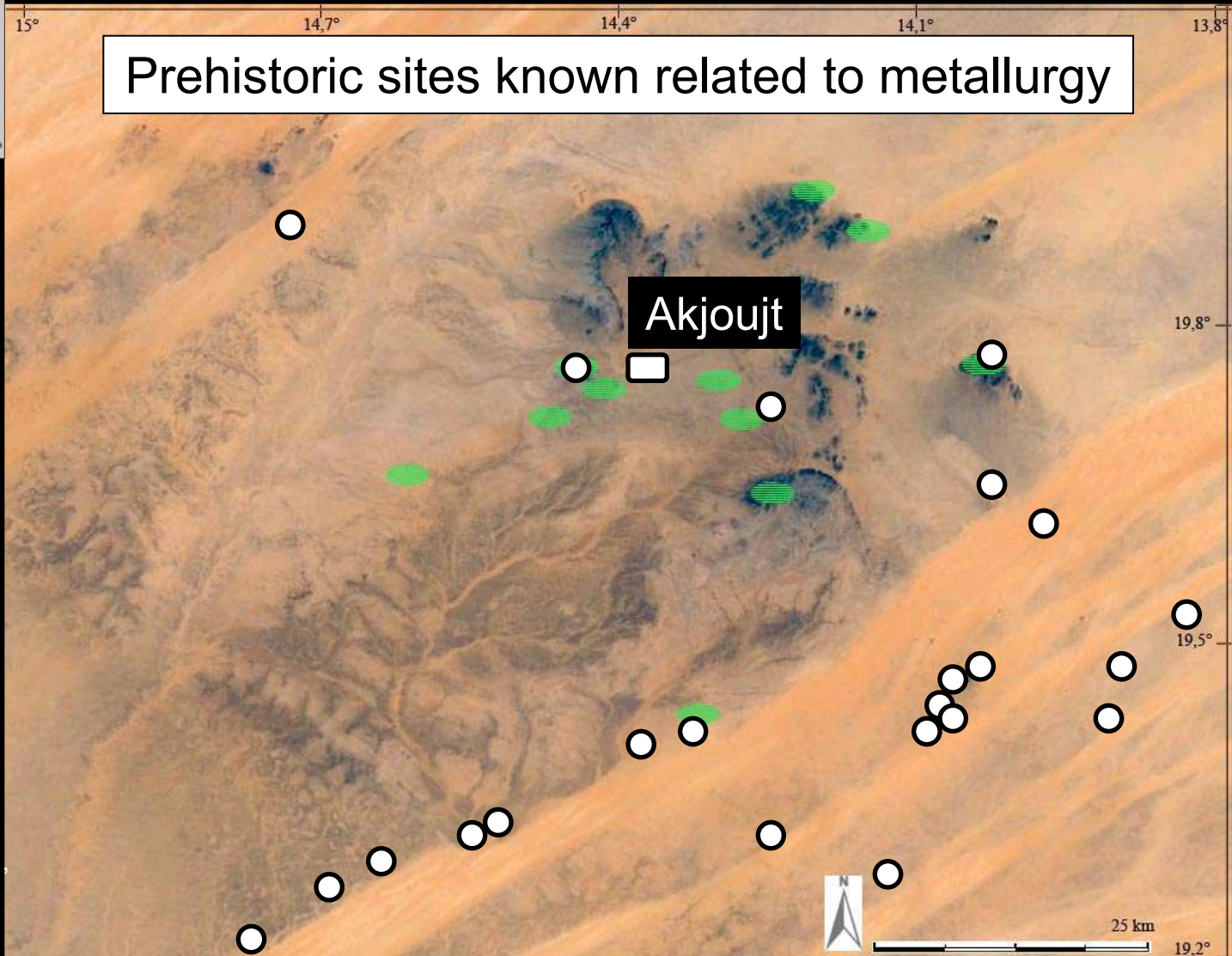




# Area of research

## Prehistoric sites known related to metallurgy

-  Copper mineralized zone
-  Actual town
-  Prehistorical sites known



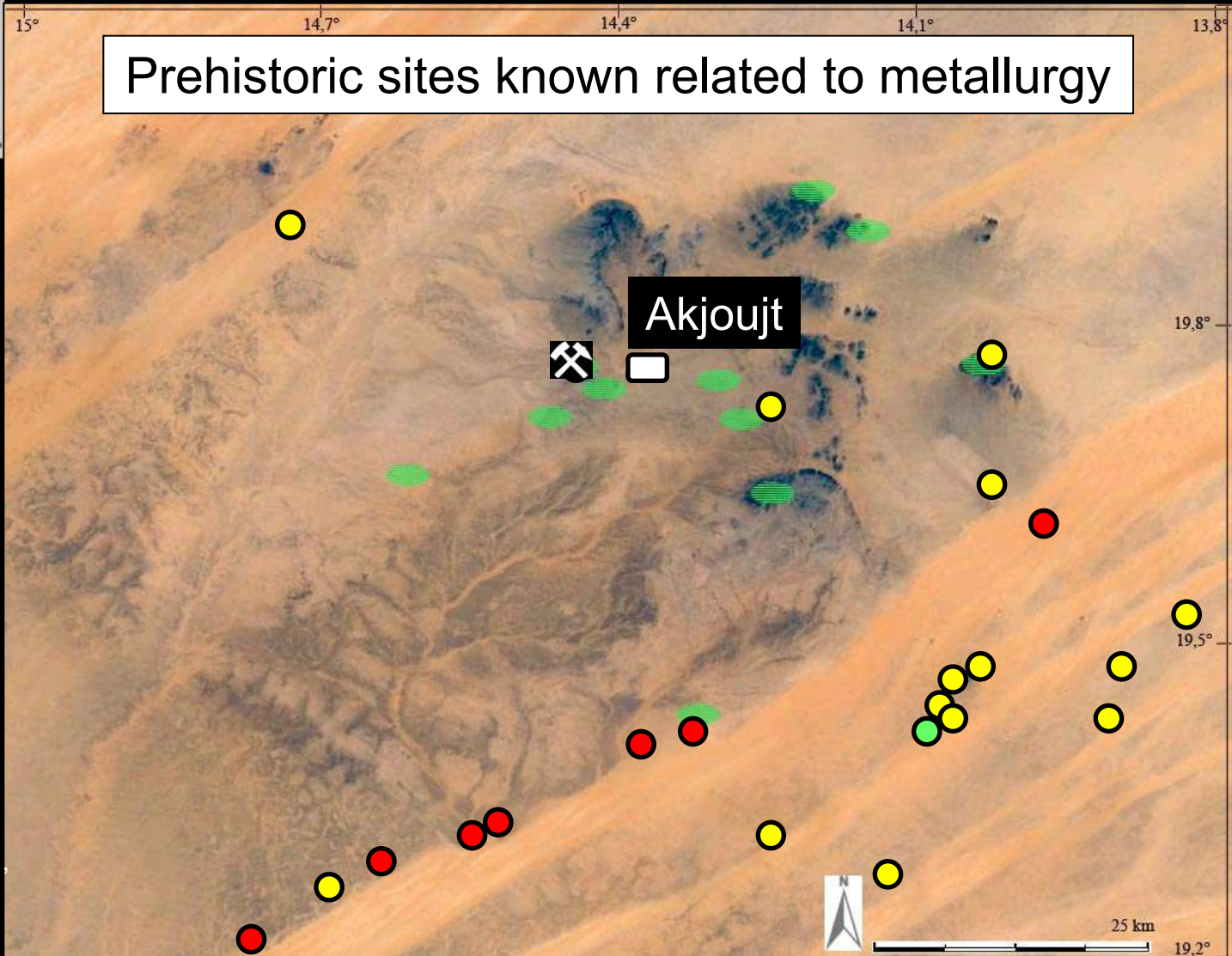
Mauny et al. 1957; Lambert, 1961, 1965, 1969, 1970, 1971, 1975, 1983; Vernet, 1993, 2012, 2014.





# Area of research

## Prehistoric sites known related to metallurgy



Mauny et al. 1957; Lambert, 1961, 1965, 1969, 1970, 1971, 1975, 1983; Vernet, 1993, 2012, 2014.



Problematic

Origin and development  
of metallurgy  
in Western Africa

# Aims

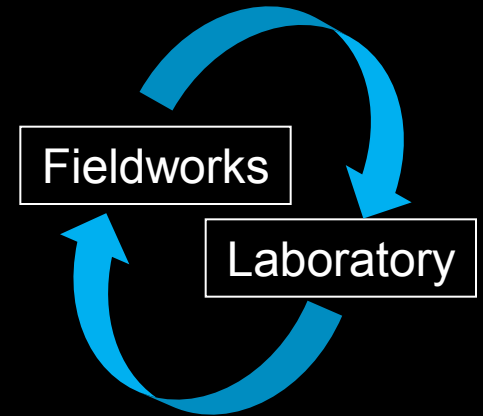
## ➔ Characterize copper metallurgy

- Define the chronology of Akjoujt region
- Understand the “*chaîne opératoire*” of the metallurgy
- Estimate implications of metal within human groups

# Aims

## ➔ Circulation and inter-cultural relationships linked to copper metallurgy

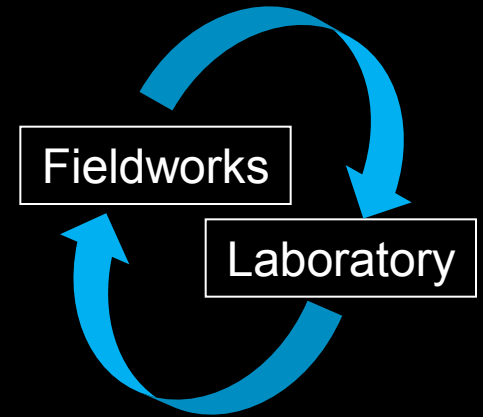
- Provenance of raw material and ores



# Aims

## ➔ Circulation and inter-cultural relationships linked to copper metallurgy

- Provenance of raw material and ores
- Exchanges linked to the metal
- Circulation of techniques



# Aims

## ➔ Universities collaboration: formation and teaching

- Formation of Mauritanian students
- Exchange of teacher / researchers:

**Mauritania**

Nouakchott University  
Mauritanian Mining School



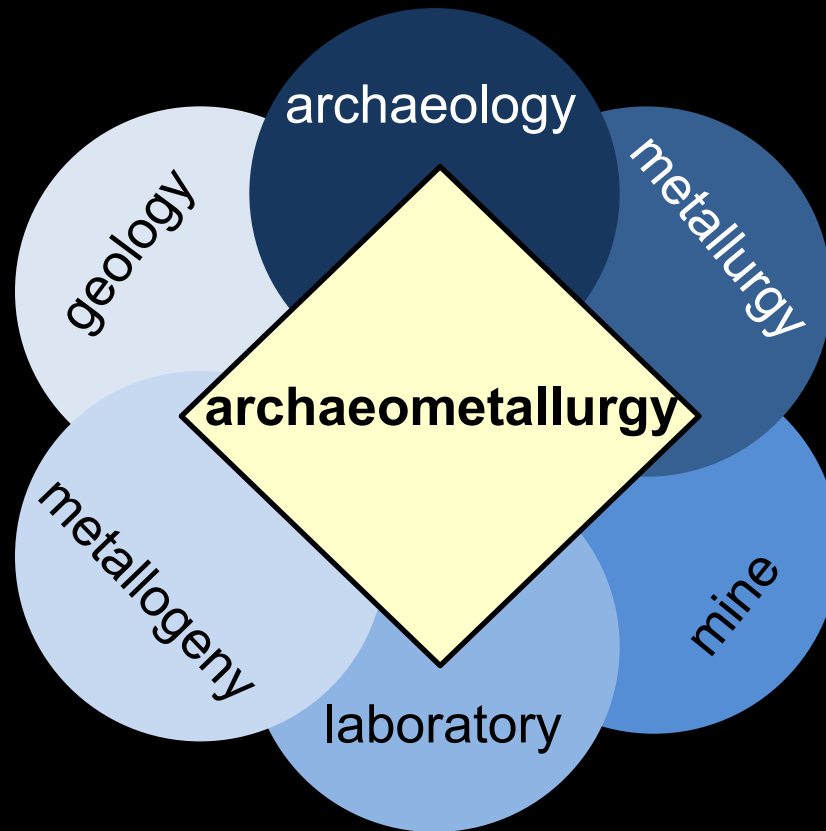
**France**

Toulouse 2  
Jean-Jaures University  
TRACES Laboratory



# Process of research

## Interdisciplinary research



# Process of research

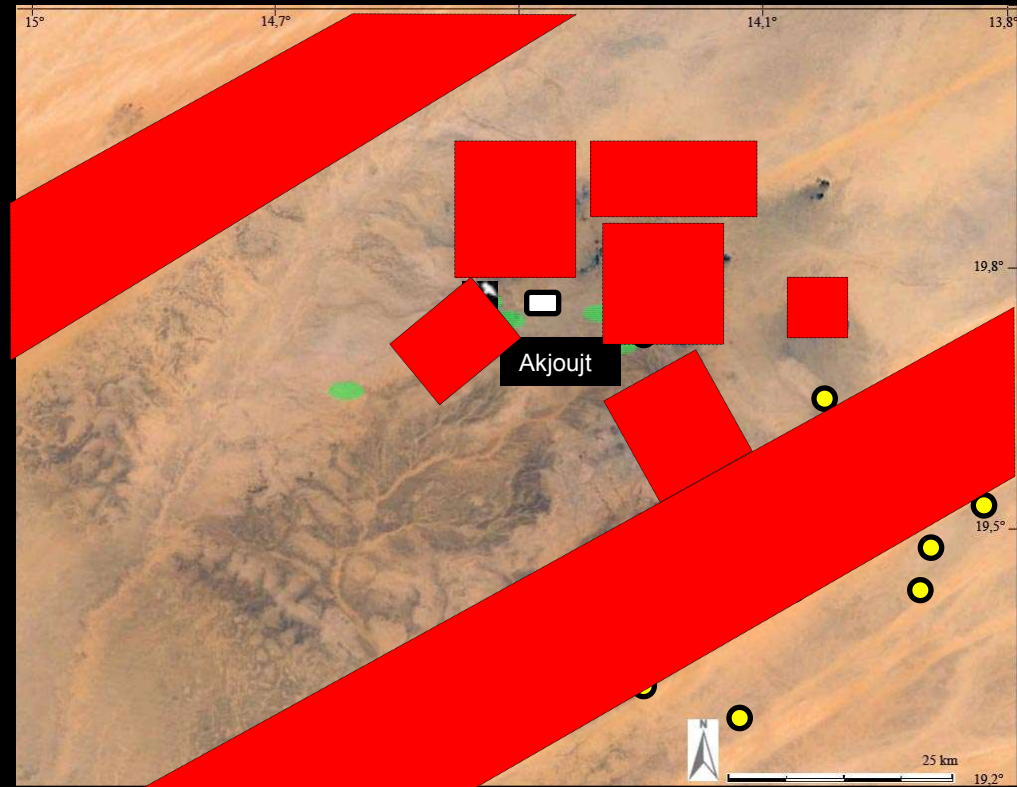
## Scientific documentation study

- Archaeological publications
- Engineer reports

## Fieldworks

- Survey and sounding (2016)

→ identify, describe,  
localise the sites



# Process of research

## Scientific documentation study

- Archaeological publications
- Engineer reports

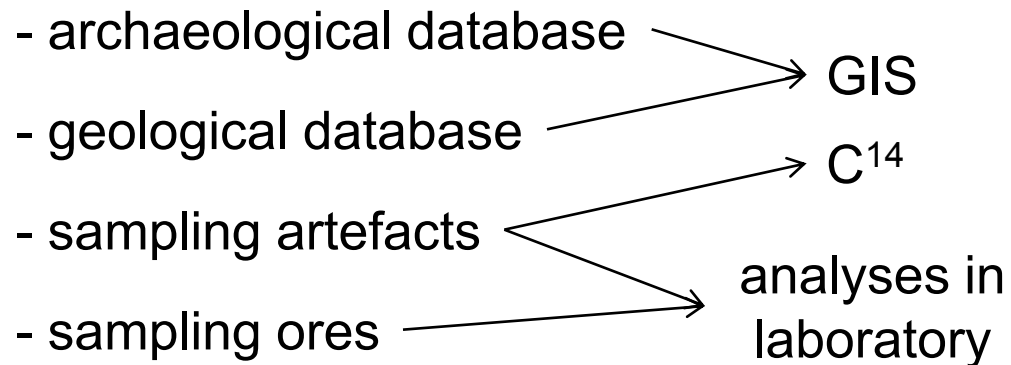
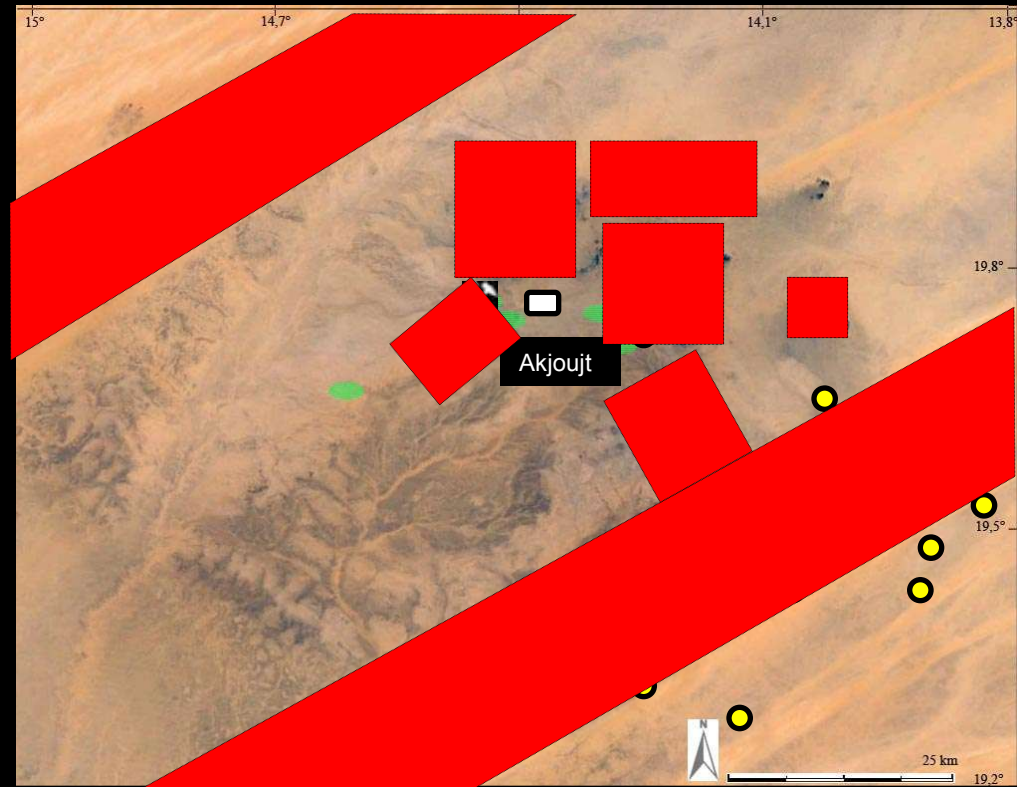
## Fieldworks

- Survey and sounding (2016)

→ identify, describe,  
localise the sites

## Team

- archaeologist
- archaeometallurgist
- mining archaeologist
- geologist
- geographer
- historian
- student



# Process of research

## Fieldworks

- Excavations (2017-2019)

→ study in details sites which present major scientific interest

- Study material conserved in IMRFP reserve (2016-2019)

→ inventory artefacts linked to the metallurgy

→ sampling on these artefacts

## Archaeometallurgical analyses in laboratory

- Mineralogical analyses
- Chemical analyses
- Isotopic analyses

# Franco-mauritanian scientific and cultural network

Office National des Musées  
de Mauritanie



Ville  
d'Akjoujt

Projet franco-mauritanien

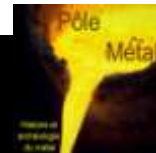
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Mauritanie

CUPRUM



Ministère de la Culture et de  
l'artisanat

Ambassade de France  
à Nouakchott





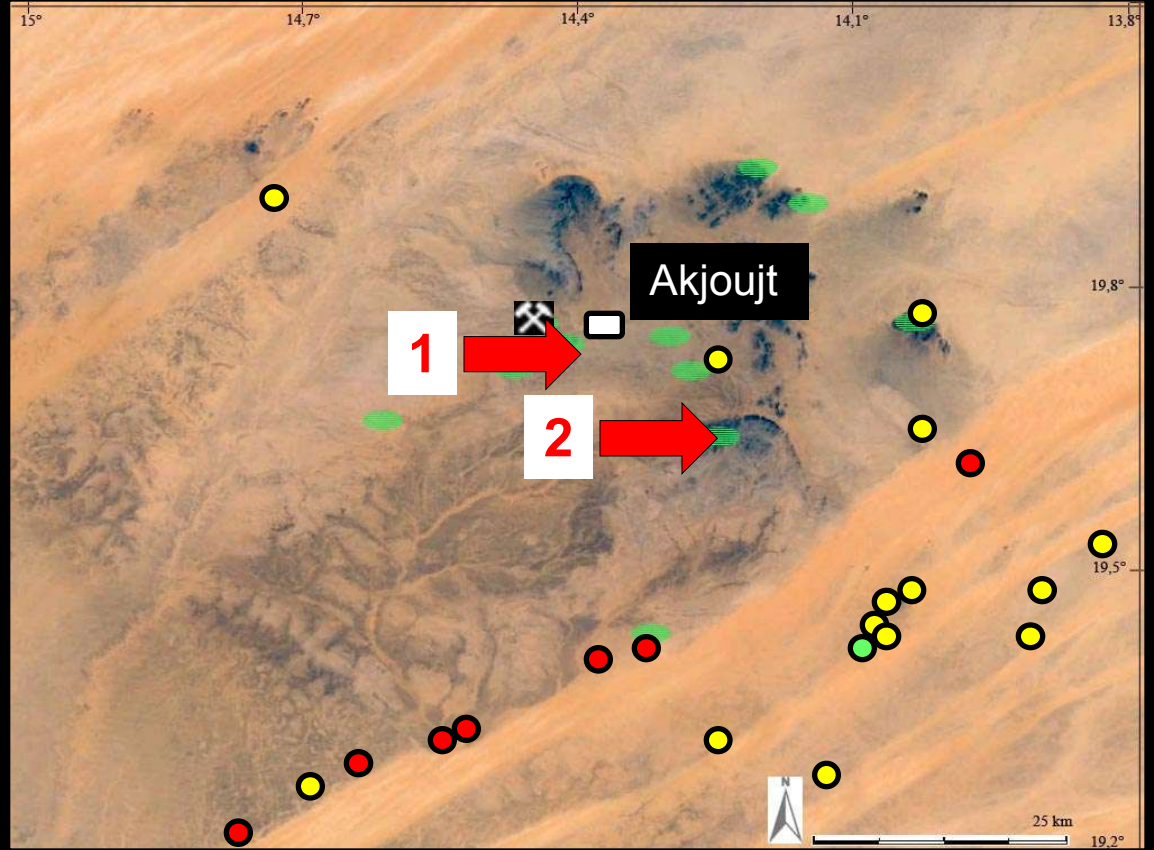
# Some promising results

Preliminary campaign (11<sup>th</sup>-12<sup>th</sup> September 2015)

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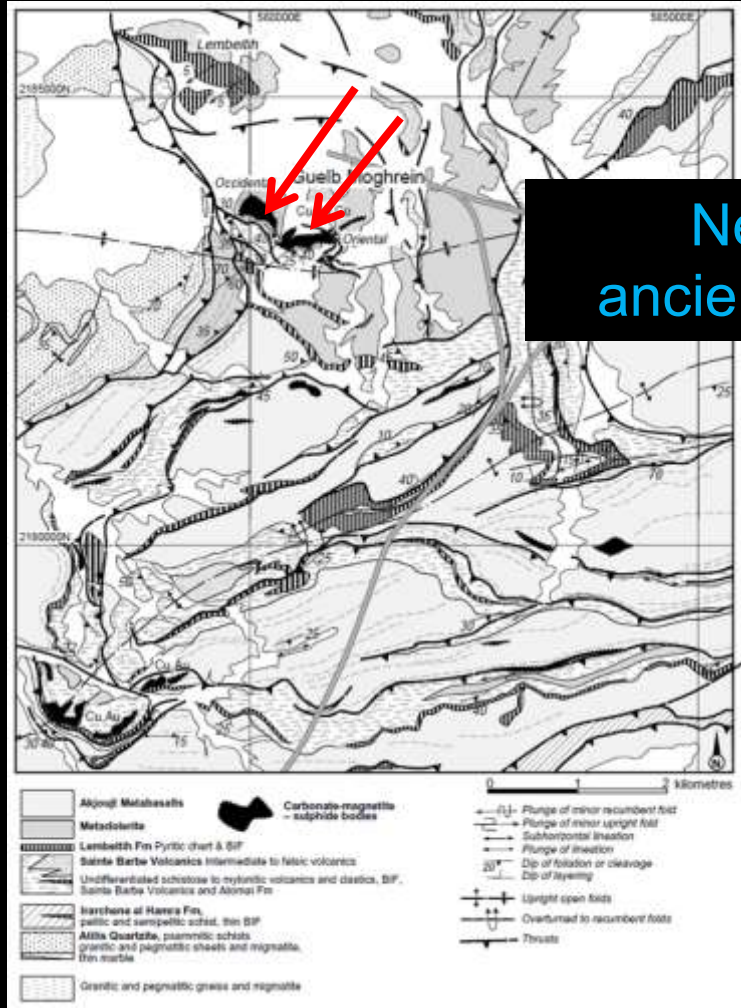
# Studied sites

- 1** Eastern Guelb Moghrein
- 2** El Khader Ligteitat

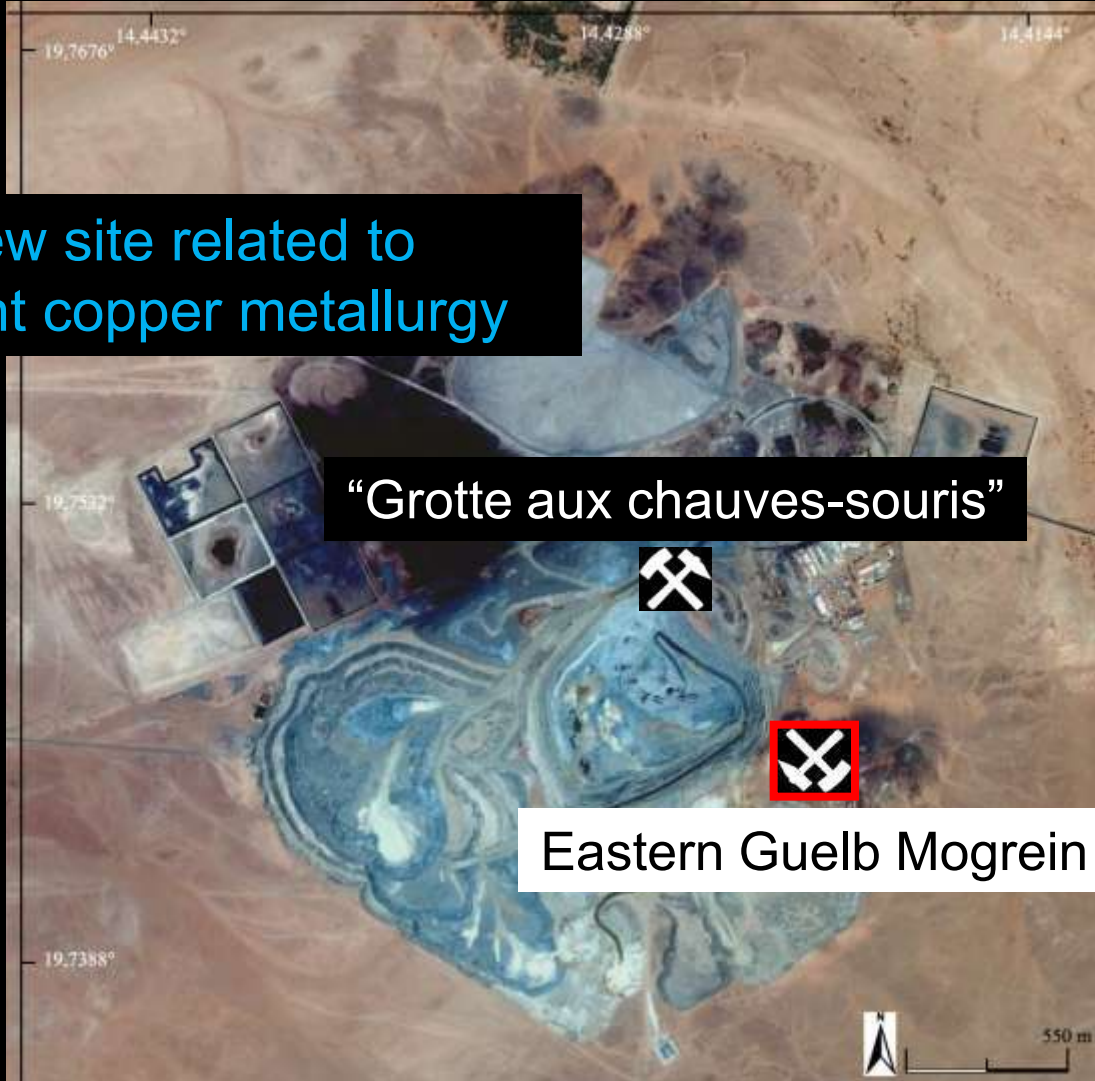


Preliminary campaign (11<sup>th</sup>-12<sup>th</sup> September 2015)

# Eastern Guelb Moghrein



New site related to ancient copper metallurgy



Strickland et al., 2001



Preliminary campaign (11<sup>th</sup>-12<sup>th</sup> September 2015)

# Eastern Guelb Moghrein



M.1



M.2



M.3



M.4

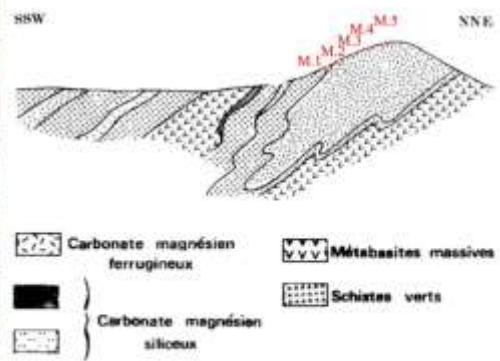
Numerous mining cavities



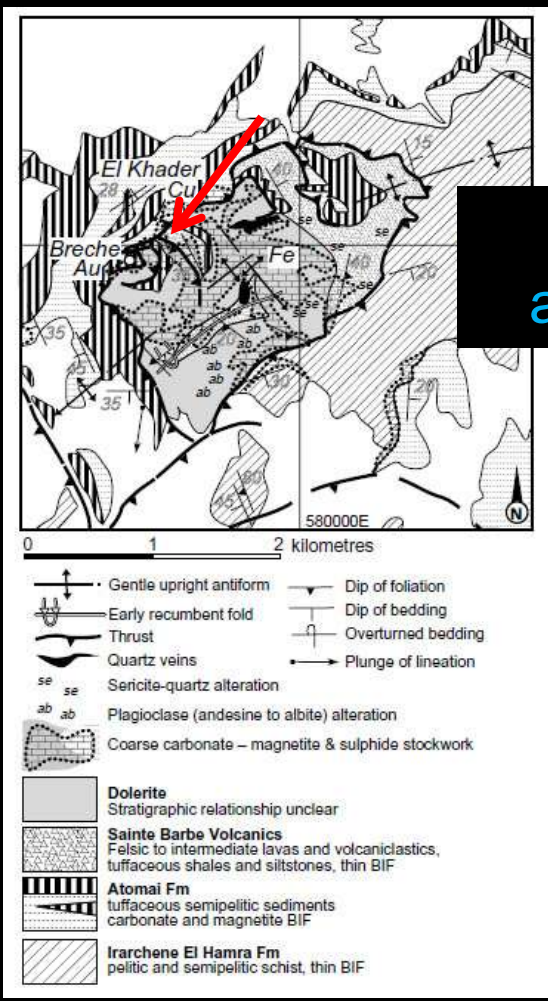
Fire-setting ?



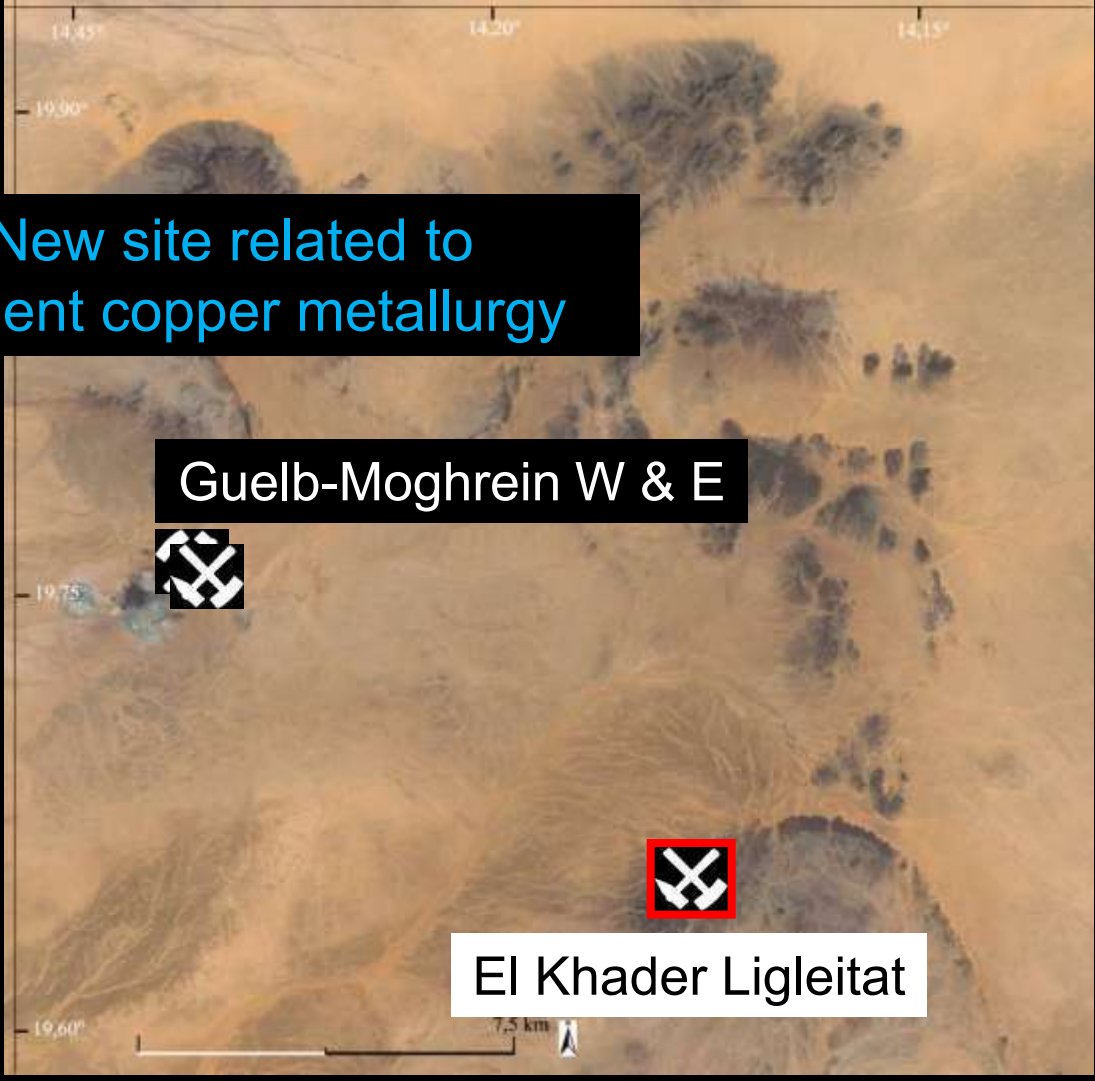
M.5



# El Khader Ligteit



New site related to ancient copper metallurgy



Preliminary campaign (11<sup>th</sup>-12<sup>th</sup> September 2015)

# El Khader Ligteitat





Preliminary campaign (11<sup>th</sup>-12<sup>th</sup> September 2015)

# El Khader Ligteitat



Numerous mining cavities



Fire-setting ?

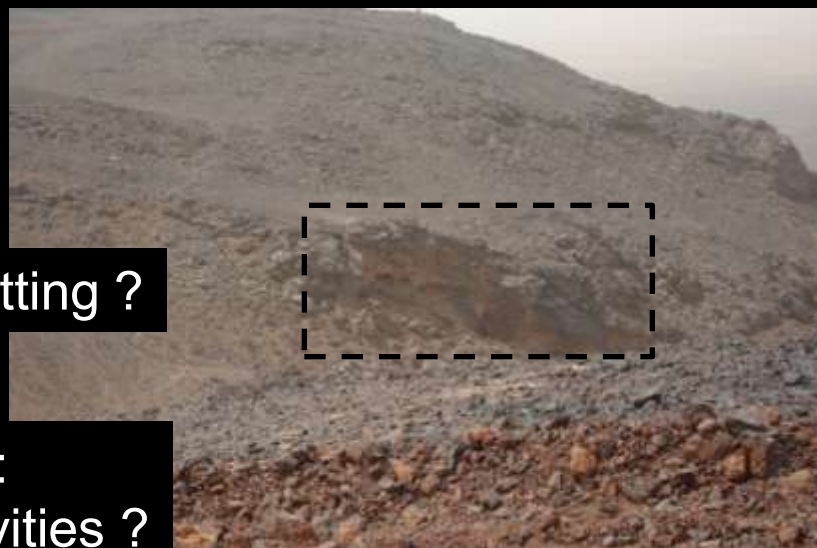


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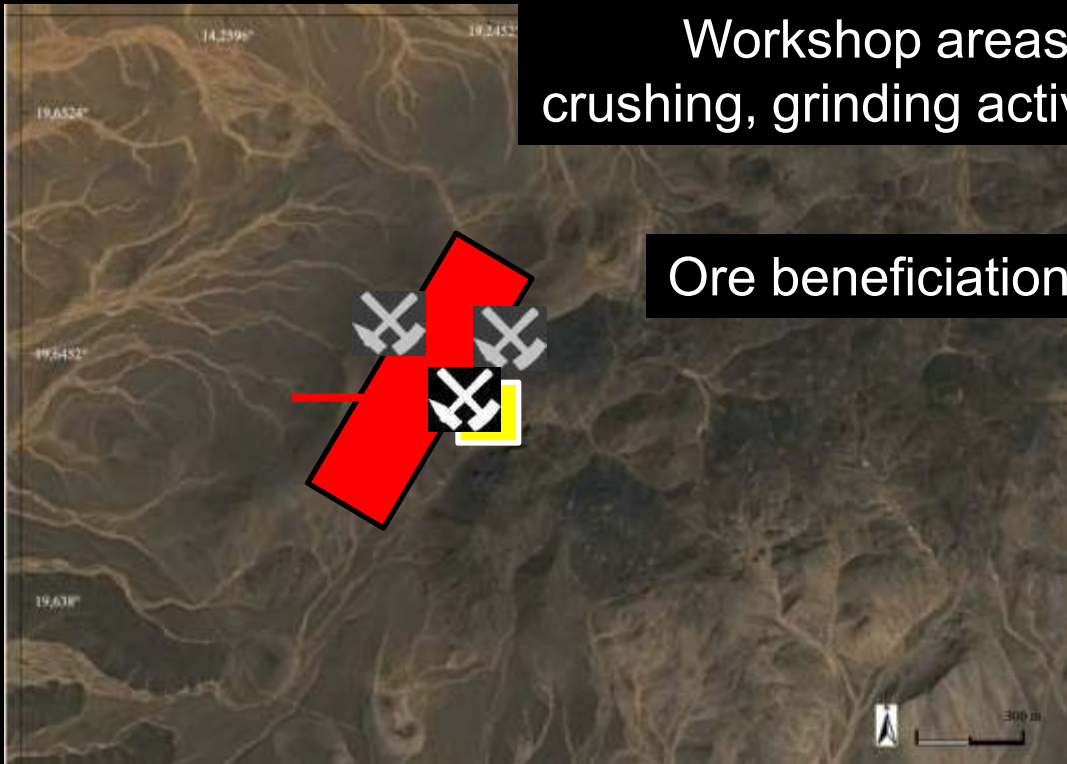
# El Khader Ligteit



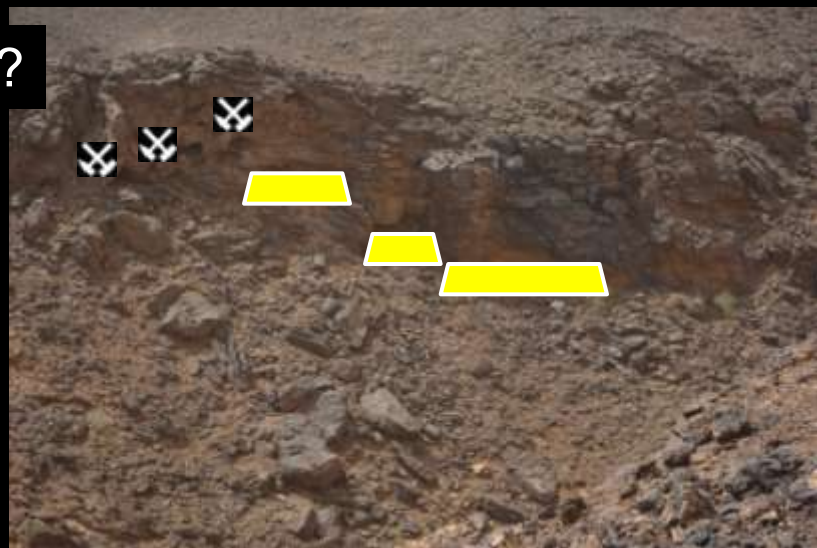
Mining cavities: fire-setting ?



Workshop areas: crushing, grinding activities ?



Ore beneficiation?



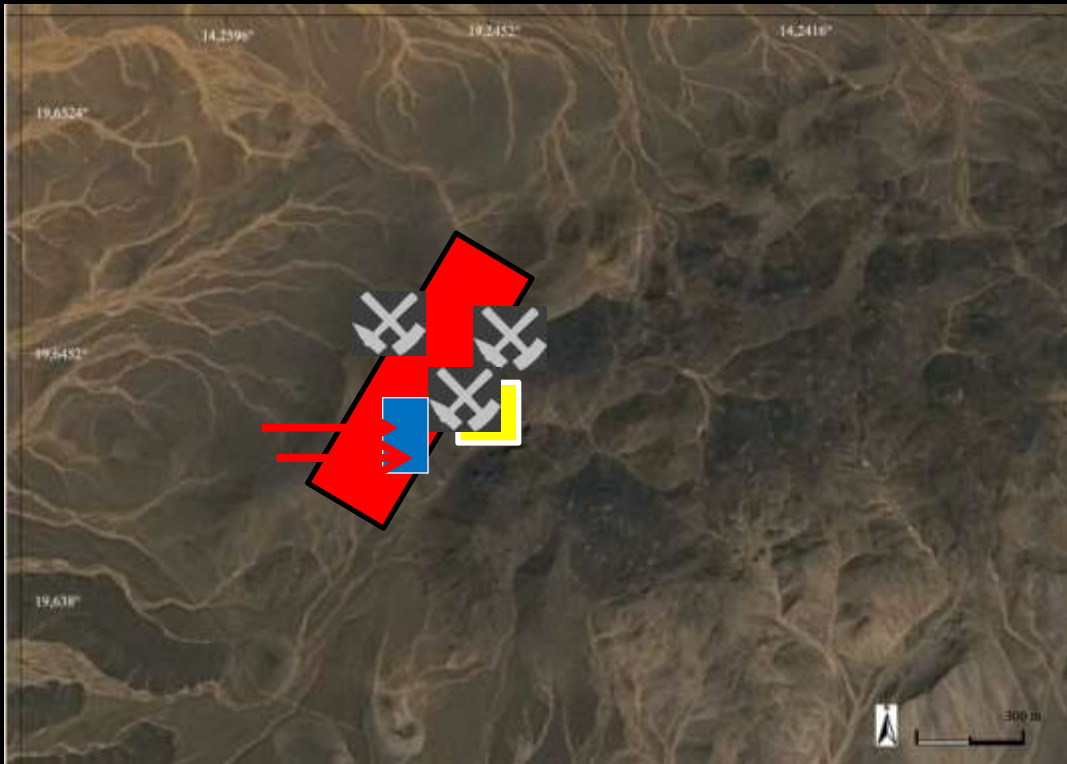


Preliminary campaign (11<sup>th</sup>-12<sup>th</sup> September 2015)

# El Khader Ligteitat



Large working area laid out ?

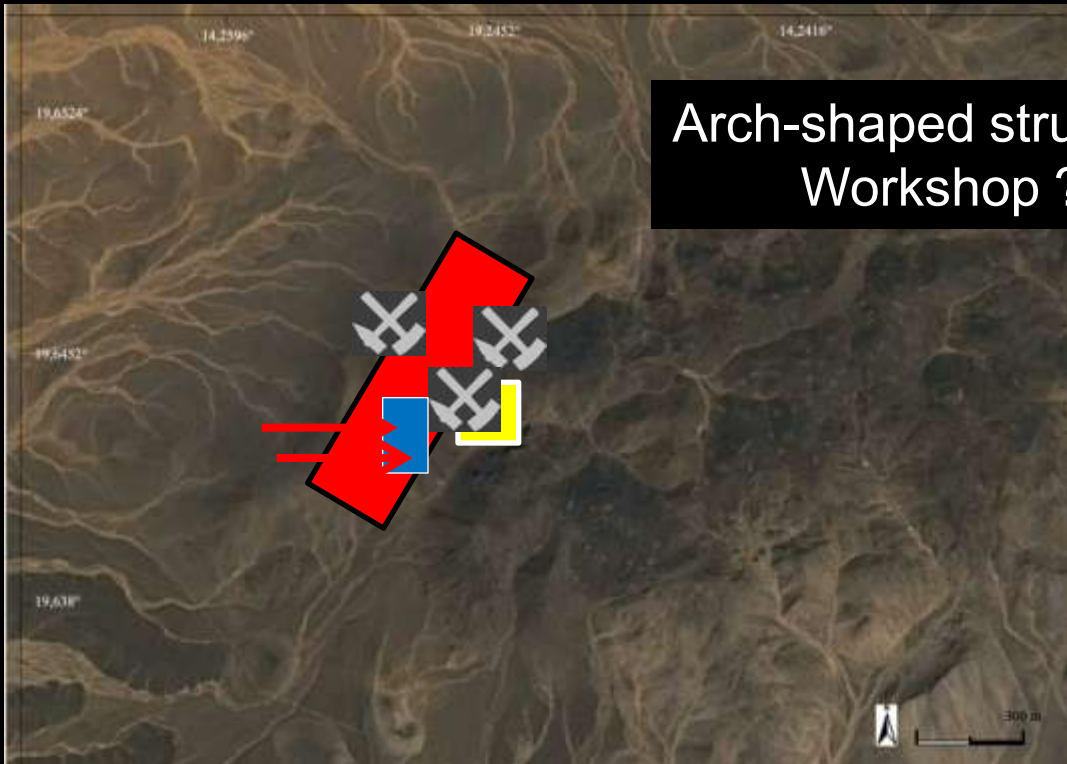


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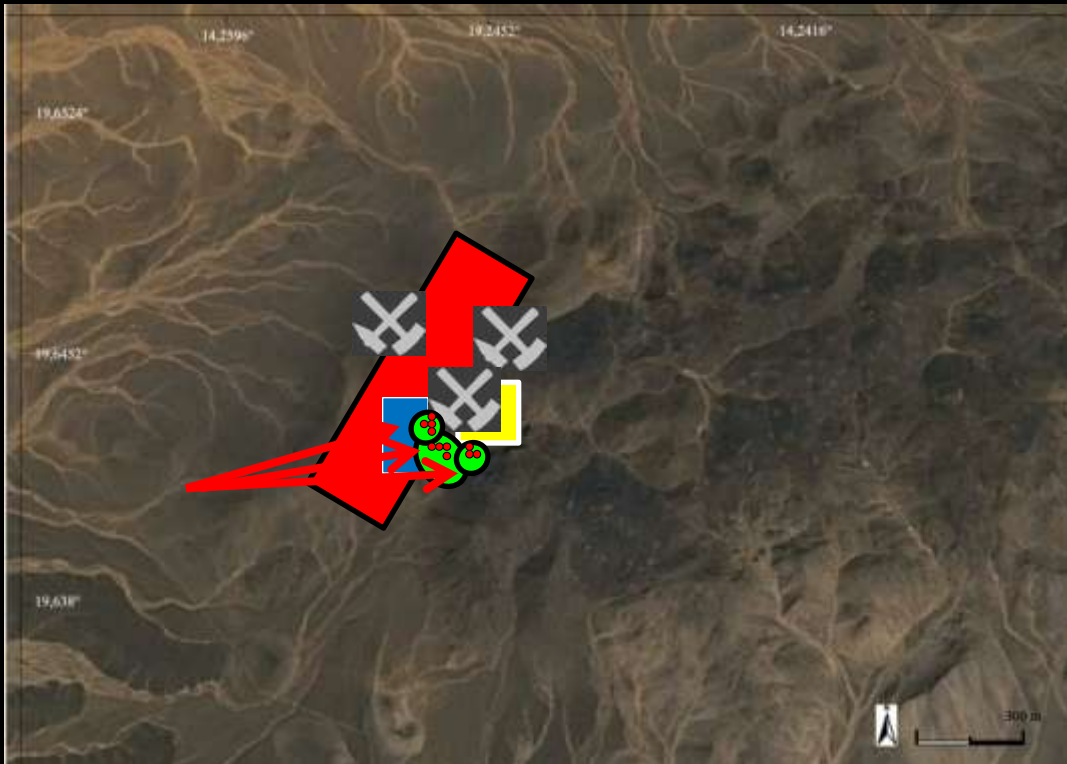
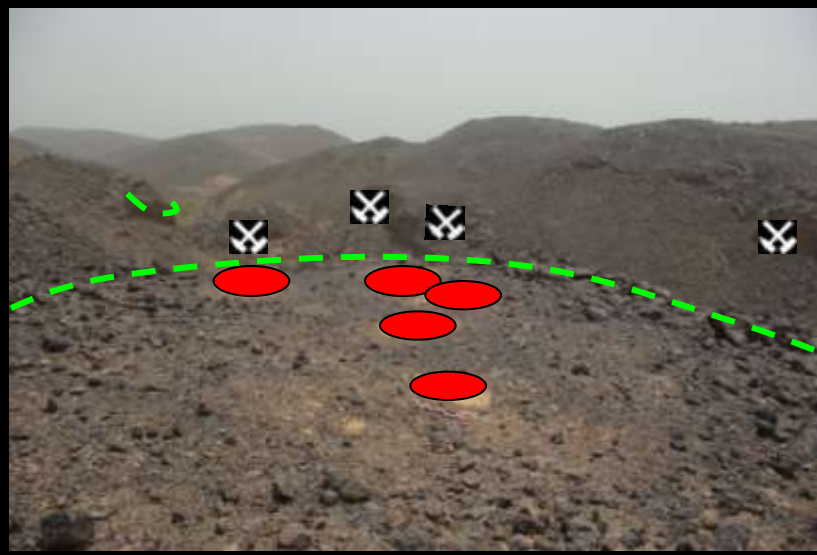


Arch-shaped structure:  
Workshop ?



Preliminary campaign (11<sup>th</sup>-12<sup>th</sup> September 2015)

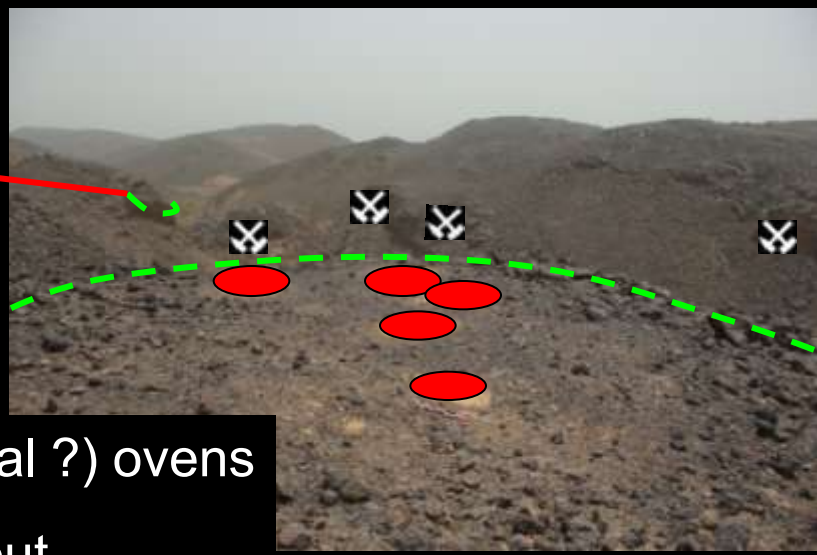
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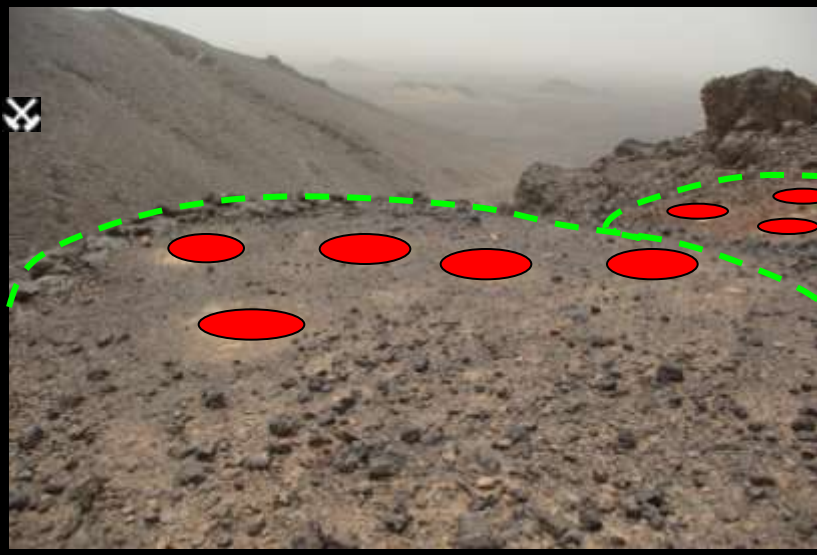
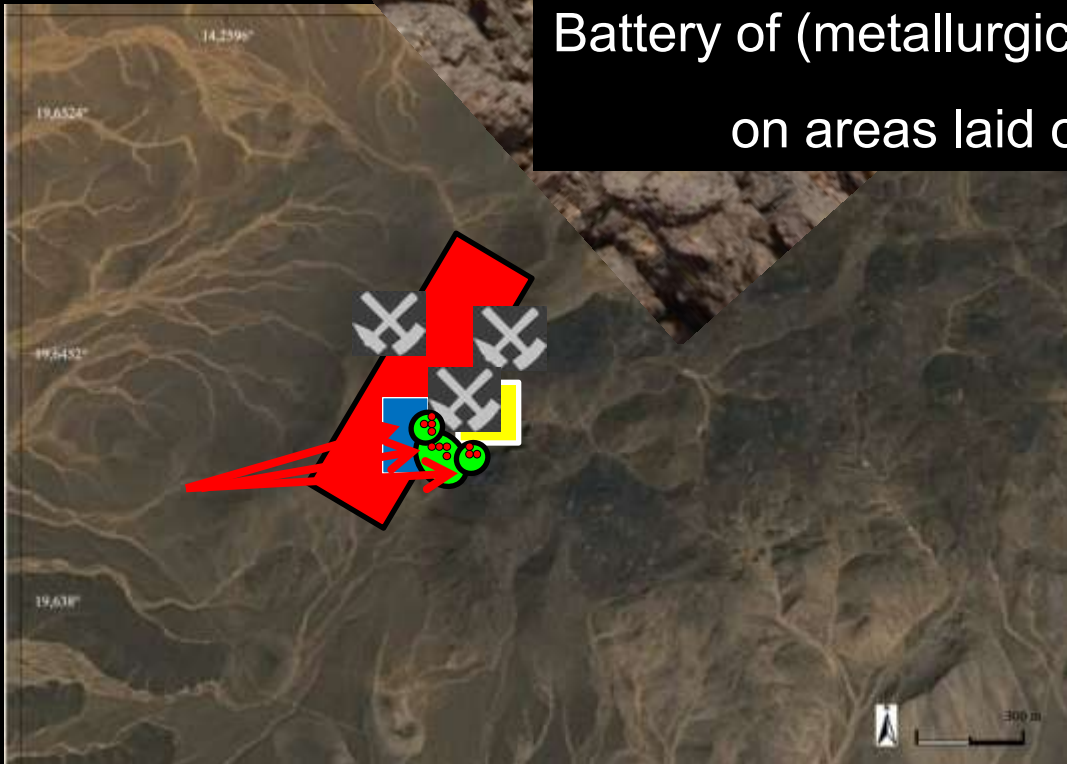


Preliminary campaign (11<sup>th</sup>-12<sup>th</sup> September 2015)

# El Khader Ligteitat



Battery of (metallurgical ?) ovens  
on areas laid out





Next fieldworks campaign:  
August – September 2016

See you on October for new results...

# Thanks to:

## TRACES Laboratory:

François-Xavier Fauvelle, Philippe Miroux,  
Caroline Robion-Brunner, Laurent Bruxelles, Sandrine Baron

## MCM – First Quantum:

Clive Newal, Antony Mukutuma, Mohamed Abdoullah Ould Bagga,  
Renier Hugo, David Cunliffe

## French Embassy in Nouakchott:

Monsieur l'Ambassadeur Joel Meyer,  
Monsieur le Conseiller de coopération et d'action culturelle Raphael Malara

## French Ministry of Foreign Affairs and International Development

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# Thank you !

**CUPRUM - CUivre : PRoduction et Usages à l'Holocène en Mauritanie -**

