

Anthropic activities and natural resources during Neolithic in Inchiri region (Mauritania): new data and future prospects

CUPRUM project (fieldworks 2016 – 2018)

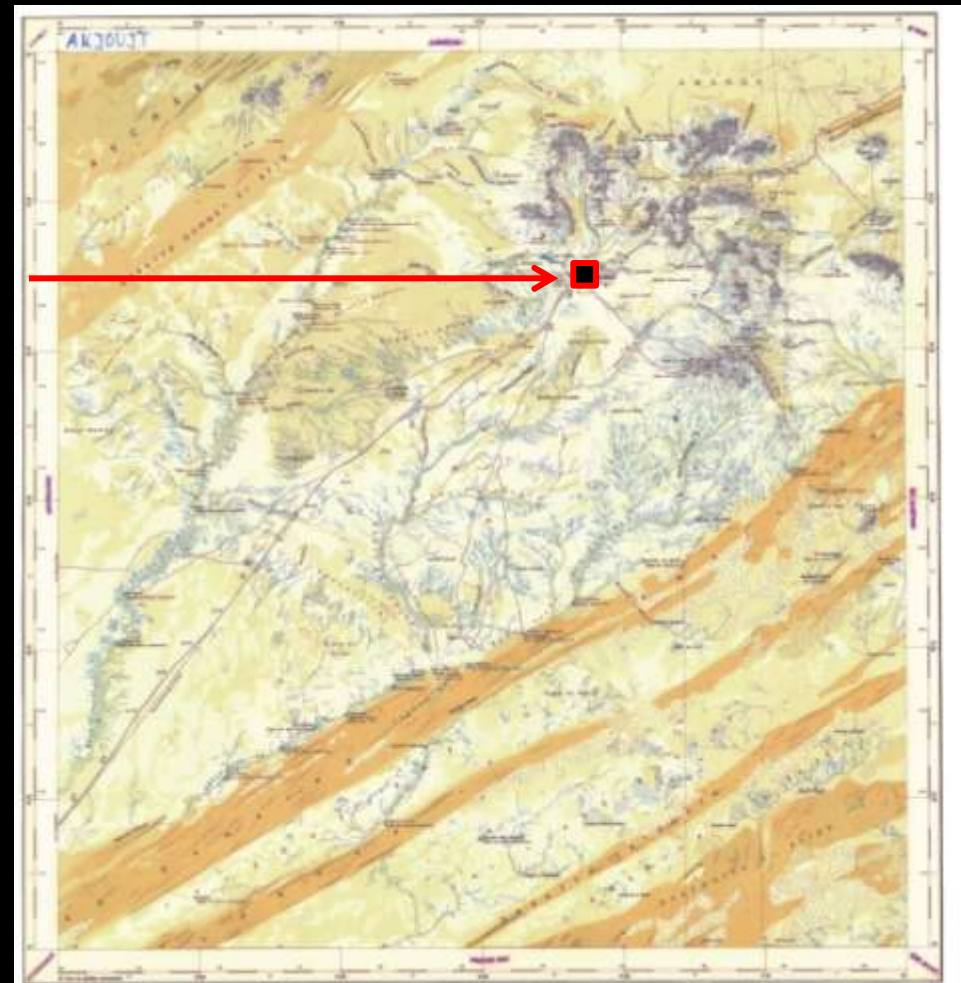
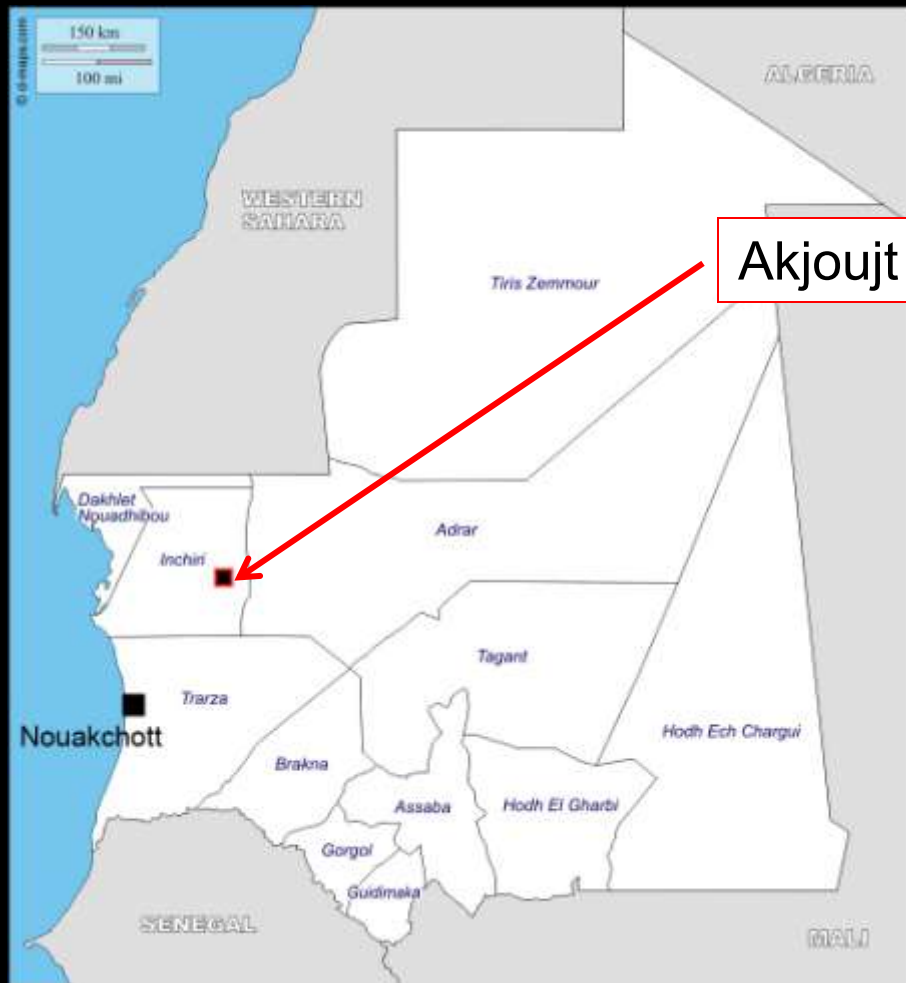
Antoine COURCIER
CNRS TRACES/UMR 5608 - Toulouse

Ethmane ESSAID
IMRFP - Nouakchott

CUPRUM - CUivre : PRoduction et Usages à l'Holocène en M auritanie -



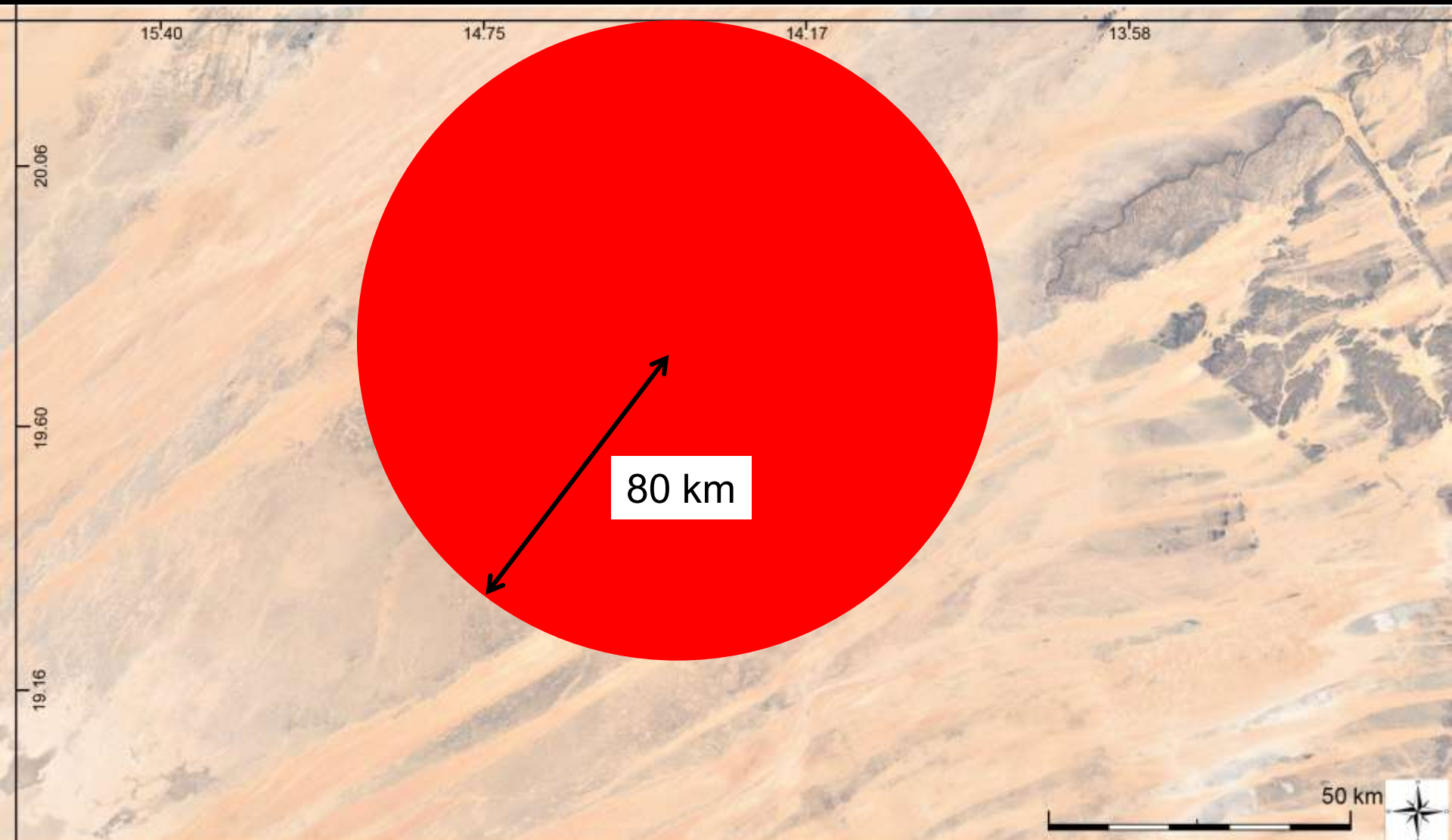
Research area



Research area



Research area



CU

PR

U

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CUPRUM

2016-2019

supported

financially and scientifically

Ministère de l'Europe et des
Affaires Etrangères

MEAE



human and logistic ways

private mining company
Mauritanian Copper Mine

MCM



Problematic

Origin and development of
the metallurgy
in Saharo-Sahelian zone

Aims

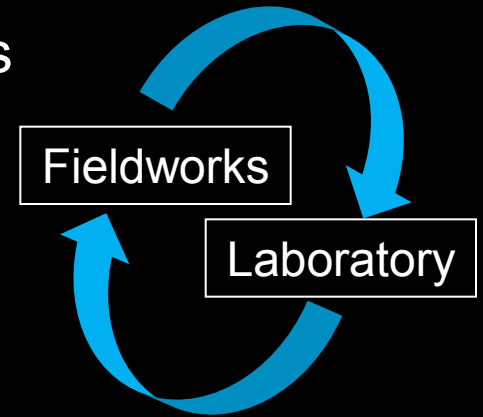
➔ Characterize copper metallurgy

- 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

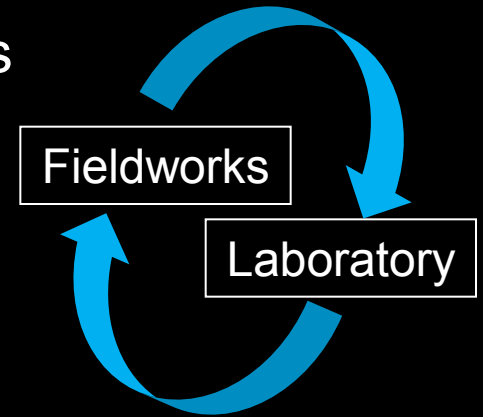
- Provenance of raw material and ores & connex raw material



Aims

➔ Circulation and inter-cultural relationships linked to copper metallurgy

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





State of art

State of Art

Last works:
1980-2014

1983-2014:
R. Vernet

2013: E. Essaid

2008: M. K. Salihy

1989-1992: M. Bathily

J.P. Carbonnel &
C. Barbey: 1968-72

N. Lambert: 1965-1973

IFAN works:
1945-1973

H. Bessac: 1955-56

1947-1962: R. Mauny & J.-J. Hallemons

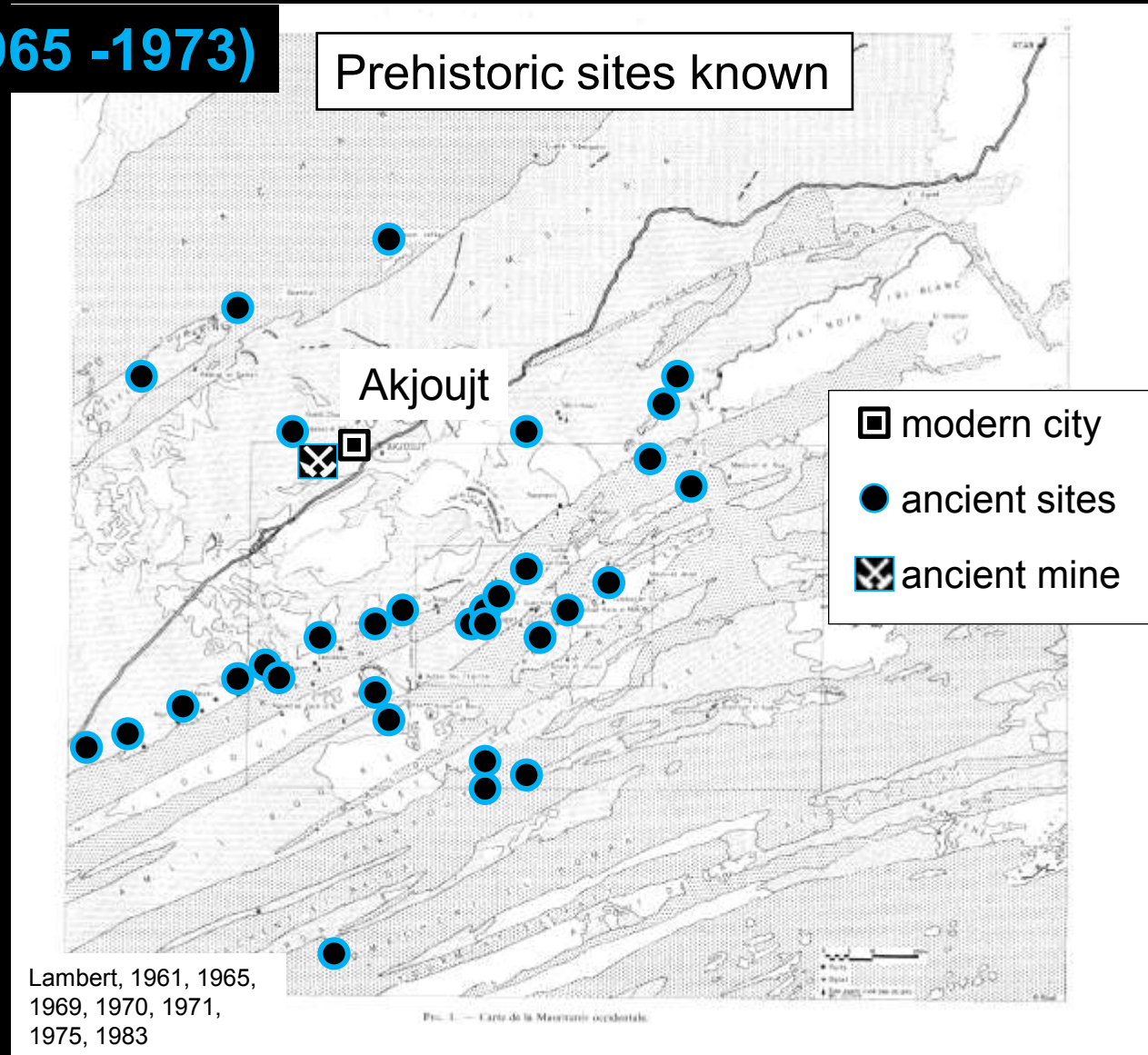
1934-1953: T. Monod & A. Blanchot

The pionniers:
1912-1960

1912: A. Crova

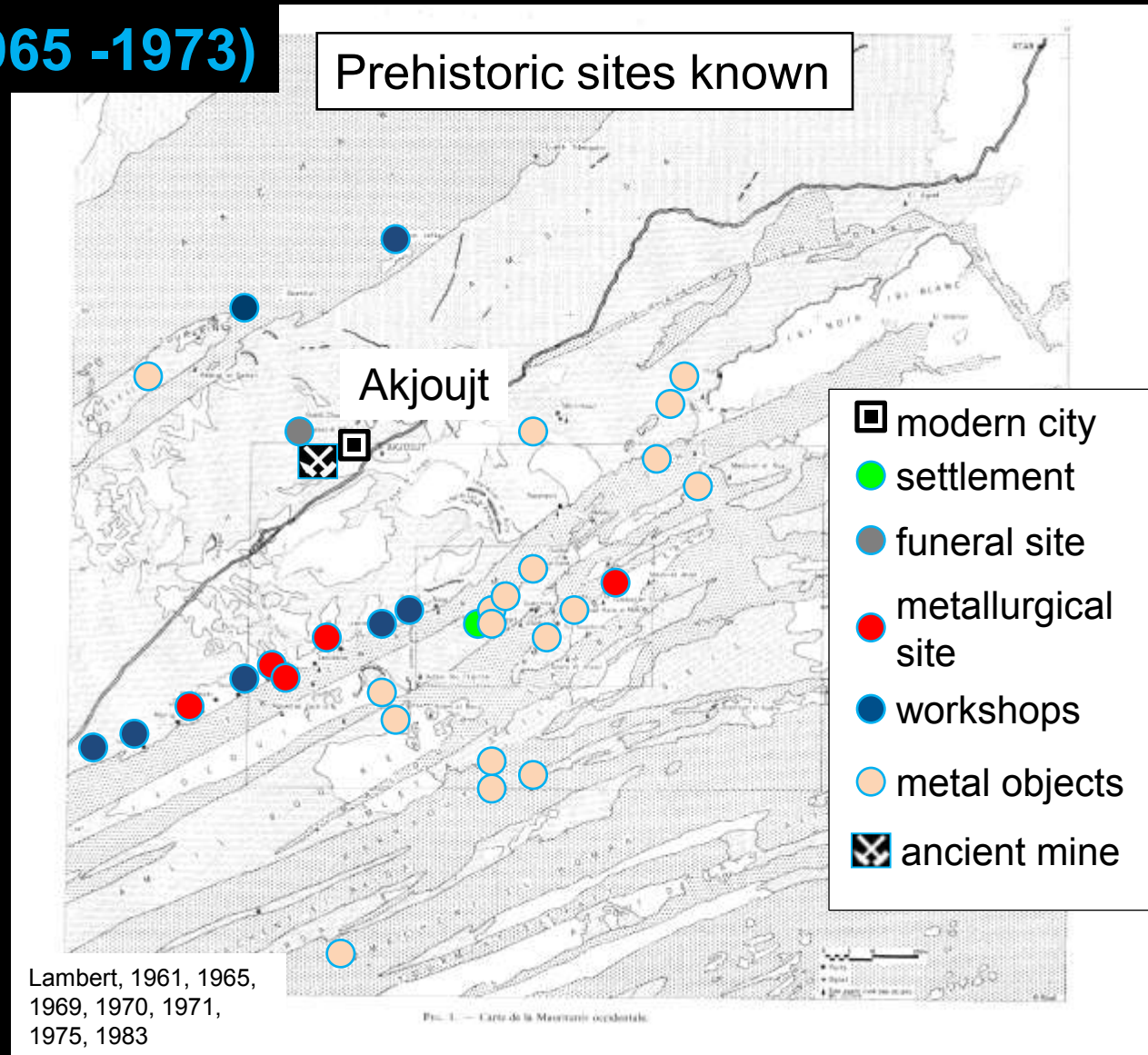
Previous works: IFAN works (1945-1973)

Nicole Lambert (1965 -1973)



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Nicole Lambert (1965 -1973)

Prehistoric sites known

ancient mine:

“grotte aux chauves-souris”



Akjoujt

- modern city
- settlement
- funeral site
- metallurgical site
- workshops
- metal objects
- ancient mine

western Guelb Moghreïn



Akjoujt, Guelb Moghreïn, 1959. ANOM

1965,

FIG. 1. — Carte de la Mauritanie occidentale.

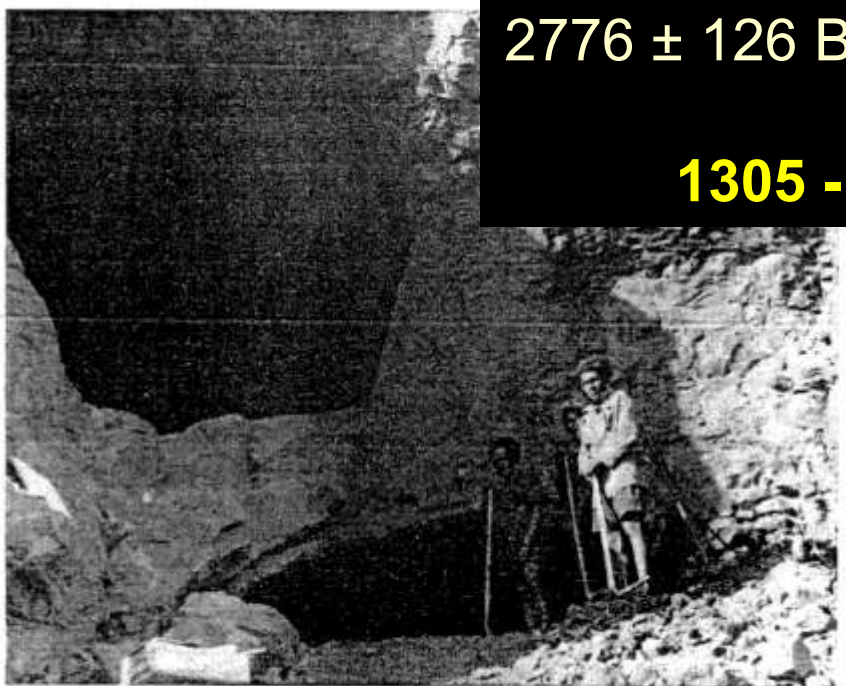
Previous works: IFAN works (1945-1973)

Nicole Lambert (1965 -1973)

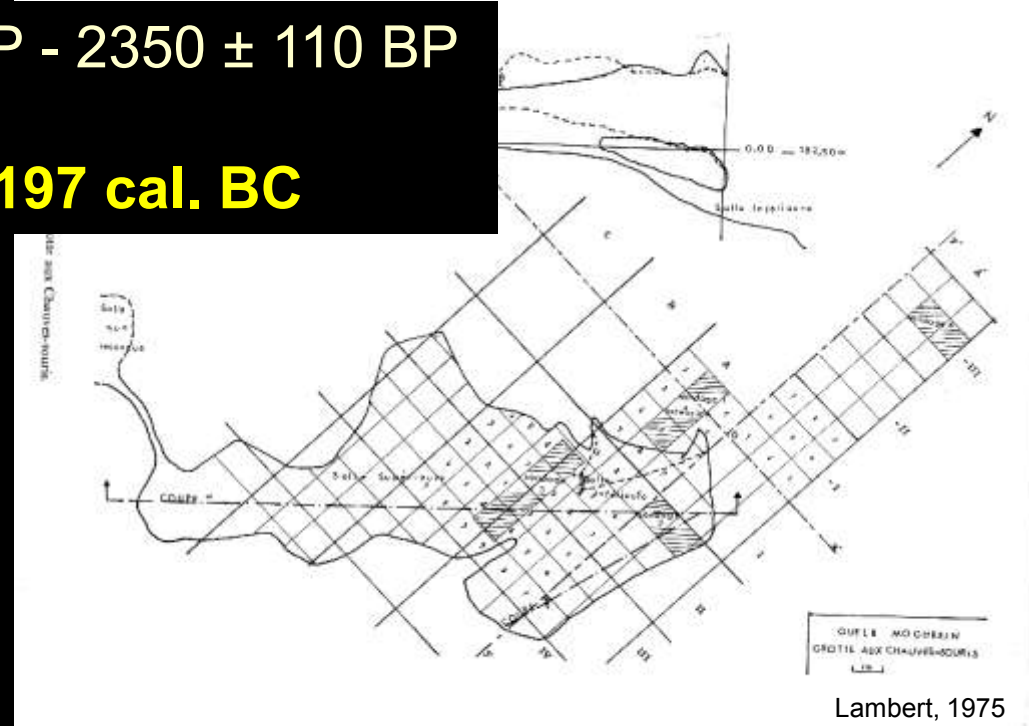
“grotte aux chauves-souris” mine

2776 ± 126 BP - 2350 ± 110 BP

1305 - 197 cal. BC



Lambert, 1965

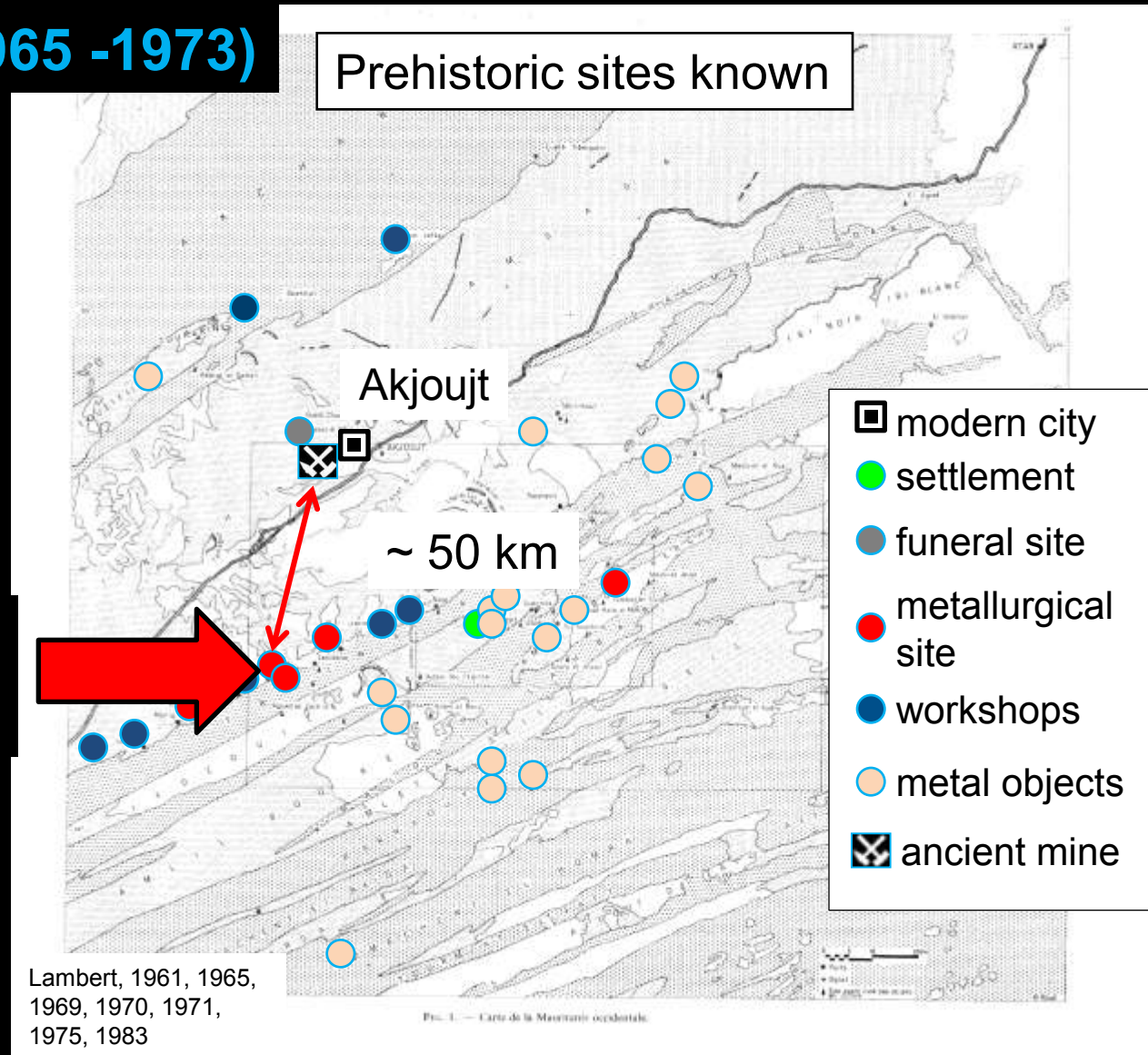


Lambert, 1975

Previous works: IFAN works (1945-1973)

Nicole Lambert (1965 -1973)

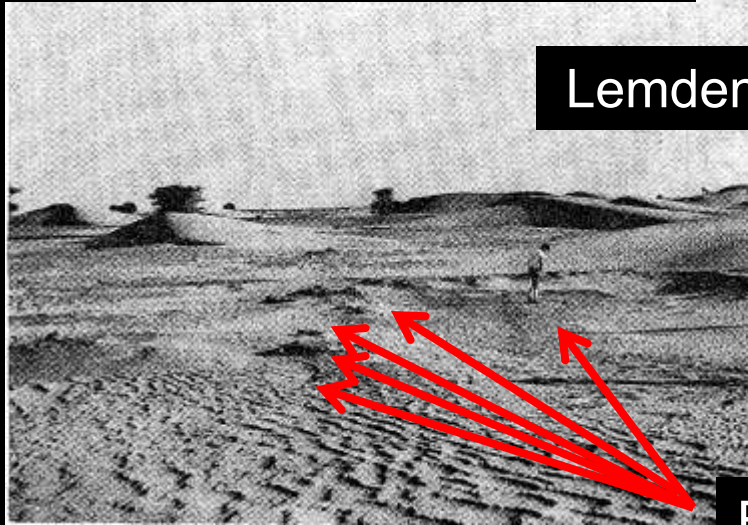
metallurgical site
Lemdena



Previous works: IFAN works (1945-1973)

Nicole Lambert (1965 -1973)

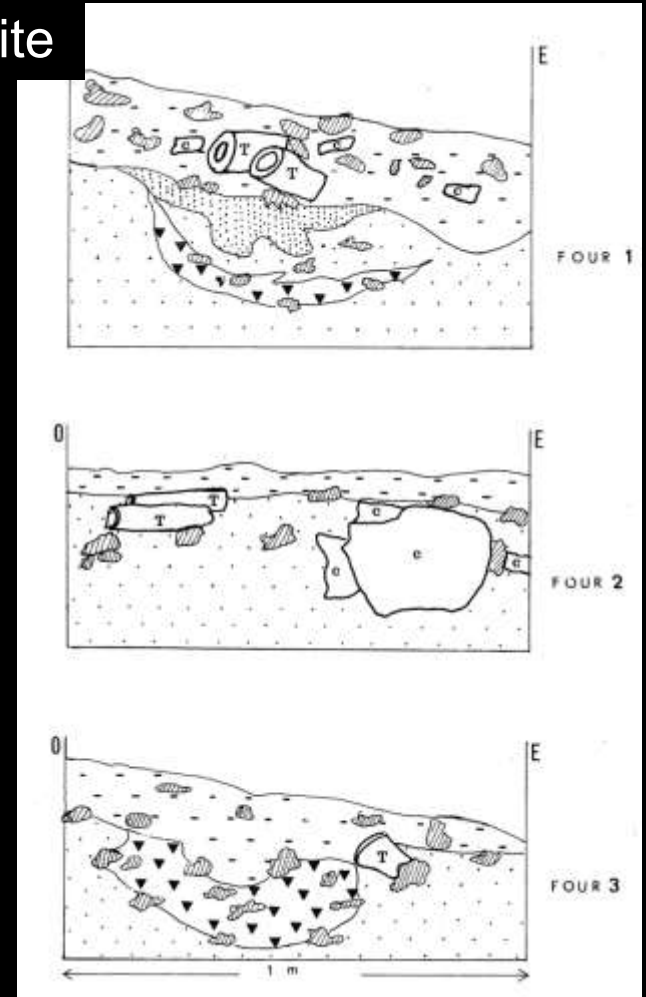
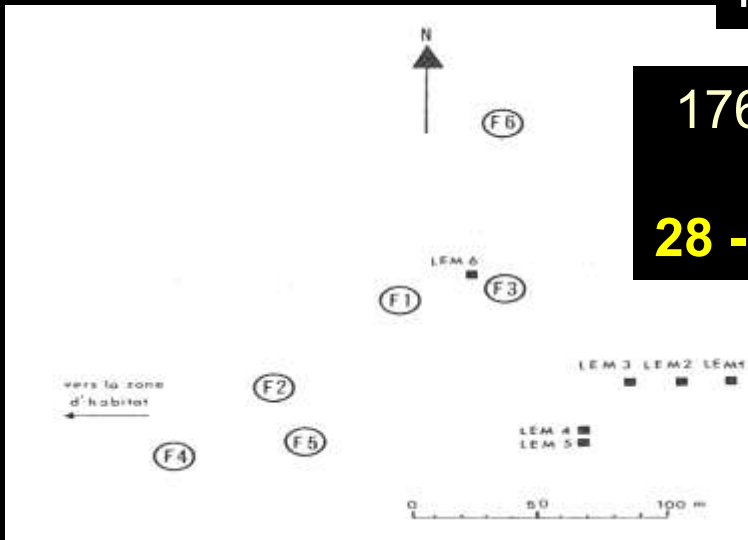
Lemdena: metallurgical site



Furnaces

1760 ± 110 BP

28 - 537 cal. AD



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?

...

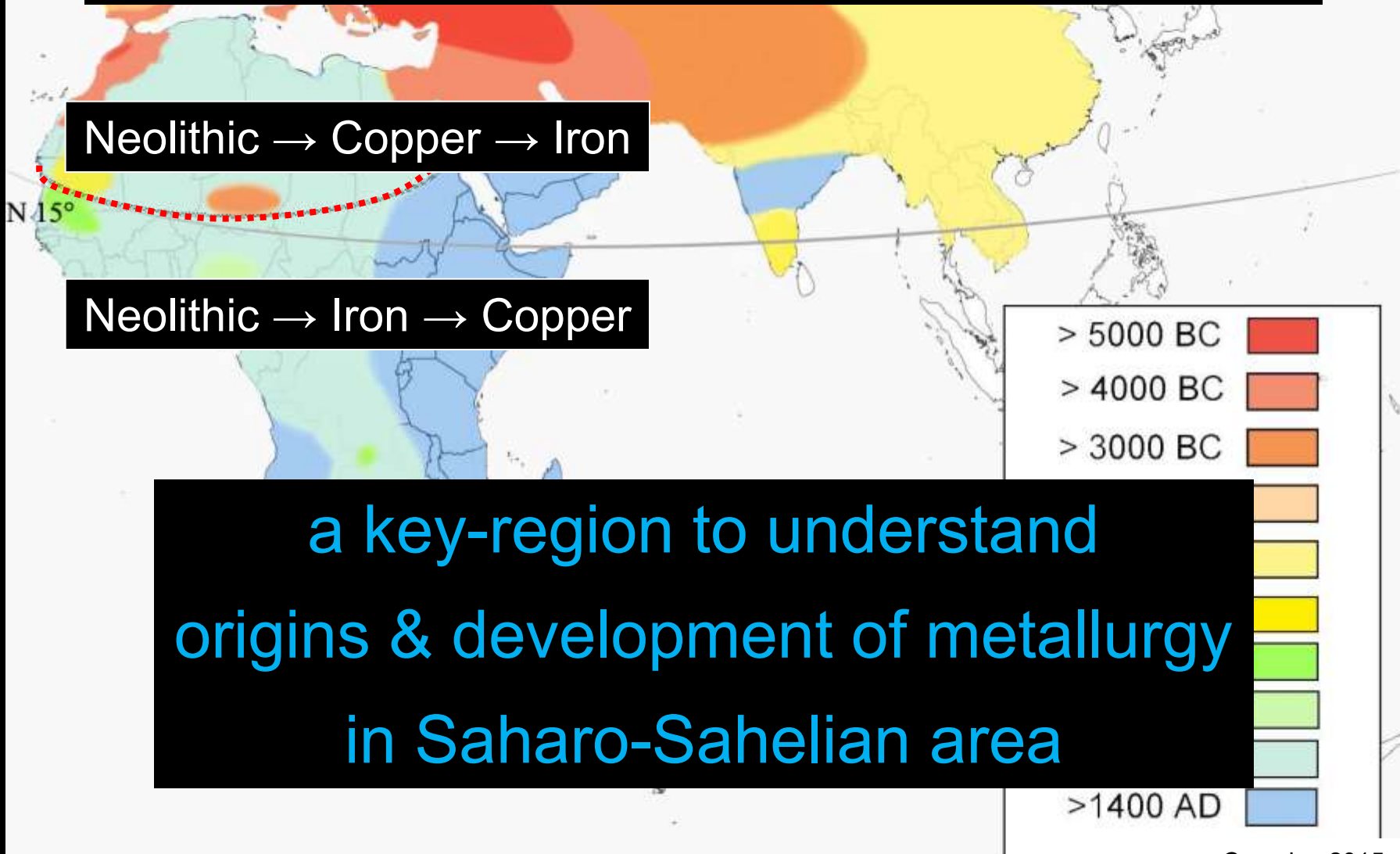
Since A. Crova, (1912)

one century of research...


... but few information

Mauritania :

interface with two metallurgical traditions

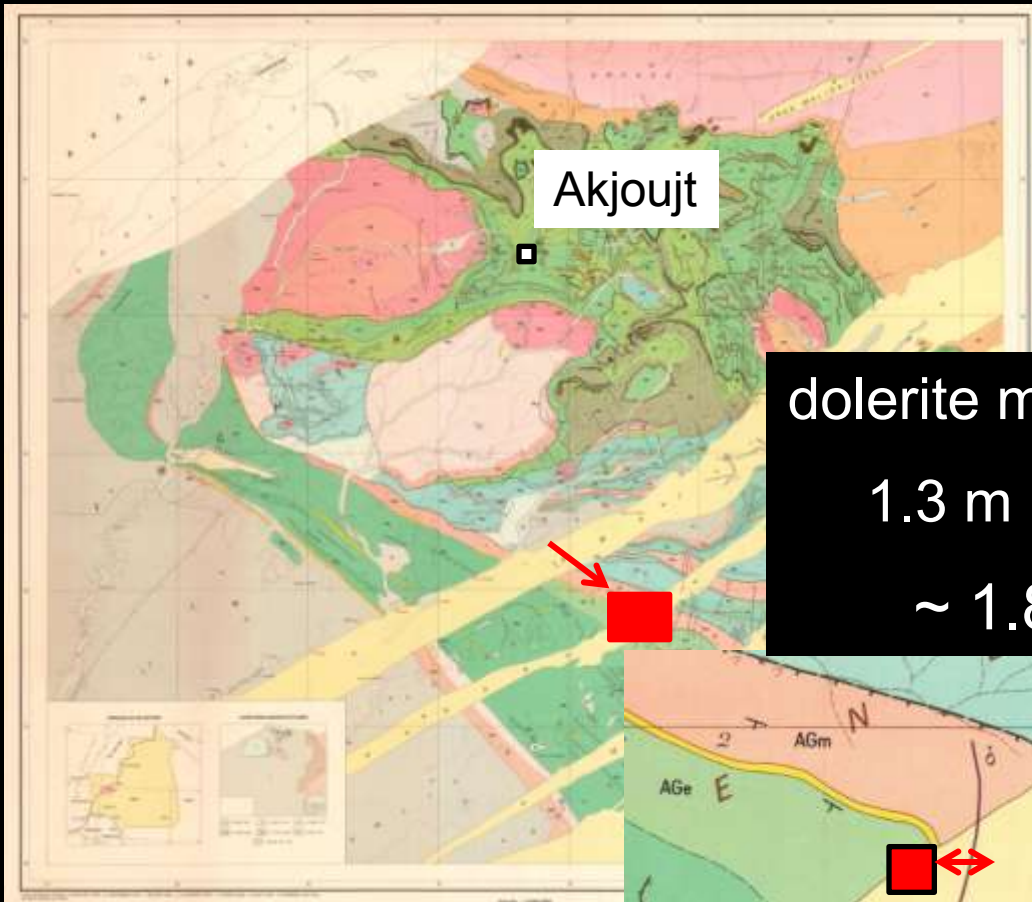


a key-region to understand
origins & development of metallurgy
in Saharo-Sahelian area



**Anthropic activities and natural resources:
fieldworks results
(2016-2018)**

Quarry

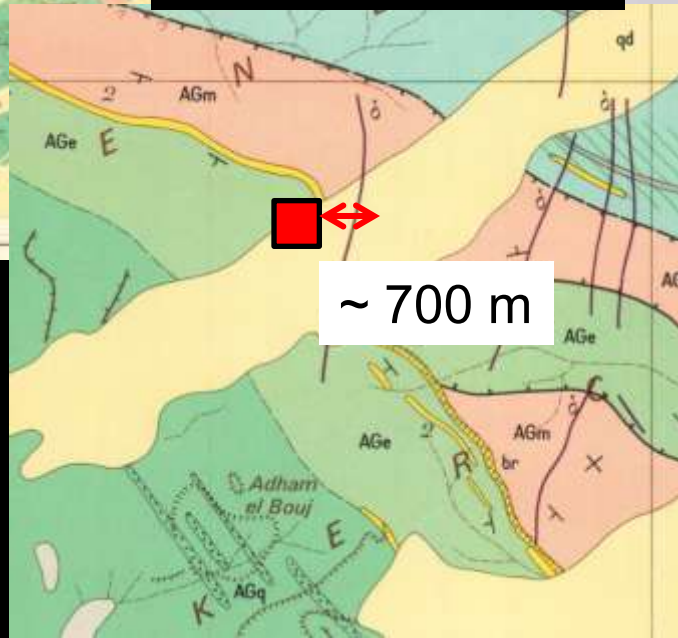


Akjoujt

dolerite monolith

1.3 m high

~ 1.8 t



~ 700 m



Quarry



Quarry



Quarry

Dolerite
Rhyolithe

massive extractive tools



Quarry

Dolerite
Rhyolithe

Quartzite
Gabbro

extractive tools

Amphibolite
Serpentinite

Granite
Basalte



Quarry

Quartz

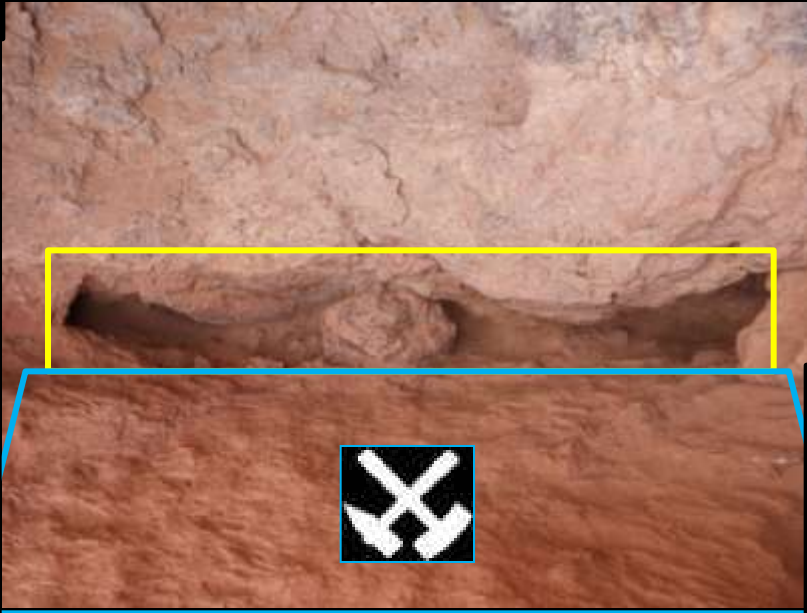
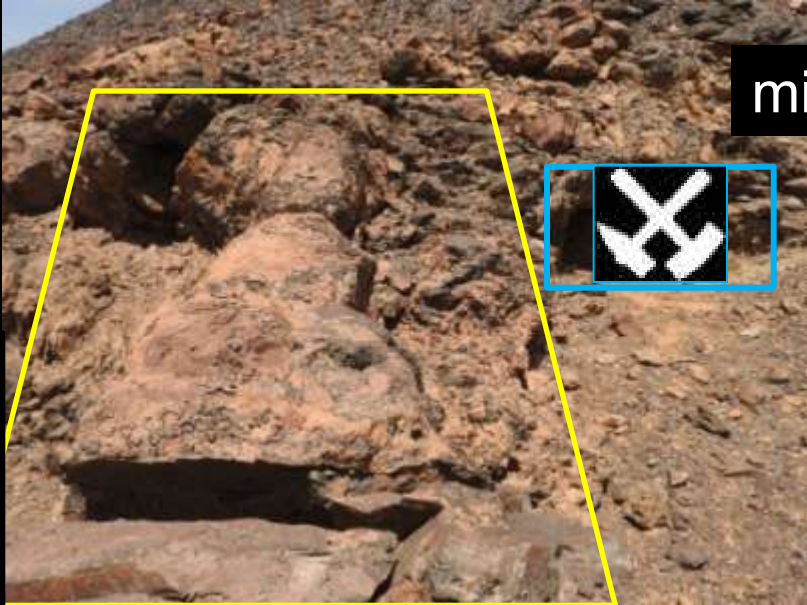
extractive & grinding/crushing tools

microlithic



Quarry

microlithic

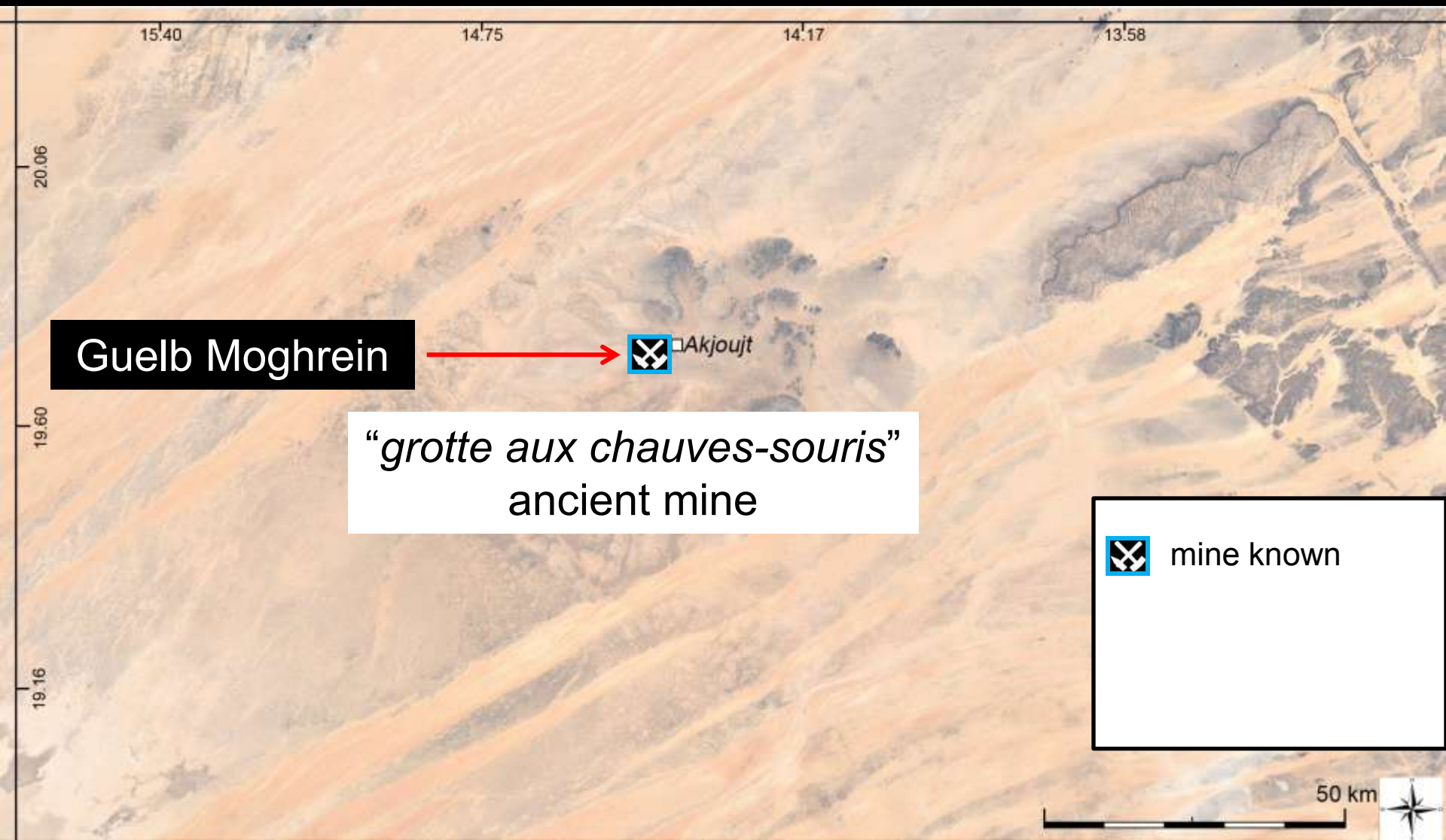




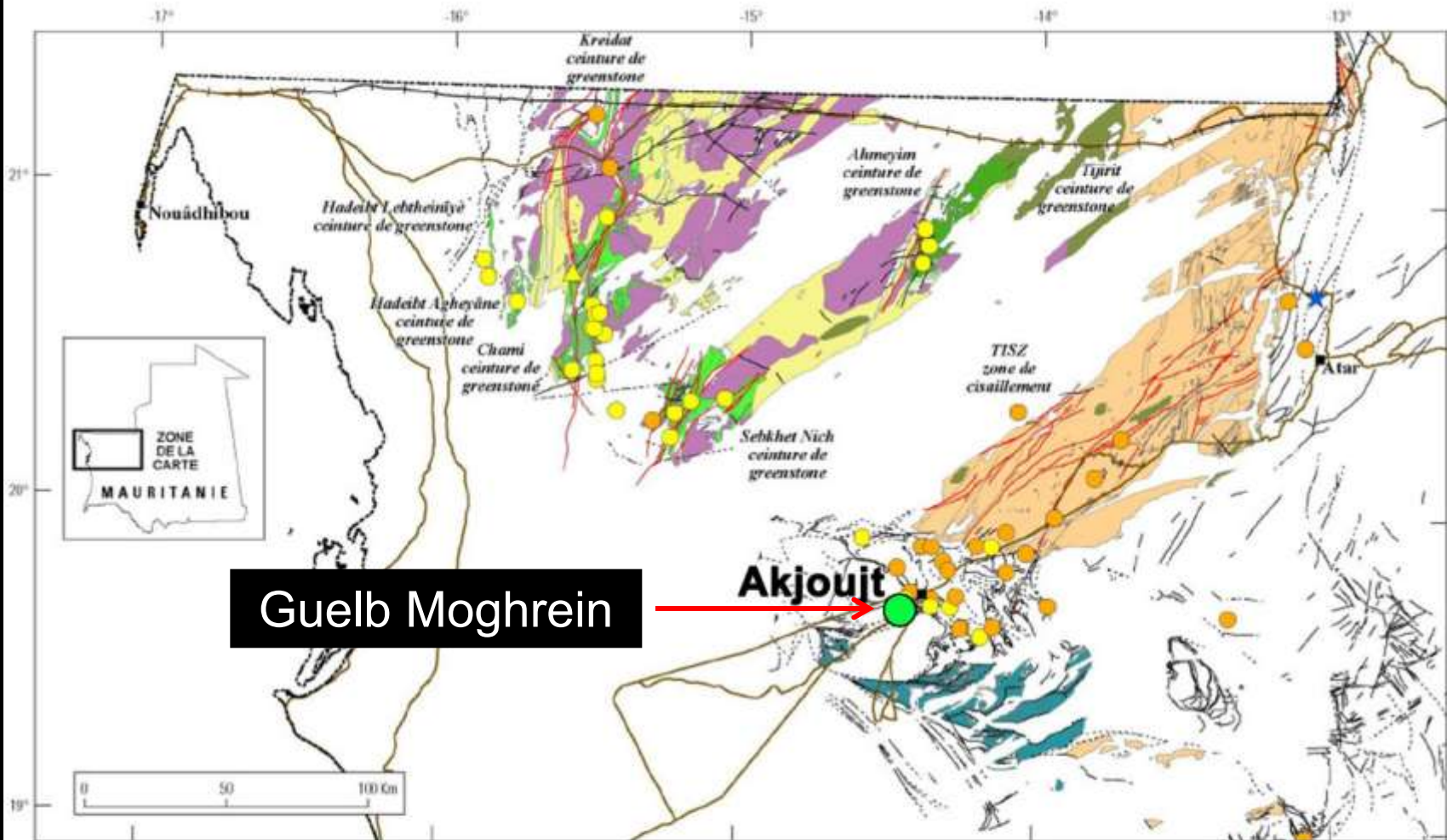
quarries

- exploitation of local rocks potential
- quarries close to mines
- production of extraction lithic tools
- production of microlithic

Mining extractive sites



Mining extractive sites

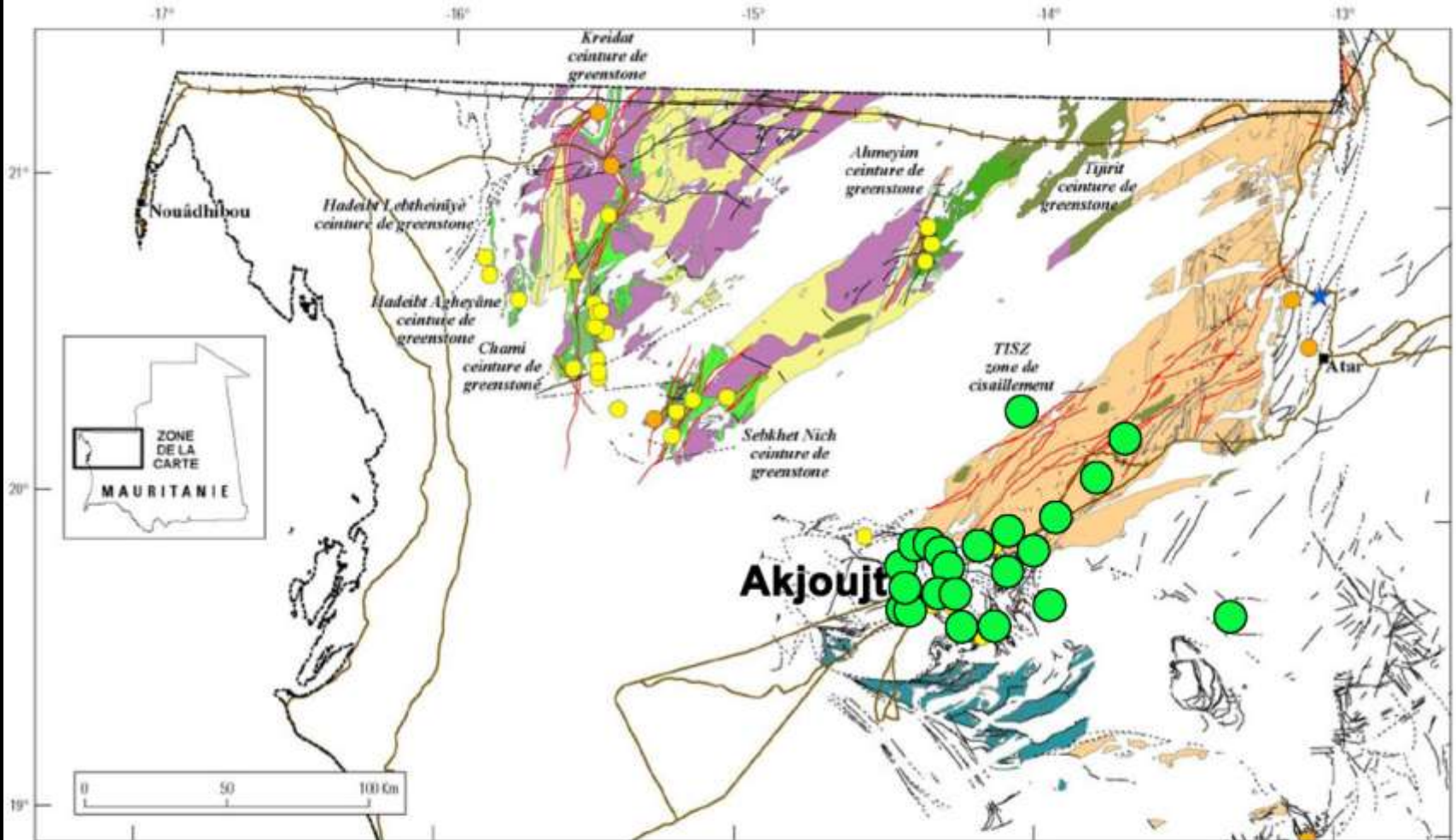


Guelb Moghrein

Akjoujt

EXPLICATION	
<ul style="list-style-type: none"> ■ Villes principales — Route —+— Voie ferrée - - - - Frontière de pays 	<ul style="list-style-type: none"> ● Occurrences de minéraux ● Cuivre ● Or ▲ Nickel ★ Zinc
<ul style="list-style-type: none"> Terrains de Tasiast-Tijrit ■ Complexe de Çtel Ogmâne ■ Cortège de Tacarat ■ Cortège de Tasiast 	<ul style="list-style-type: none"> Terrains de Choum-Rag el Abiod ■ Complexe d'Amsaga ■ Groupe de Saouda
<ul style="list-style-type: none"> ■ Groupe de Lebzenia ■ Formation d'Aouèoua ■ Formation de Sebkheth Nich ■ Formation de Talhayet ■ Formation de Tijra 	<ul style="list-style-type: none"> Structure — Faille, certaine - - - - Faille, couvert ou présumé - - - - Zone de cisaillement

Mining extractive sites



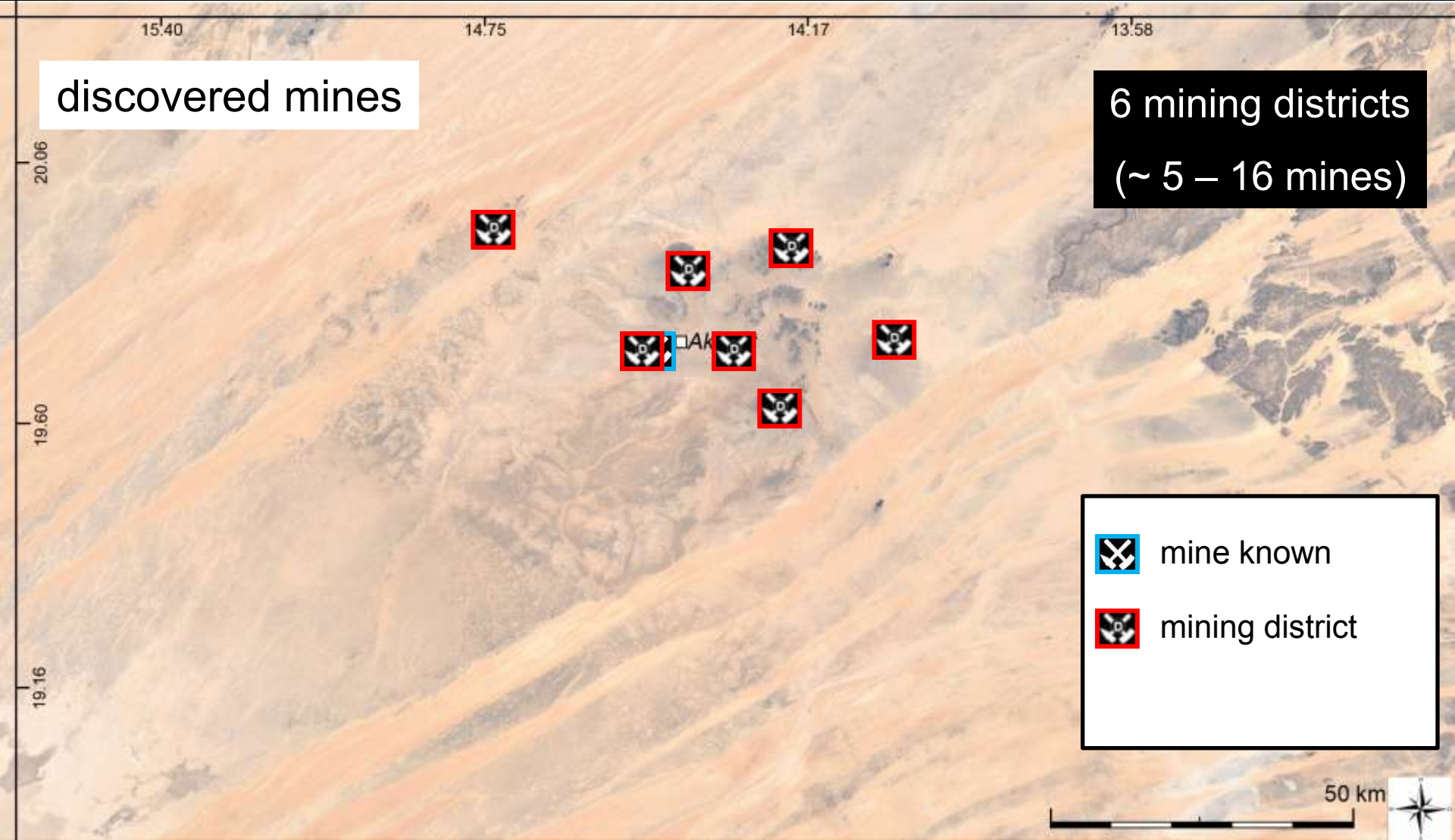
		EXPLICATION	
■	Villes principales	Occurrences de minéraux	Terrains de Tasiast-Tijrit
—	Route	● Cuivre	■ Complexe de Çtel Ogmâne
—+—	Voie ferrée	● Or	■ Cortège de Tacarat
- - -	Frontière de pays	▲ Nickel	■ Cortège de Tasiast
		★ Zinc	
			Groupes de Lebzenia
			■ Formation d'Aouëoua
			■ Formation de Sebket Nich
			■ Formation de Talhayet
			■ Formation de Tijra
			Terrains de Choum-Rag el Abiod
			■ Complexe d'Amsaga
			■ Groupe de Saouda
			Structure
			— Faïlle, certaine
			- - - Faïlle, couvert ou présumé
			— Zone de cisaillement

discovered mines

6 mining districts
(~ 5 – 16 mines)

 mine known

 mining district



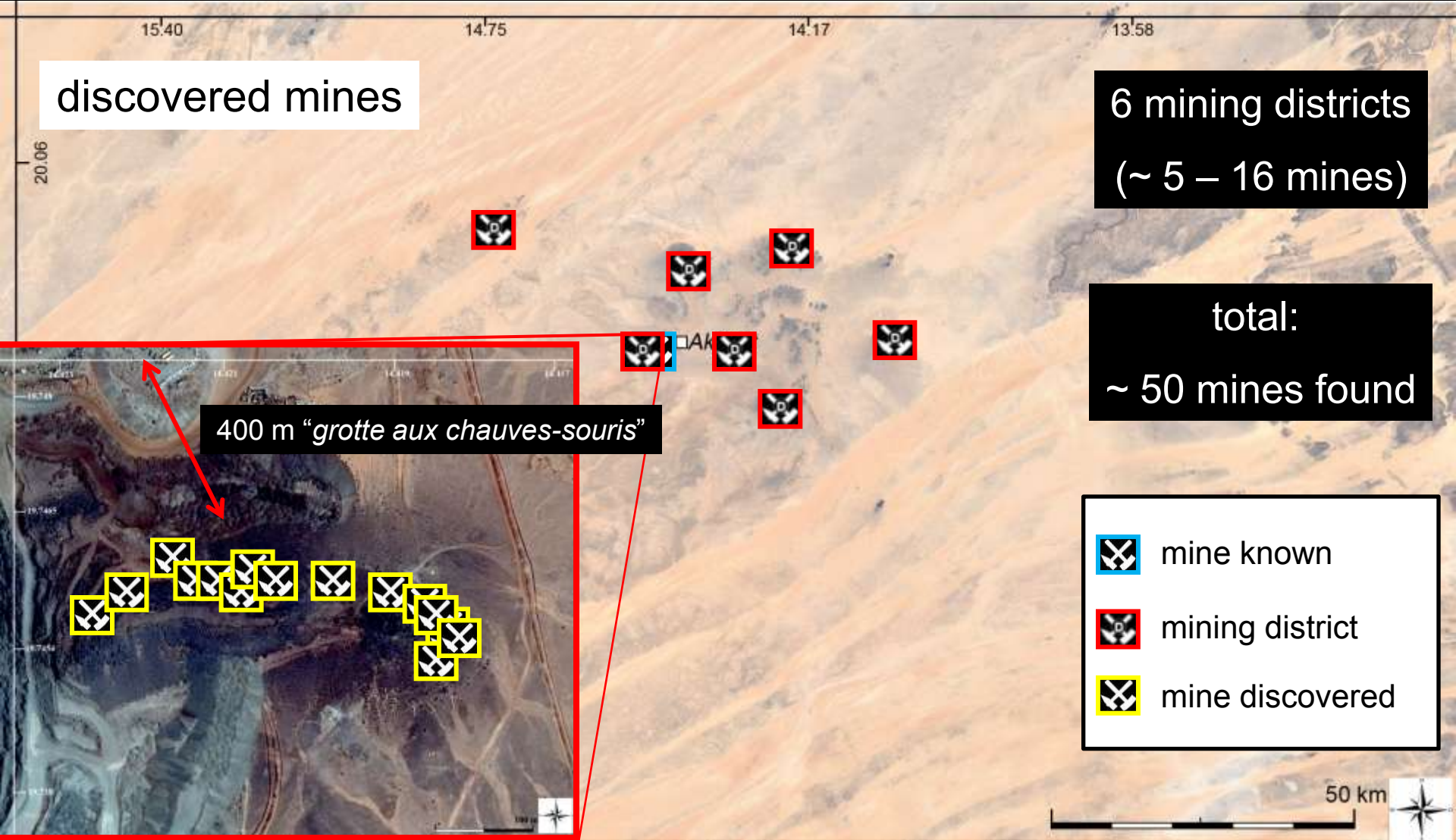
discovered mines

6 mining districts
(~ 5 – 16 mines)

total:
~ 50 mines found

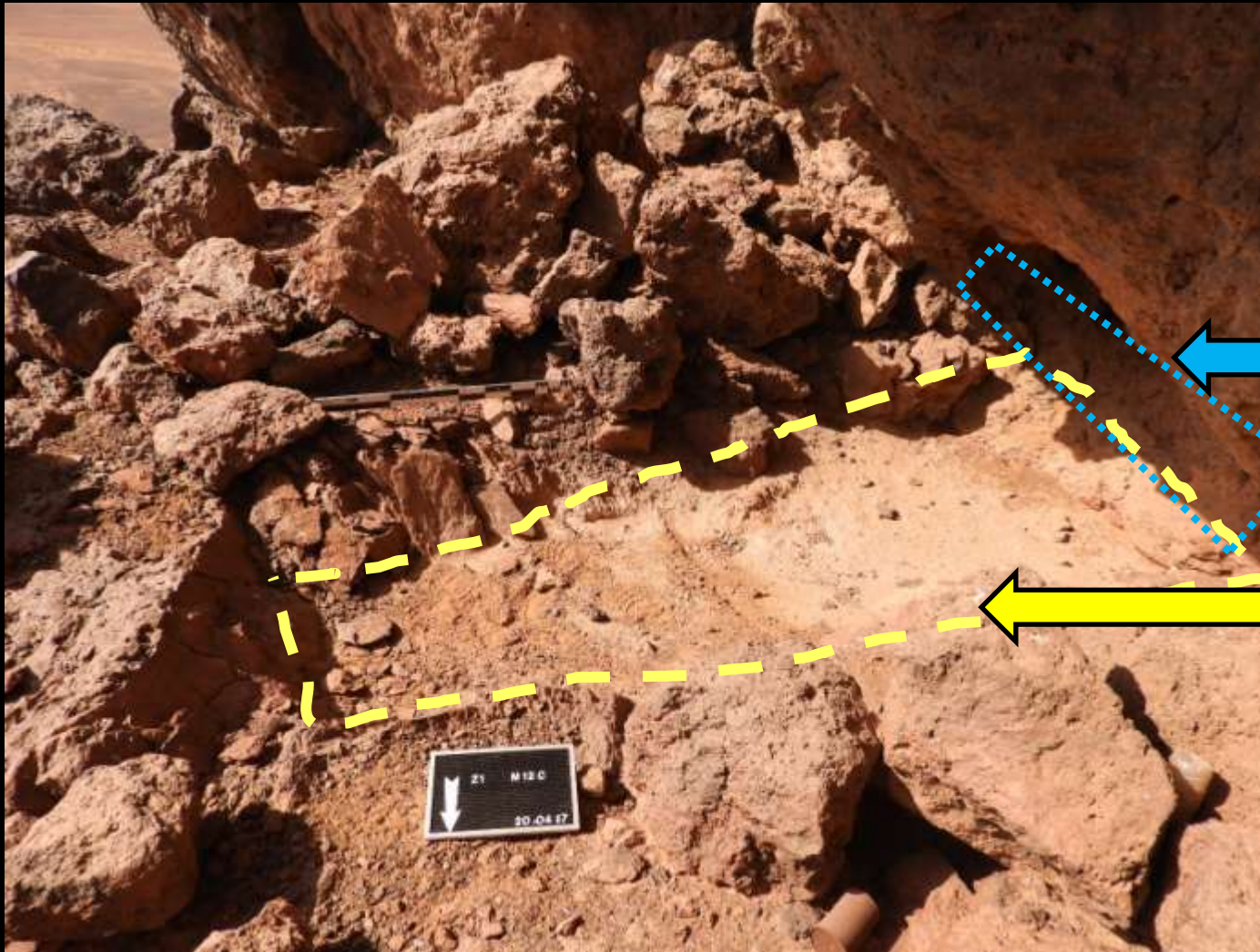
400 m "grotte aux chauves-souris"

-  mine known
-  mining district
-  mine discovered



Mining extractive sites

cutting face

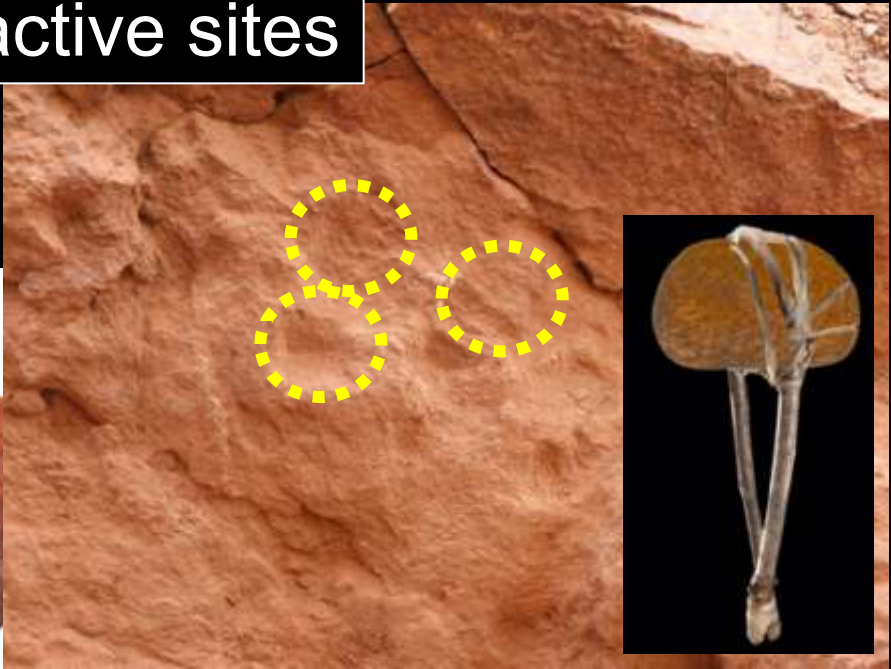


flint quarry

extractive site

Mining extractive sites

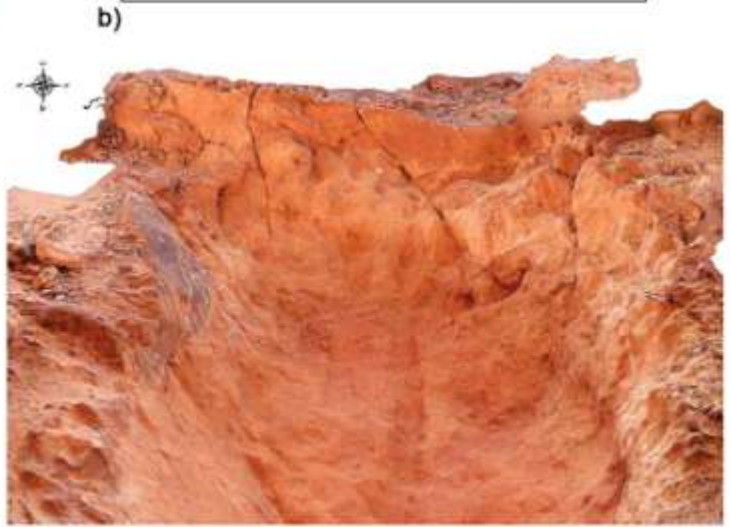
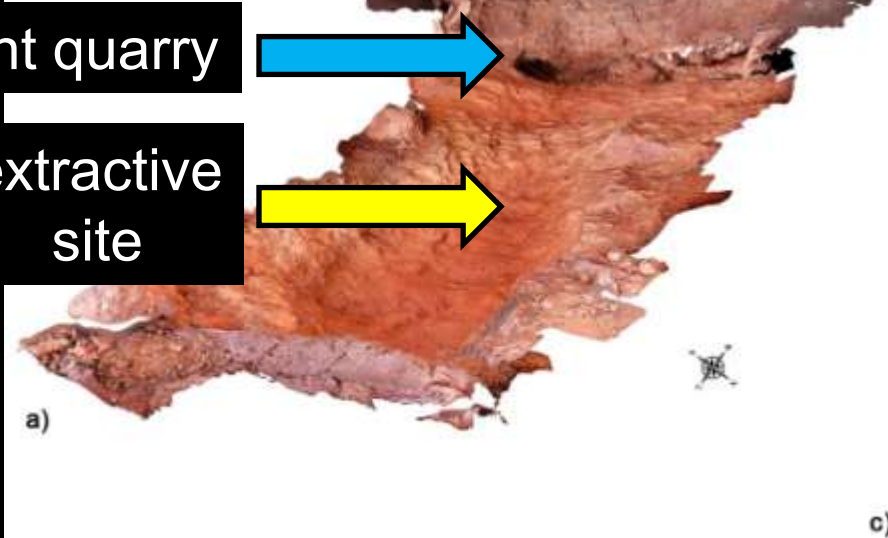
cutting face



flint quarry



extractive site



c)

Mining extractive sites

cutting face



extraction:

- iron ores?
- pigments?
- flux for copper smelting?



Mining extractive sites

cutting face



Mining extractive sites

small cavities



Fire-setting
&

stone hammer
extraction



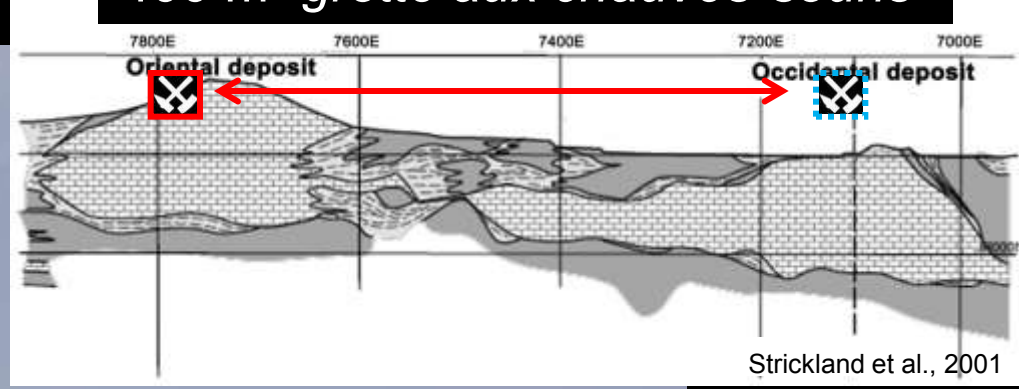
require wood: 1kg wood / 1kg rock extracted

Mining extractive sites

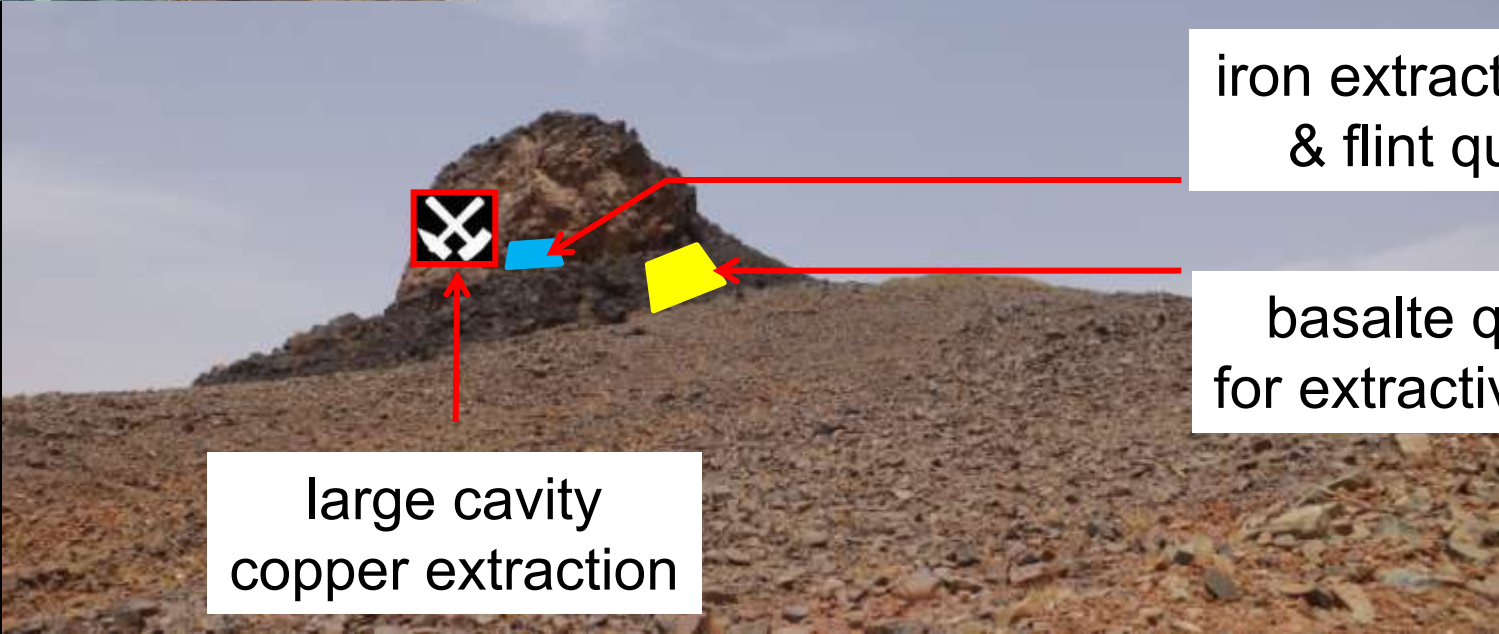
large cavities



400 m "grotte aux chauves-souris"



Strickland et al., 2001



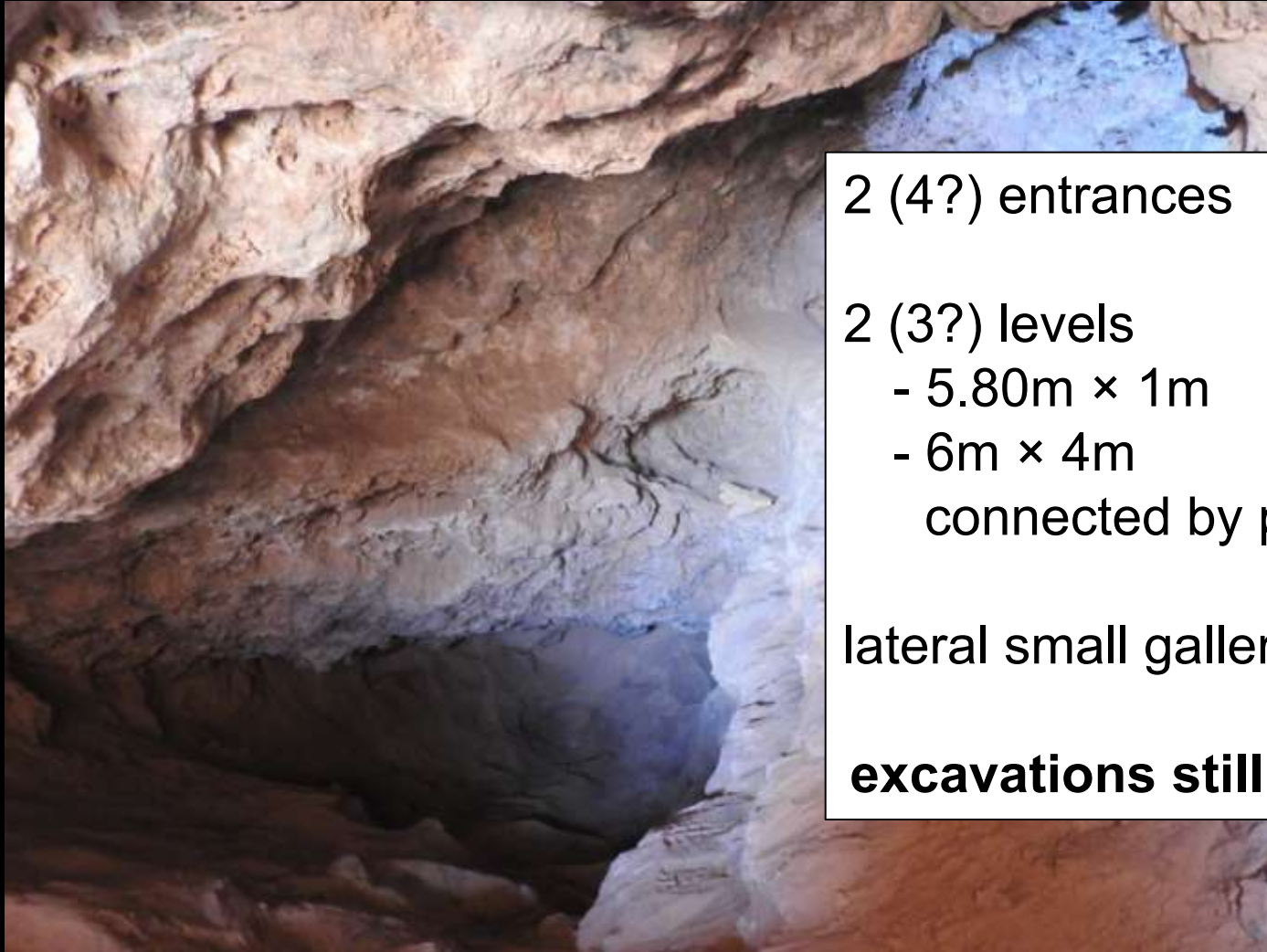
iron extractive site & flint quarry

basalte quarry for extractive tools

large cavity copper extraction

Mining extractive sites

large cavities



2 (4?) entrances

2 (3?) levels

- 5.80m × 1m

- 6m × 4m

connected by pit access

lateral small galleries

excavations still in progress



mines

- exploitation of local ores potential
- extraction copper ores
- extraction iron ores?
- extraction iron pigments?
- extraction by stone hammering
&/or
- extraction by fire-setting
- require wood & water

Crushing/grinding camps

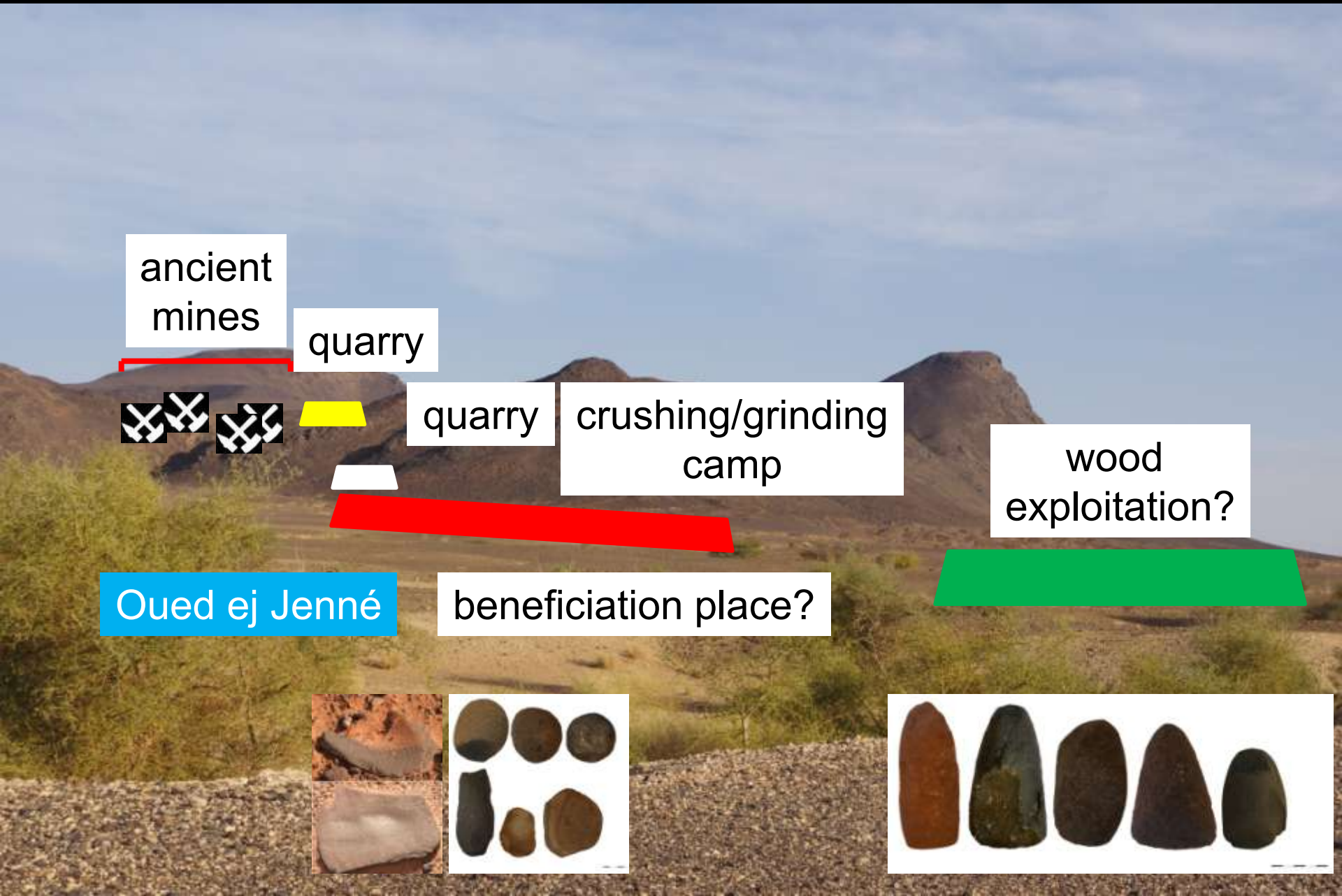
Khatt el Haneikât

beneficiation place?

cupules for grinding ores

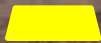


Crushing/grinding camps



ancient mines

quarry



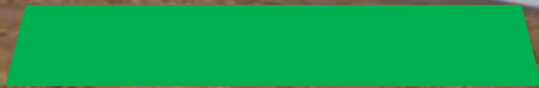
quarry

crushing/grinding camp

wood exploitation?

Oued ej Jenné

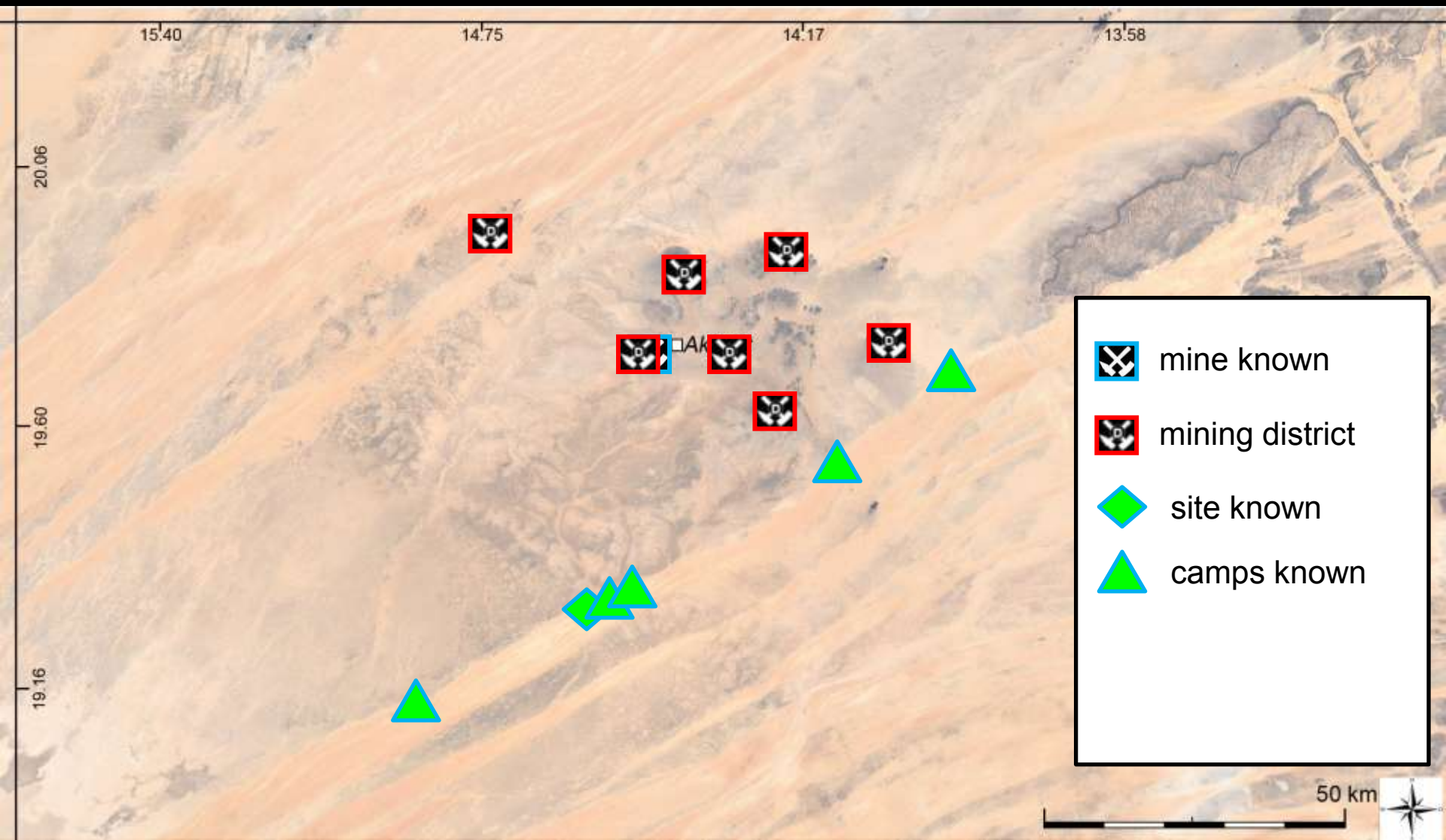
beneficiation place?



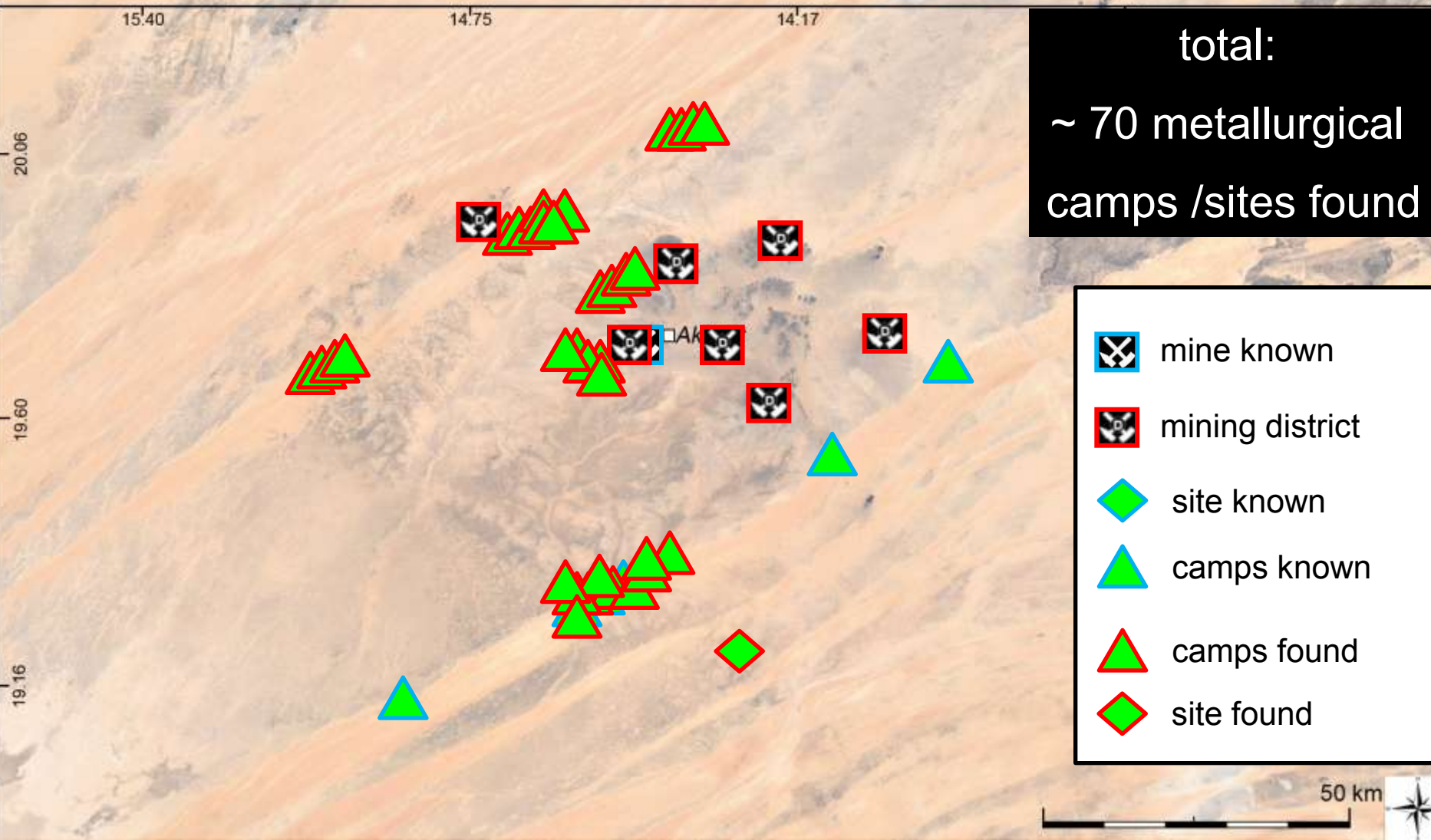
crushing/grinding camps:

- short duration of occupation
- workshops
- localised in vicinity of mines
- use of tools produced locally
- beneficiation?
- concentrated ores
- require water

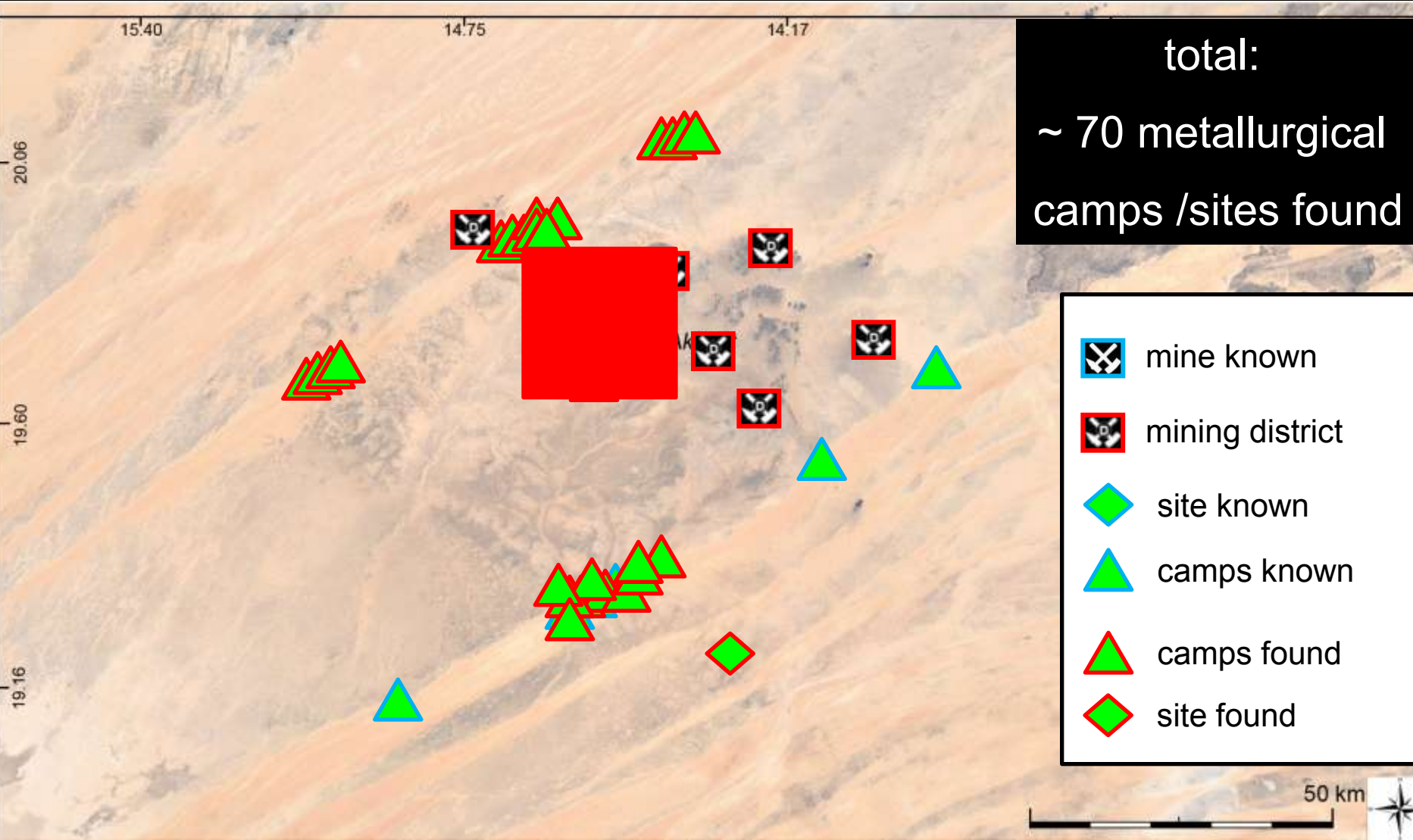
Metallurgical camps / metallurgical sites



Metallurgical camps / metallurgical sites



Metallurgical camps / metallurgical sites



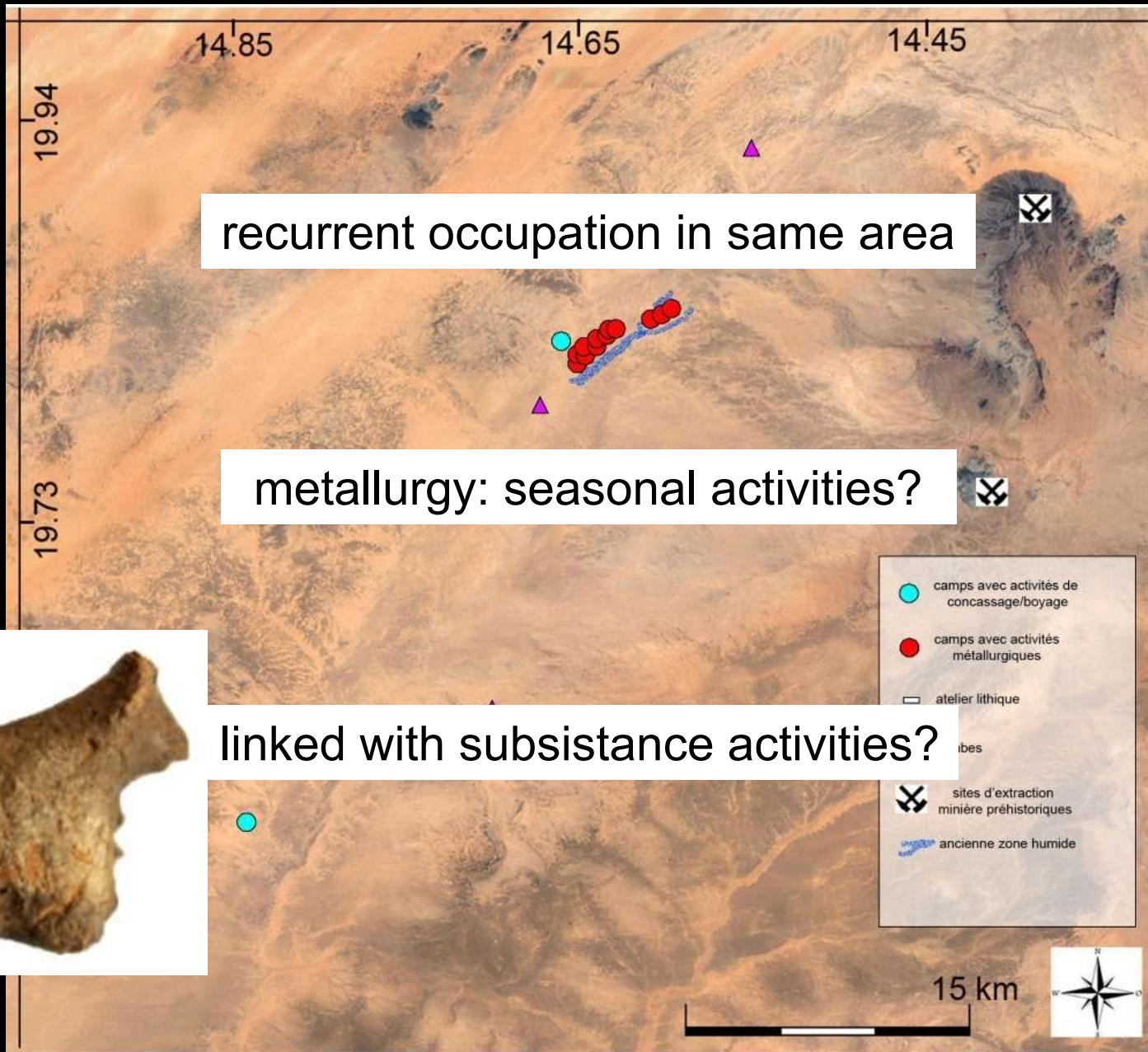
Metallurgical camps / metallurgical sites

occupation in same area

correlation between humid zone and metallurgical activities?



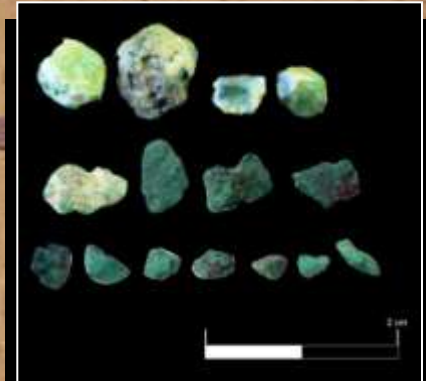
Metallurgical camps / metallurgical sites



Metallurgical camps



Metallurgical camps



Metallurgical camps

- short duration of occupation
 - seasonal occupation (?)
 - subsistence activities associated
 - installation along humid zones
- some metallurgical activities
 - crush/grinding ores
 - beneficiation (?)
 - smelting
 - crushing slags
 - require wood & water

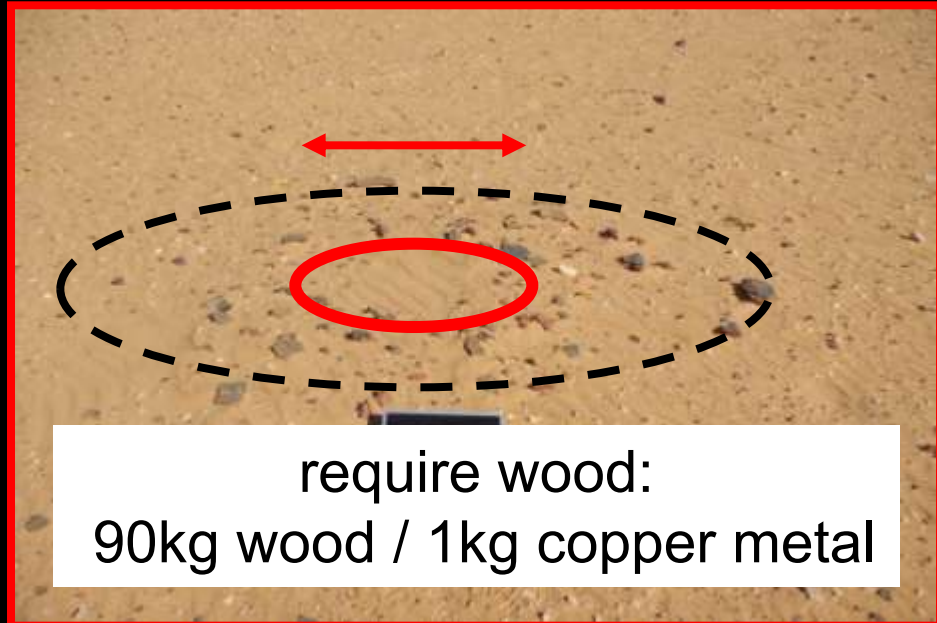
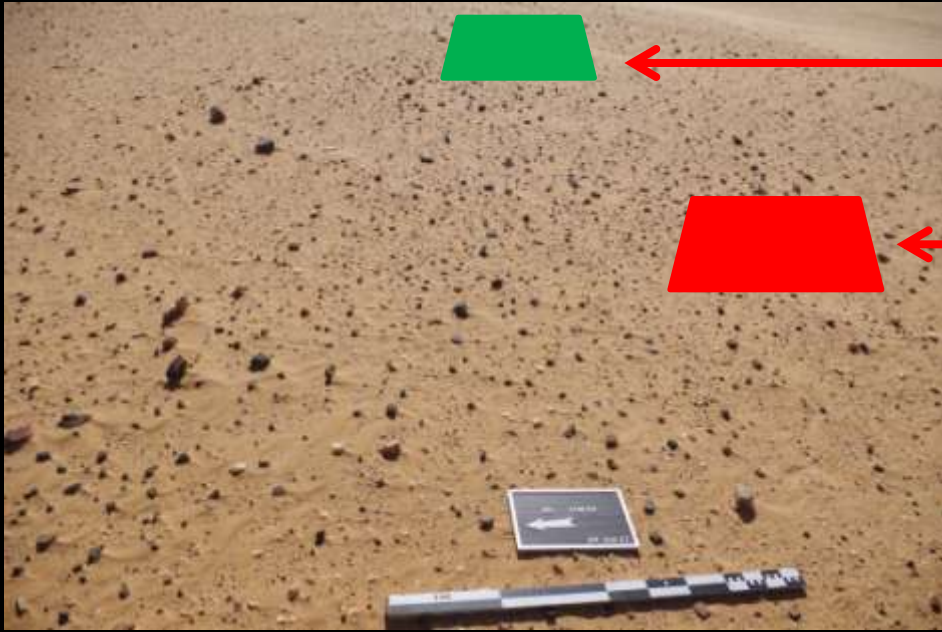
Metallurgical sites



← crushing/milling place



← furnace



require wood:
90kg wood / 1kg copper metal

Metallurgical sites

slags heaps



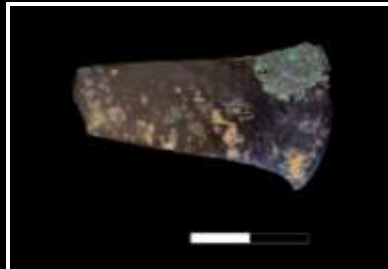
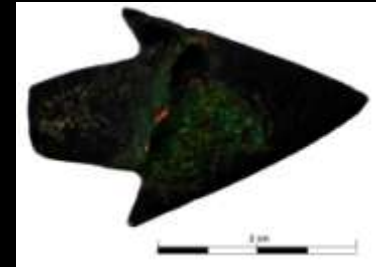
Metallurgical sites

Prills & nuggets of copper metal



Metallurgical sites

Half-product & copper metal objects



Metallurgical sites

N. Lambert's works



CUPRUM team's works

- Metal object
- Tap slag
- Tap slag, furnace
- metallurgical oven
- ▲ estinguished rivers



Lemdena's Border



Square of Excavation



Slag Heaps



Estinguished rivers

0 0,5 1 Kilometers

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Metallurgical sites

excavations

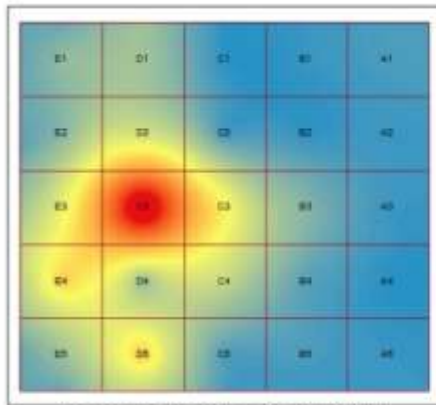
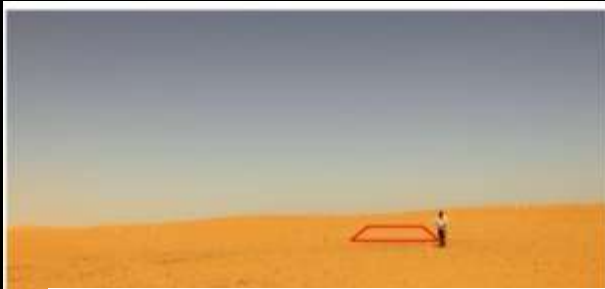


- Metal object
- Tap slag
- Tap slag, furnace
- metallurgical oven
- ▲ estinguished rivers

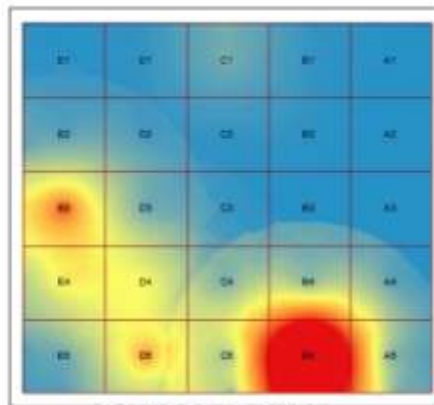
- ▭ Lemdena's Border
- ▭ Square of Excavation
- ▭ Slag Heaps
- Estinguished rivers

0 0,1 0,2 Kilometers

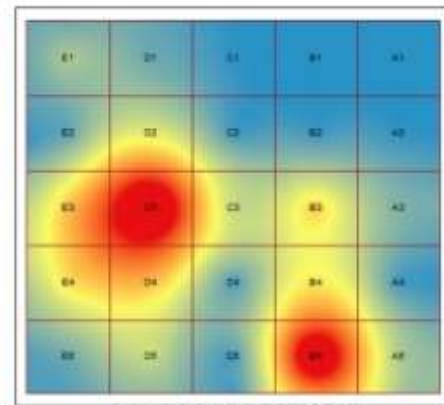
Metallurgical sites



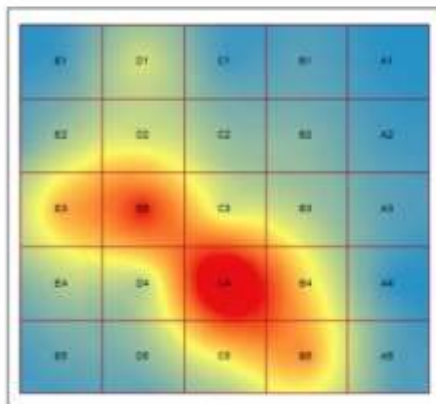
fragments de minerais cuprifères



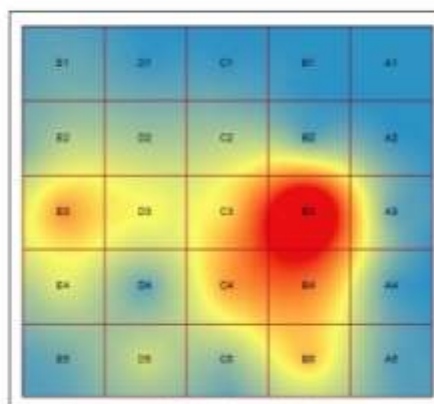
fragments de creusets



Fragments de parois de fours métallurgiques



scorings



billes de métal

TOTALS	
tessons	605
scorings	309
minerais	179
éléments de four	154
objets métal	0
débris de taille	0
macrolithiques	15
os (regouffes)	117
charbons	13
frags. osif d'astruche	2
billes de métal	140
fragments de creuset	55
objets semi-finis	2

0 1.0 2 3 4 Meters



Scale 1:5000
Map 1/10000

Metallurgical sites

- long duration of occupation
- settlement
- installation in sandy bars
- numerous activities among them metallurgy
- metallurgical activities close to humid zones
- many metallurgical activities
 - crush/grinding ores
 - beneficiation (?)
 - smelting
 - crushing slags
 - melting
 - production semi-manufactured
 - production of metal objects
- require wood & water

Main points

intensive exploitation of local raw material potential

spatial anthropic occupation connected with metallurgical activities

copper metallurgy in correlation with subsistence activities

Welcome to participate with us to
the archaeological fieldworks !



for more information:
courcier.antoine@laposte.net

Thanks to :

Laboratoire TRACES :

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IMRFP:

Youba Ould Cheikhna, Mohamed Bechry, Ethmane Dadi Essaid

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



Thanks to :

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Monsieur l'Ambassadeur Joël Meyer,

Monsieur le Conseiller de coopération et d'action culturelle Raphaël Malara

Ministère de l'Europe et des Affaires Etrangères

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