Journée de restitution des projets ECCOREV 2016
24 mai 2018 (IMERA Marseille)

Traçages isotopiques des changements climatiques rapides à l'Holocène en lien avec l'occupation humaine à Persepolis

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Élodie BRISSET, Morteza DJAMALI (IMBE)
Jean-Louis HUM (master 2)

PERSEPOLIS

515-520 by Darius I (BC 522-486)

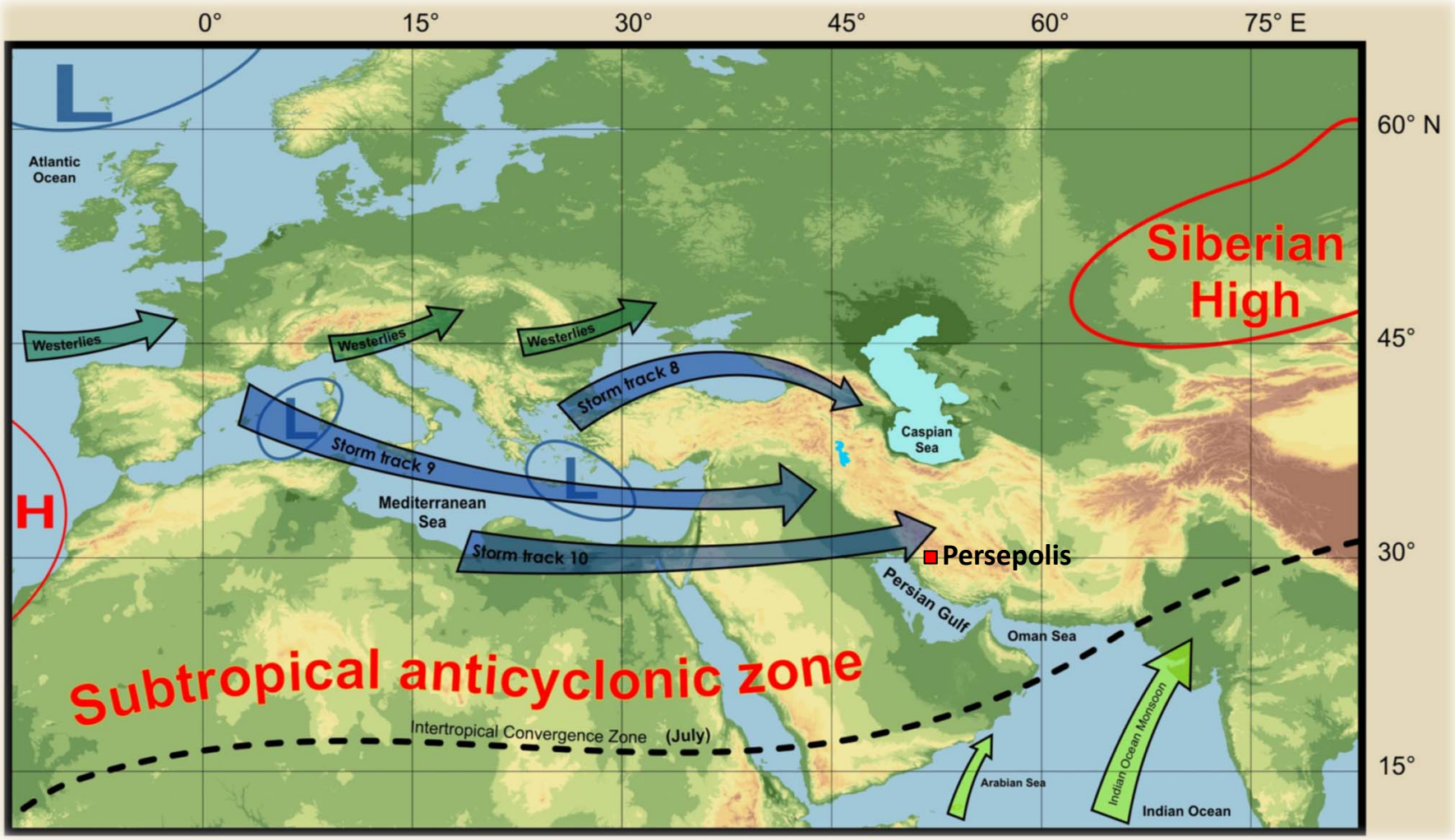
Capital of the Achemenid Empire

(Wikipedia, licence Creative Commons)

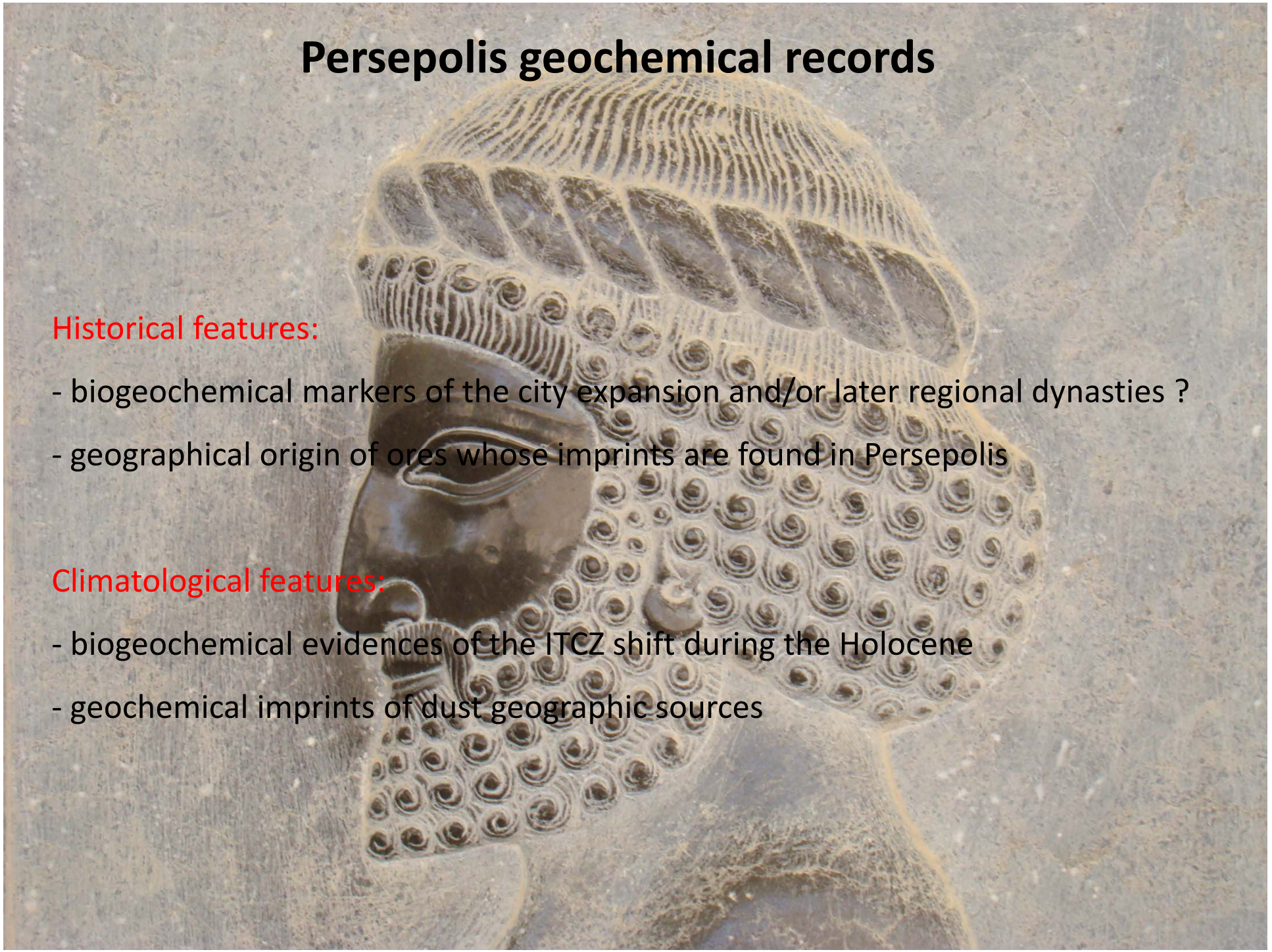
The Achemenid Empire (550-330 BC)

(Wikipedia, licence Creative Commons)

Main climatological features for the Zagros Mountain



Persepolis geochemical records

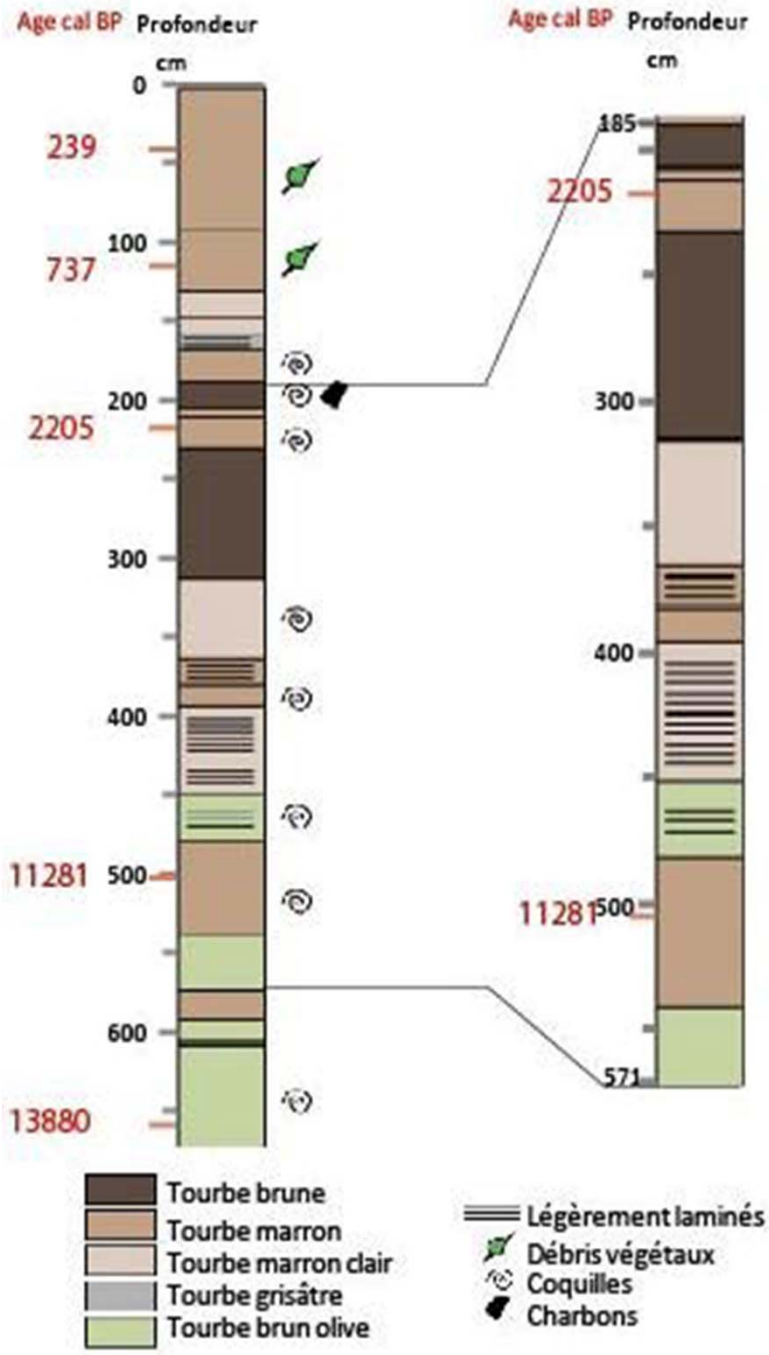


Historical features:

- biogeochemical markers of the city expansion and/or later regional dynasties ?
- geographical origin of ores whose imprints are found in Persepolis

Climatological features:

- biogeochemical evidences of the ITCZ shift during the Holocene
- geochemical imprints of dust geographic sources



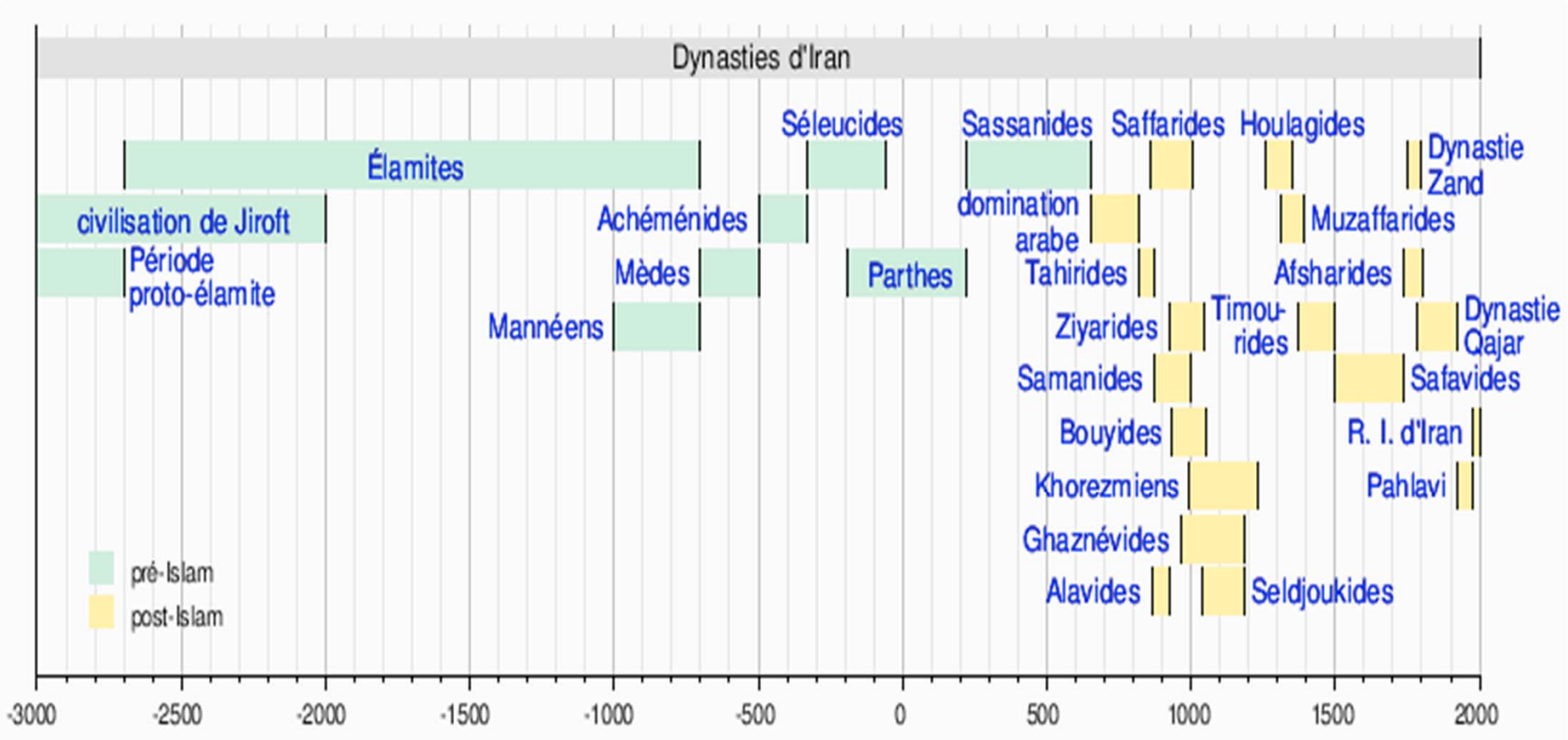
Rouzian wetland – spring fed

7m FQ2 core (5 ^{14}C dates, 2 in progress)

Geochemical analyses: 1.9 – 5.7m

Timeline Iranian dynasties

Core FQ2 (Persepolis)



Age BC-AD

(Wikipedia, licence Creative Commons)

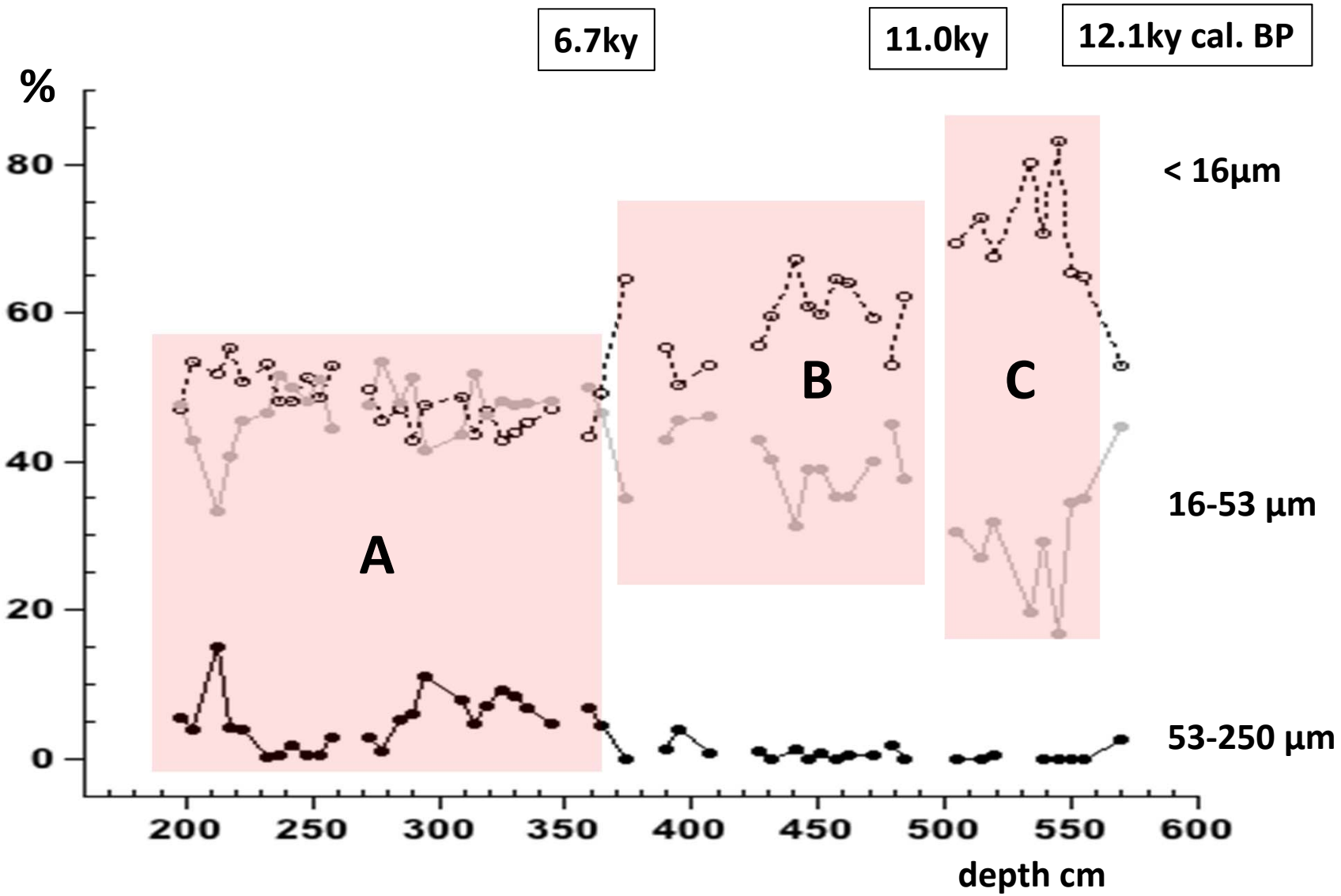
Climate records

Gain size analyses

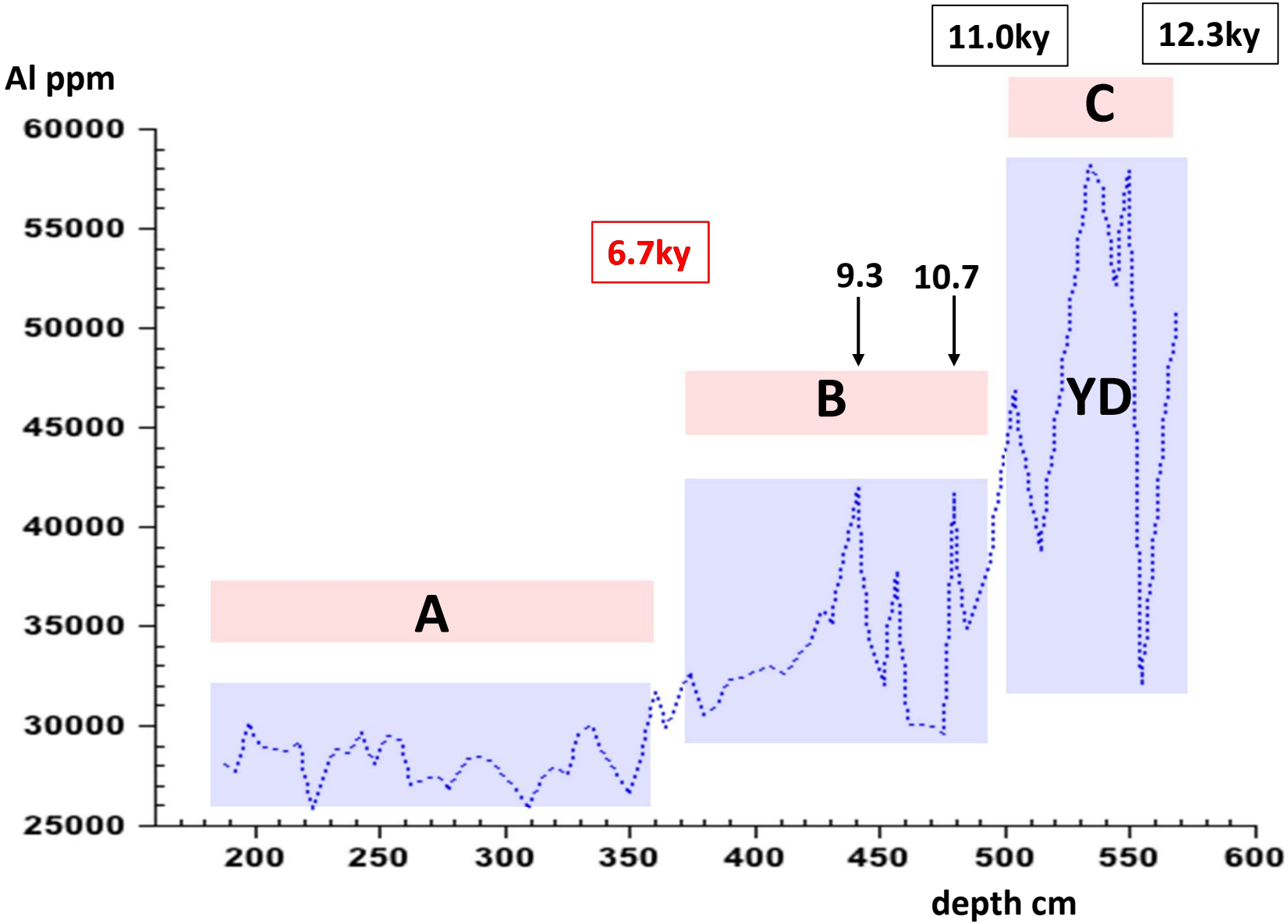
Dust markers (trace metals)

Comparison to paleoecological records

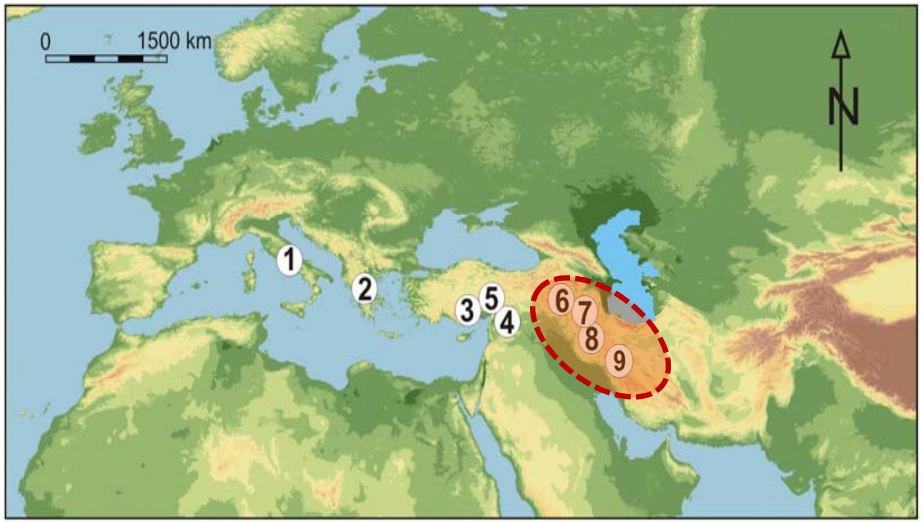
Grain size analysis

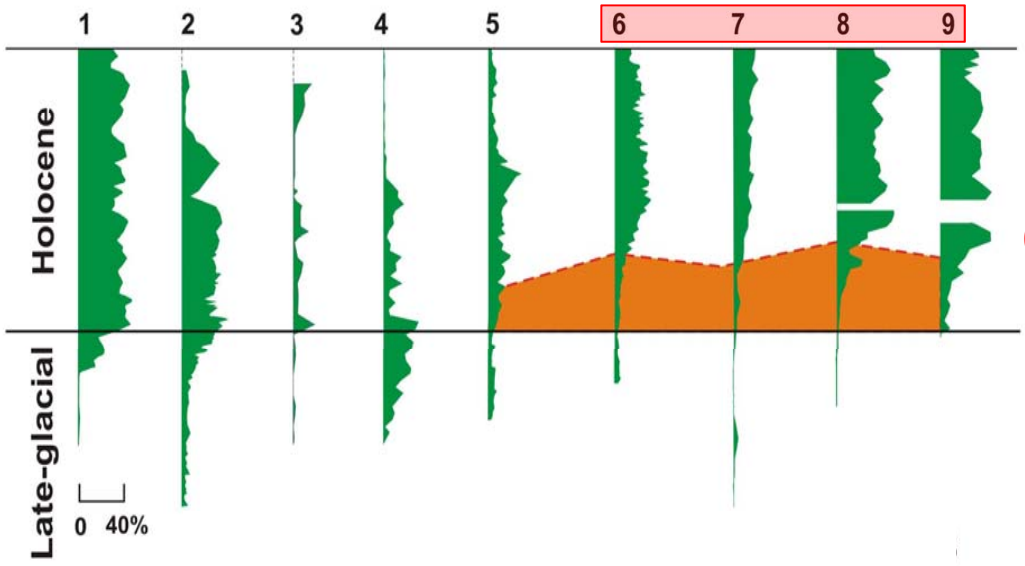


Al concentration



Decideous *Quercus* pollen curves

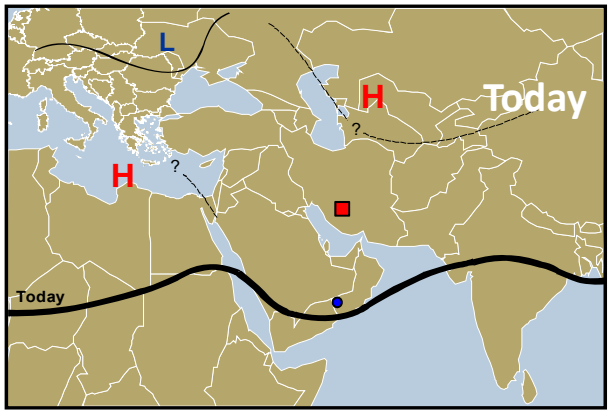


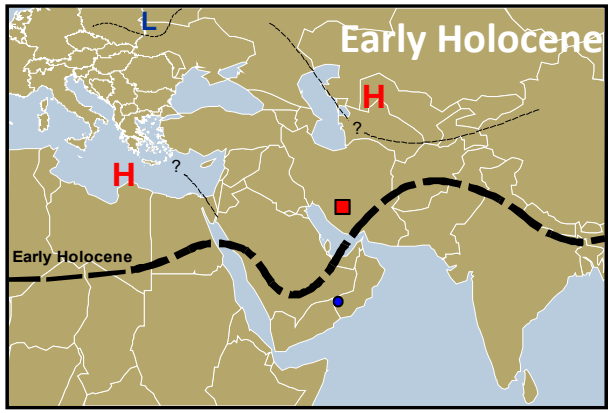


6.3ky

B

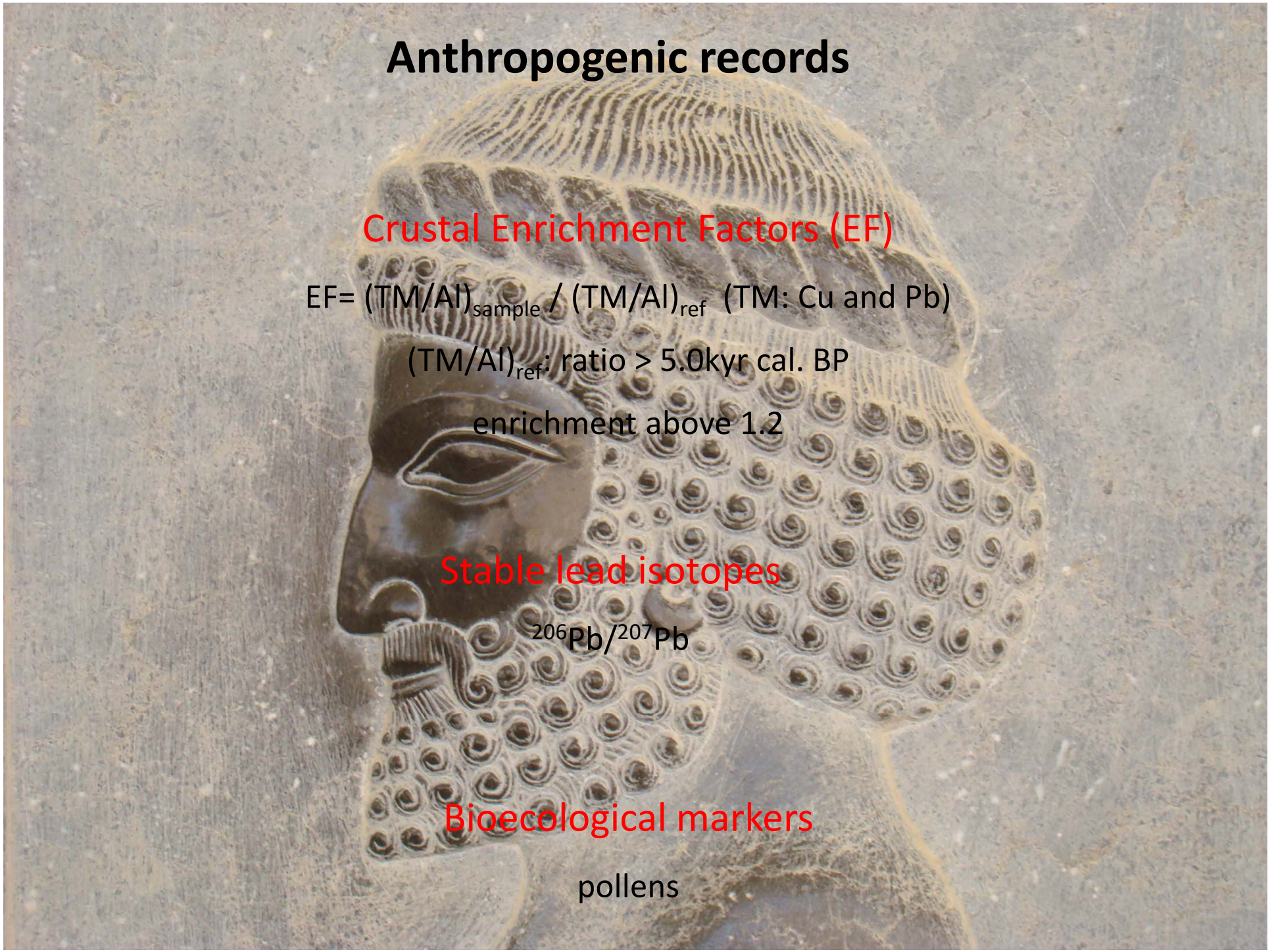
11ky





Djamali et al., 2010

Anthropogenic records



Crustal Enrichment Factors (EF)

EF= $(TM/Al)_{sample}$ / $(TM/Al)_{ref}$ (TM: Cu and Pb)

$(TM/Al)_{ref}$: ratio > 5.0kyr cal. BP

enrichment above 1.2

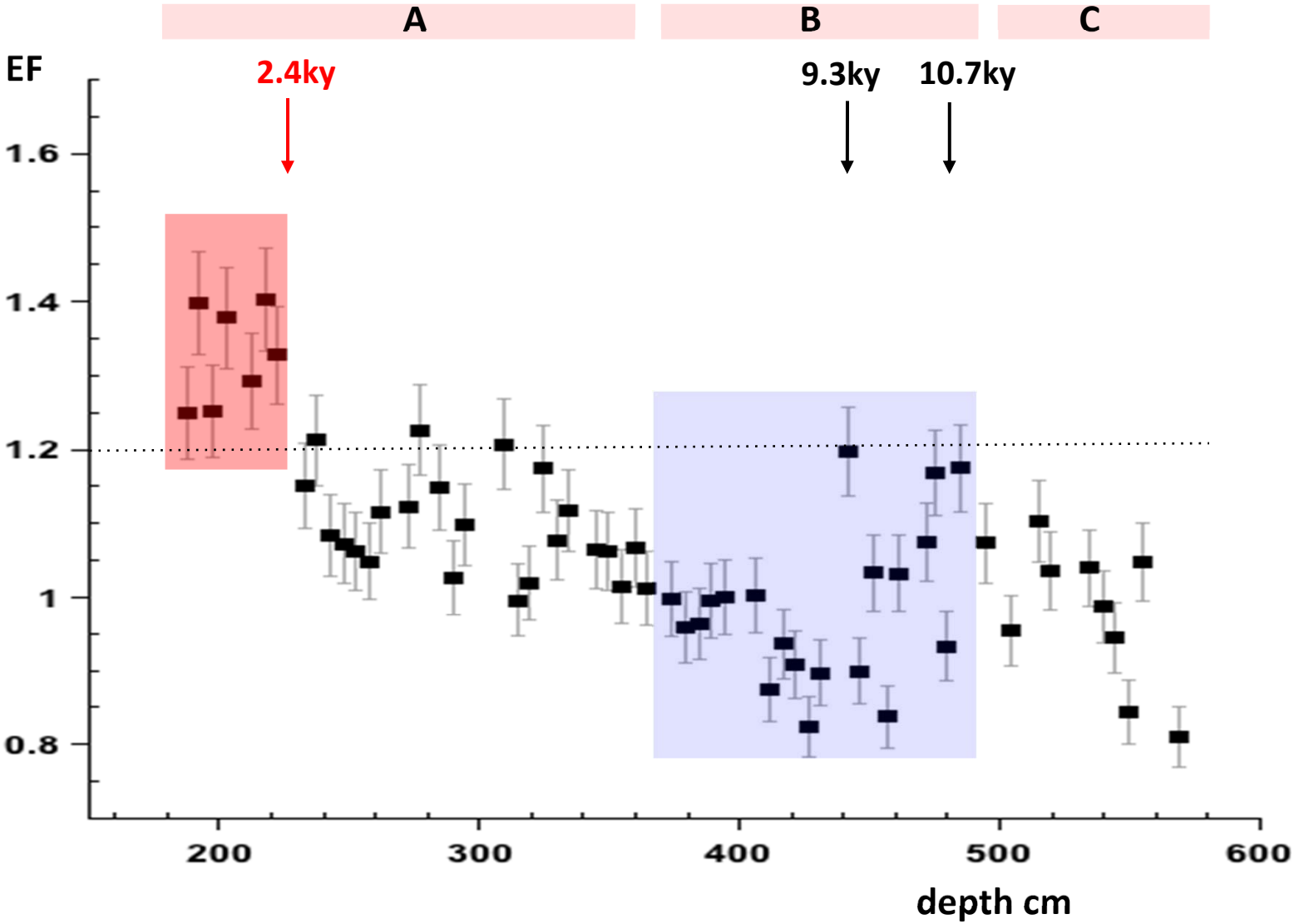
Stable lead isotopes

$^{206}Pb/^{207}Pb$

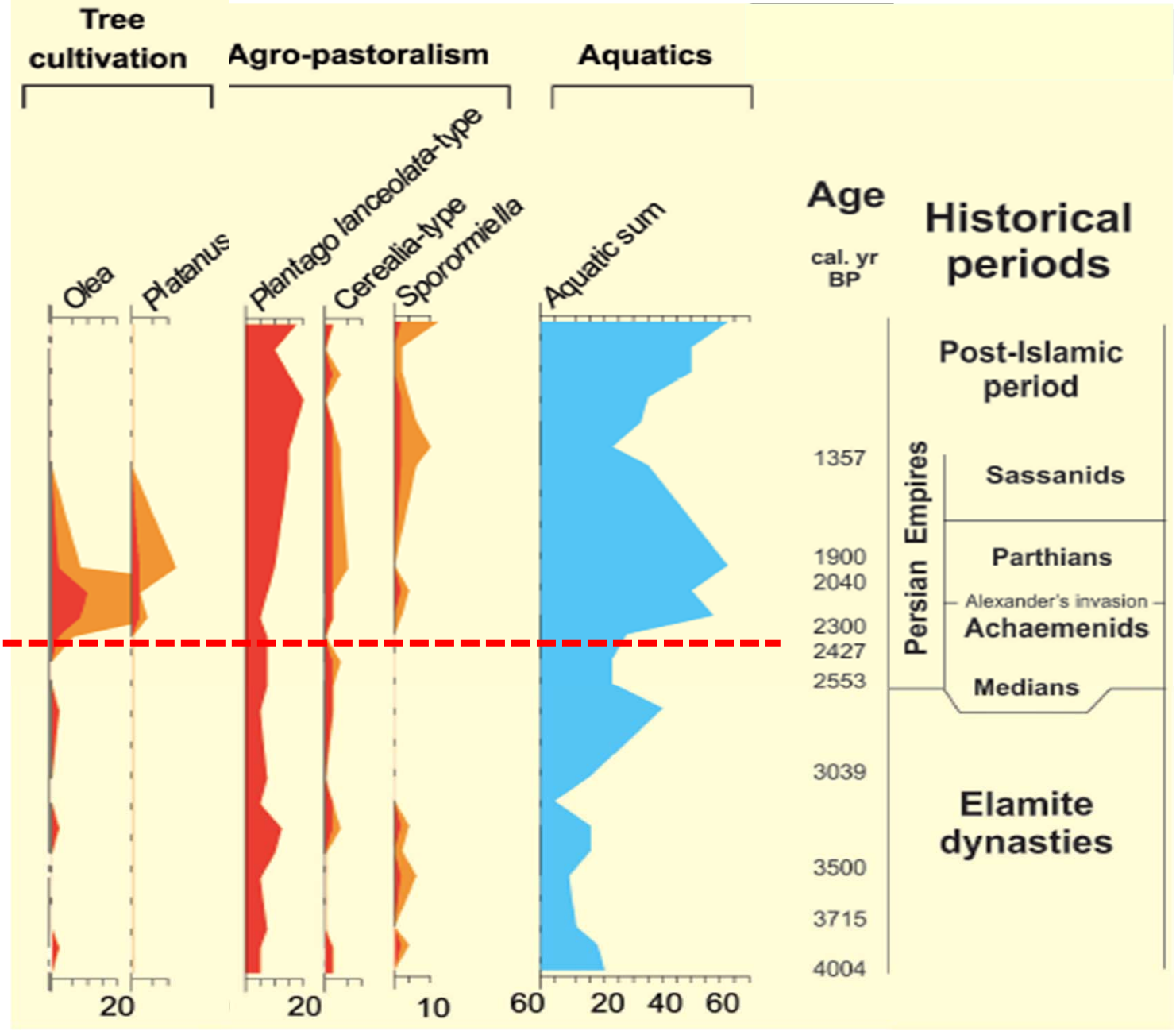
Bioecological markers

pollens

Cu crustal Enrichment Factors (EF)

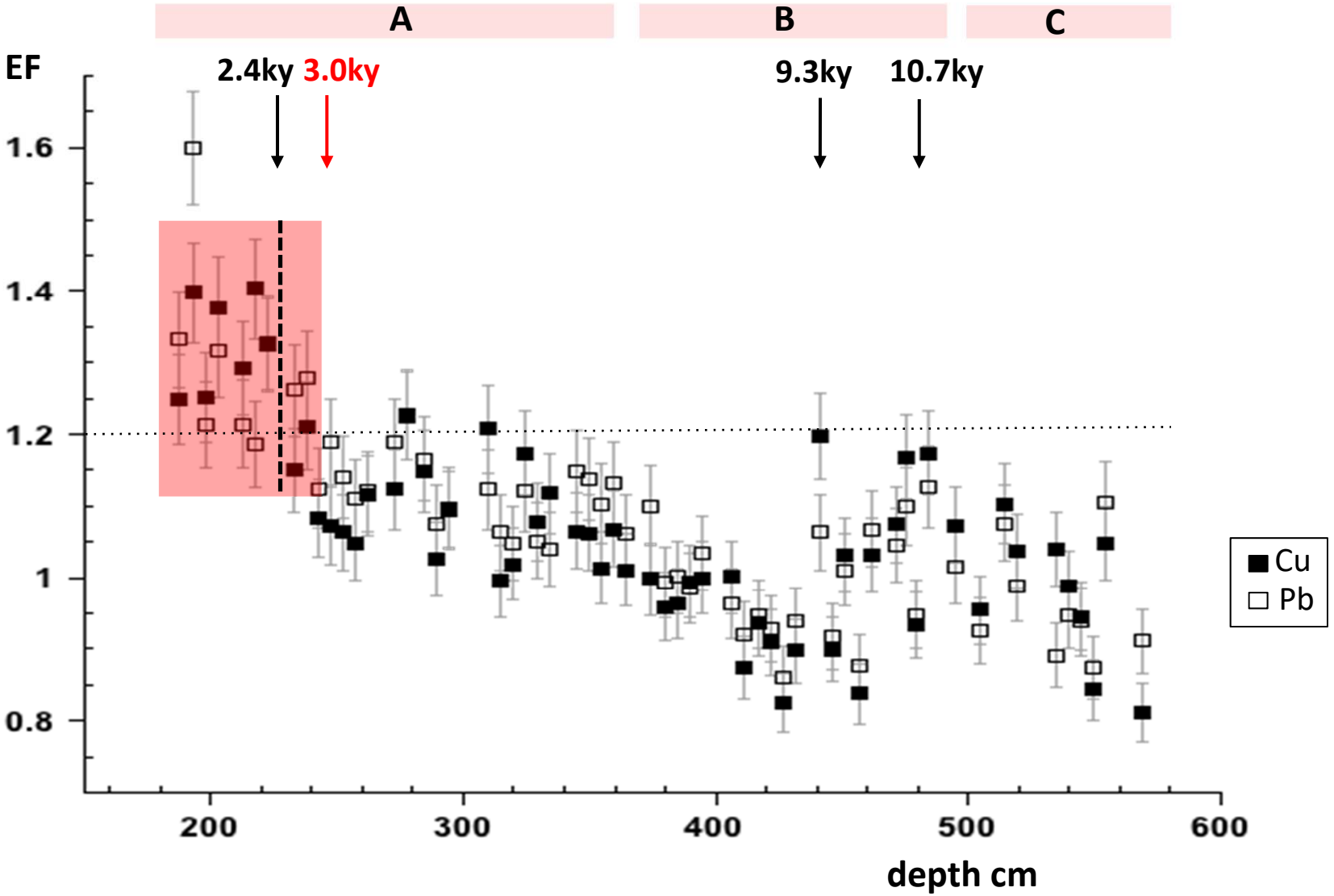


Pollen record from lake Parishan

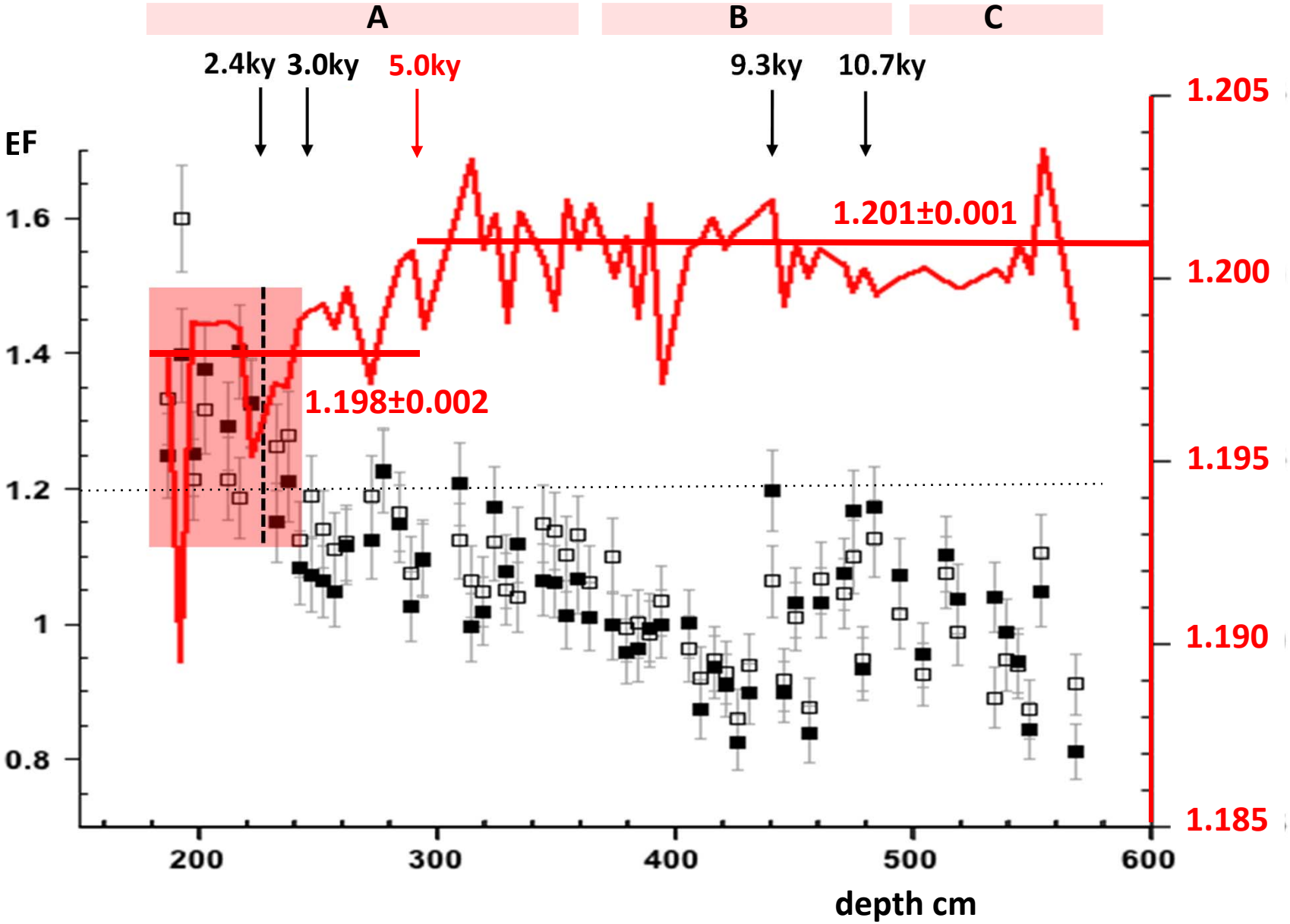


Djamali et al., 2015

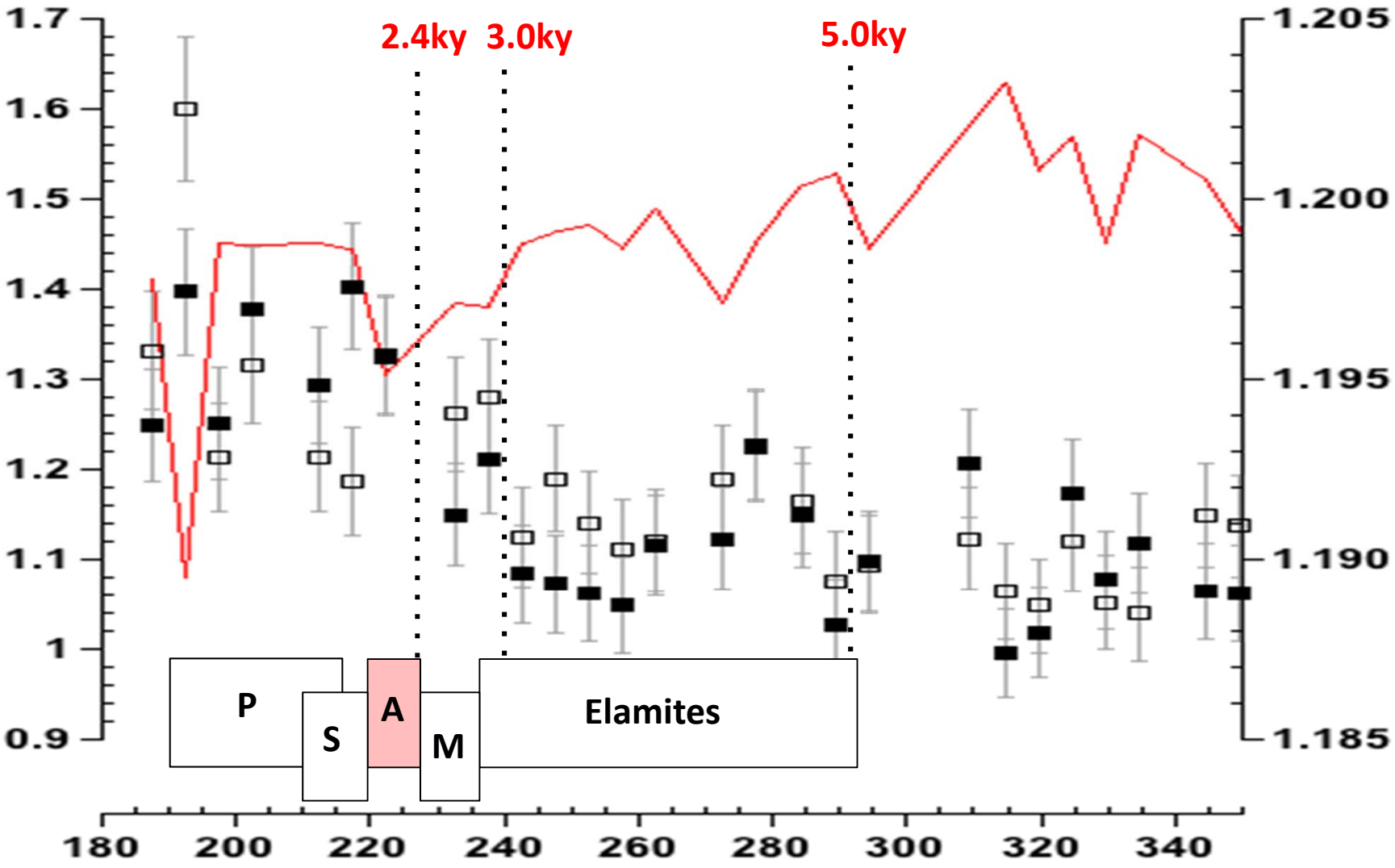
Pb-Cu crustal Enrichment Factors (EF)



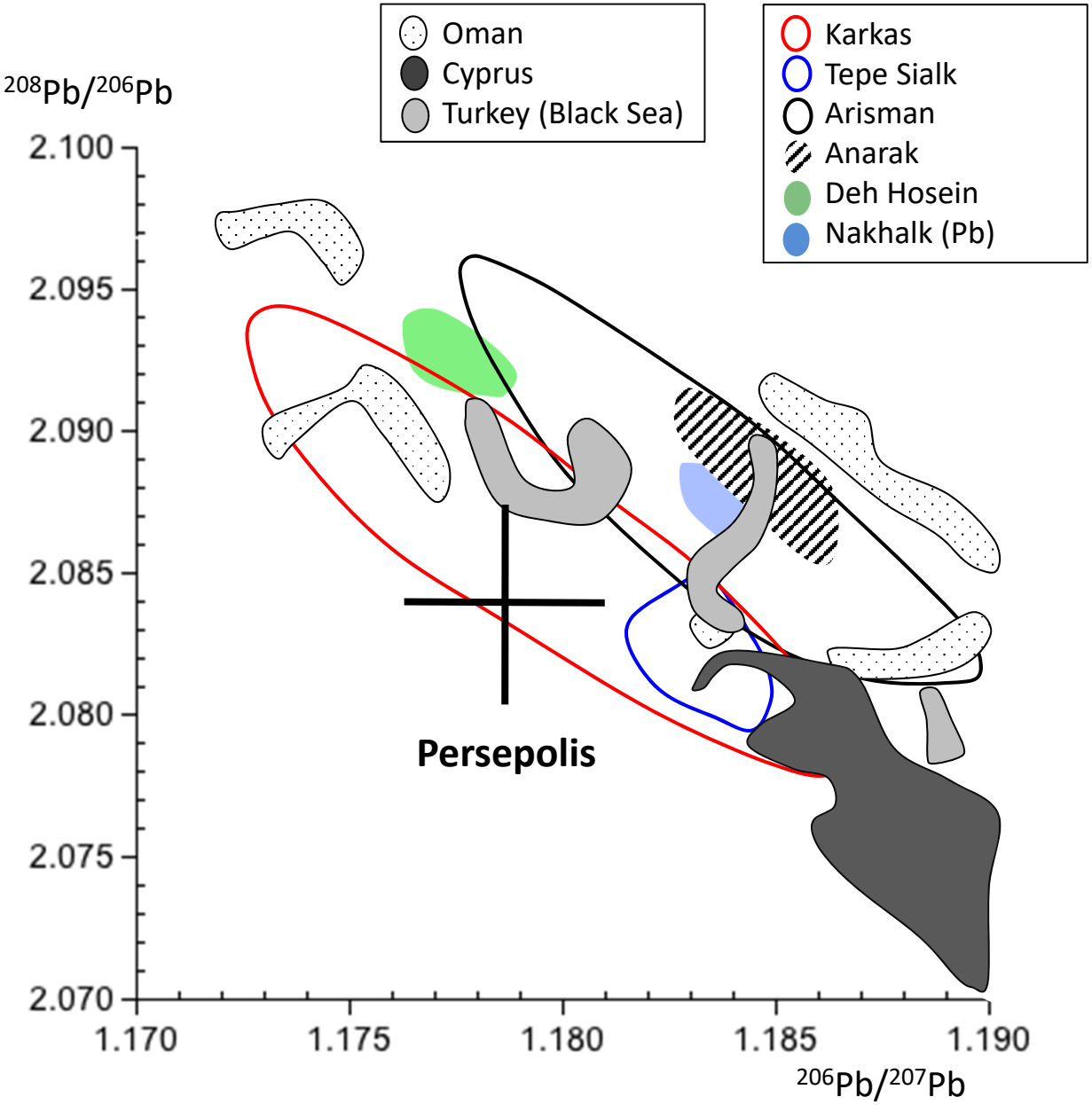
Anthropogenic markers

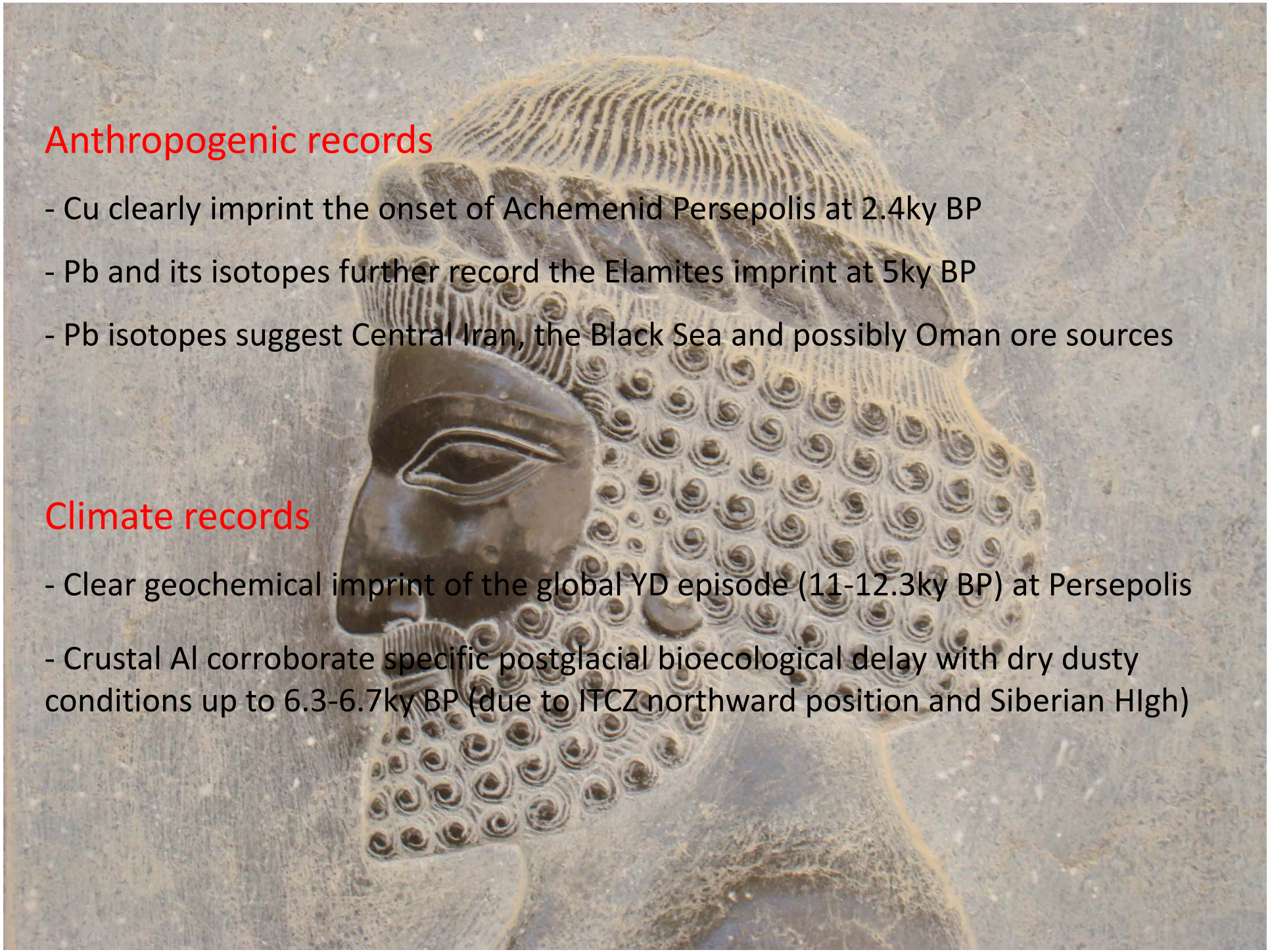


Anthropogenic markers



Pb isotope systematics





Anthropogenic records

- Cu clearly imprint the onset of Achemenid Persepolis at 2.4ky BP

- Pb and its isotopes further record the Elamites imprint at 5ky BP

- Pb isotopes suggest Central Iran, the Black Sea and possibly Oman ore sources

Climate records

- Clear geochemical imprint of the global YD episode (11-12.3ky BP) at Persepolis

- Crustal Al corroborate specific postglacial bioecological delay with dry dusty conditions up to 6.3-6.7ky BP (due to ITCZ northward position and Siberian HIgh)

Veron A., J.L. Hum, M. Djamali. 2017.
Geochemical and paleoecological imprints of metallurgical and climate episodes during the Holocene in Persepolis (SW Iran).
Proceedings of the 9th Internationla Symposium on Ecosystem Behavior, **Biogeomon conference**, Aug. 20-4th 2017, Litomysl, Rep. Tchèque.

Delanghe D., J.J. Hum, A. Veron, C. Claude, A. Sharifi, A. Pourmand, M. Djamali. 2017.
Sedimentological and chemical markers of early Human industries and climate shifts in Persepolis (SW Iran) during the Holocene.
Proceedings of the International Meeting of Sedimentology, Oct. 10-12th 2017, Toulouse, France.

Hum J.J. 2017.
Couplage des marqueurs sédimentologiques et isotopiques de l'occupation humaine et des changements climatiques à l'Holocène dans le bassin de Persepolis, Iran. **Rapport stage Master Set II**, ED251 Aix Marseille Université, 46p.

Points faibles du projet

Modèle d'âge

non linéaire à l'Holocène moyen

Analyses isotopes Nd et Terres Rares

en attente

Récupération d'artéfacts Cu

prévue en juin 2018

Perspectives analytiques...

Isotopes du néodyme sur périodes climatiques clefs

collaboration K. Tachikawa (CEREGE)

Isotopes du cuivre sur périodes anthropisées

collaboration Z. Fekiakova (CEREGE)

Analyses ^{14}C

collaboration A. Sharifi (Univ. Miami)

Points forts du projet

Contribution de l'équipe de sédimentologie

- taille des grains et morphologie des quartz
- Teneurs matière organique

Aspect transdisciplinaire unique sur Zagros:

- profils complets en métaux et isotopes Pb, Sr
- consistance avec données palynologiques régionales…
- … et données sédimentologiques

Mise en place et consolidation de collaboration

- avec des équipes Iraniennes (Iranian National Institute for Oceanography and Atmospheric Science; Musée National d'Antiquité de Téhéran)
- palynologie, sédimentologie, géochimie sur un autre projet

Projets : programmes et thèses

Soumission d'un projet NERC (février 2018)

"At the crossroads of civilization: multidisciplinary palaeoenvironmental perspectives on the making, rise and fall of complex societies in southern Persia"
(N. Marriner CNRS Chrono-environnement)

Préparation de projet ANR

"Approche paléo-environnementale de l'émergence et du développement du commerce des métaux en Asie occidentale (période Sassanide)"
(A. Véron CNRS CEREGE)

Projet CNRS

"Sensibilité des géosystèmes montagnards aux pratiques agricoles, minières et aux changements climatiques en Asie du Sud-Ouest"
(E. Brisset, classée section 31 en 2018)

Thèse AMU (début oct. 2017)

"Géoarchéologie des ports antiques des rives nord du Golfe Persique (Iran)"
(M. Pourkerman)