

The Middle Eastern Heritage of the Petroleum Industry: The Archaeology of Bitumen*

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Abstract

The Near East has always been an important supplier of petroleum as early as the late 19th century A.D. As soon as petroleum was hit in Masjid-I Suleiman in 1908, Iran became one of the major exporting countries. It is now estimated that Iran holds about 10% of the world's proven reserves of oil with new discoveries still being made. But the export of Iranian petroleum-related products is by no means a 20th century novelty, archaeological research has identified a flourishing ancient bitumen-industry from the Bronze Age (ca. 2000 B.C.) onwards. Bitumen is a material very closely related to petroleum and quite indigenous to the Near East. It has long been applied by mankind for various purposes, especially in areas where bitumen naturally surfaces. Archaeological fieldwork combined with chemical studies (mainly EA-IRMS and GC-MS) has been used from the eighties onwards to analyze bitumen and consequently determining interregional networks and human spheres of influence and trade. This specific field of study makes it possible to define the first real 'industry' in petroleum; i.e. the deliberate overexploitation and interregional export of hydrocarbon-matter. This talk will focus on the close connection and interactions between geochemical sciences and archaeology; how advances from the former have helped shape the latter and contributed not only to our understanding of the history of mankind, but also of that of the petroleum industry and its heritage. We will cover the history of this field of study, the most commonly used techniques, the challenges we encounter, and future technological perspectives. We will also focus on the results that have been booked in this field over the last decennia, and how we may define southwest-Iran as the first-ever region creating and supporting an industry in petroleum-related products.

The Middle Eastern Heritage of the Petroleum Industry

The Archaeology of Bitumen



- 1908
- Masjid-i Suleiman (Iran)
- Anglo-Persian Oil company



Petroleum industry: Today



Petroleum industry: **Antiquity**





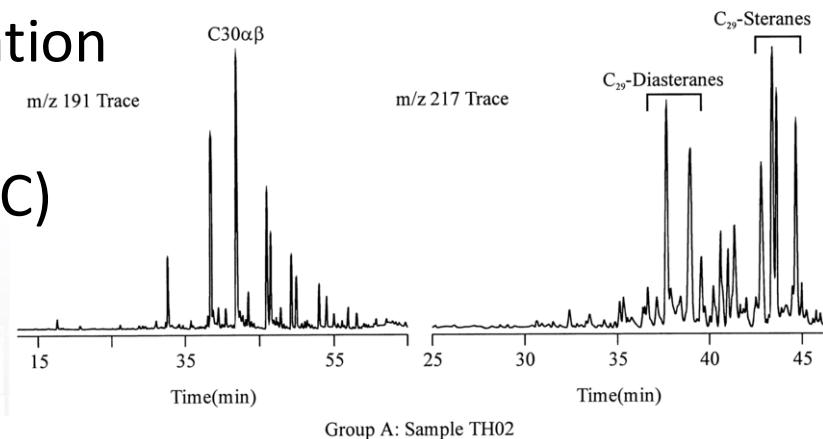
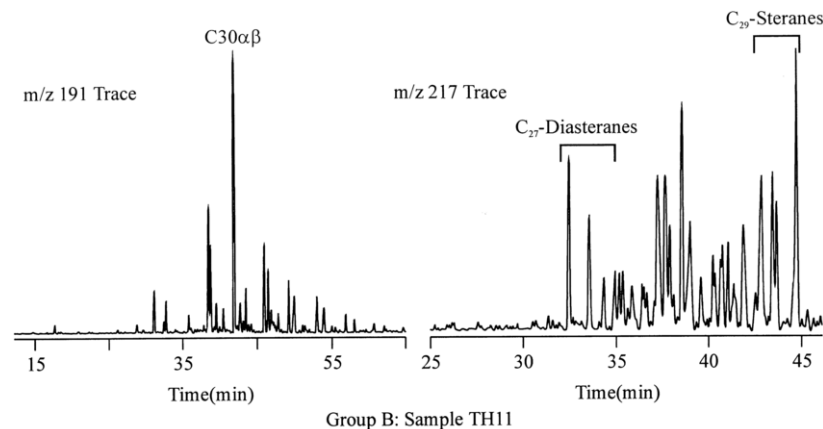


Archaeological Sciences

“The application of scientific techniques to the analysis of archaeological materials”

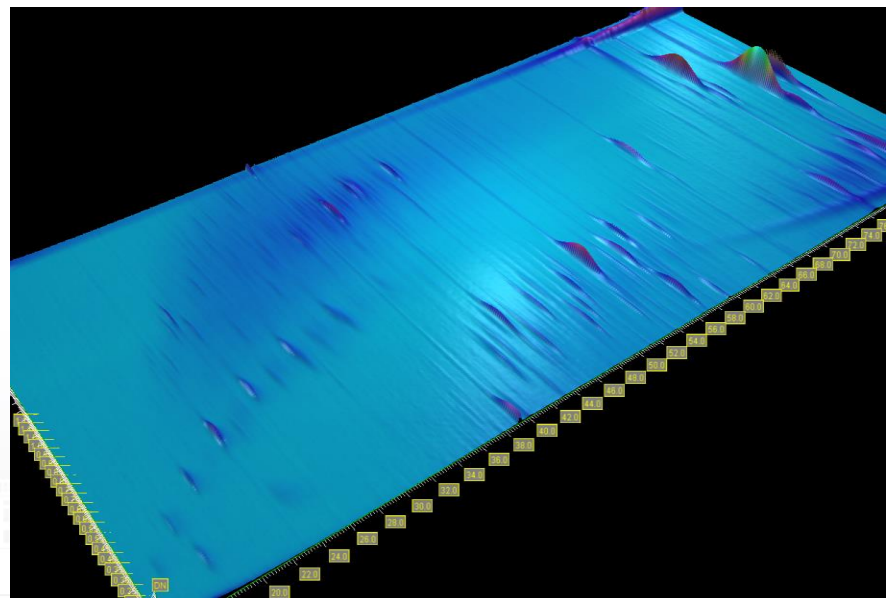
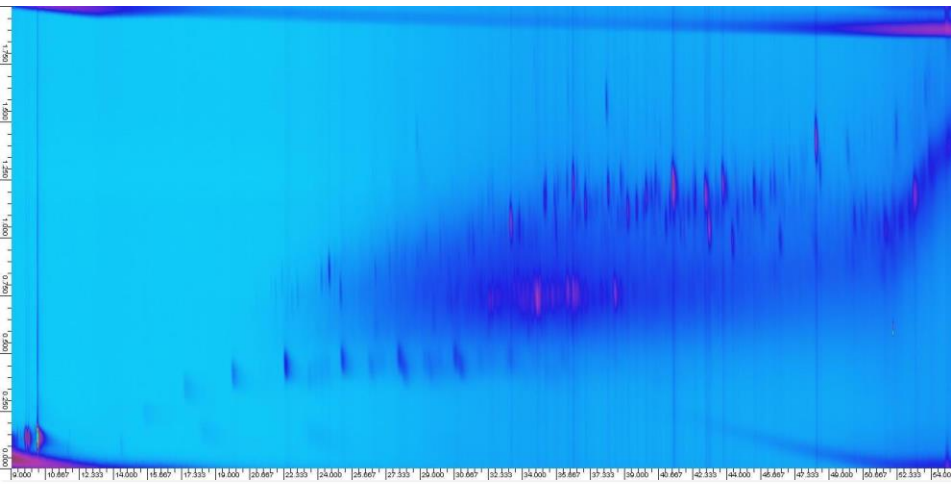
Fingerprinting:

- Hydrocarbon identification/quantification
 - GC-MS
- Stable Carbon Isotope Analysis ($^{12}\text{C}/^{13}\text{C}$)
 - EA-IRMS



Archaeological Project:

- Characterizing the ancient **bitumen industry**
- Development of separation techniques and methods for specific compound-identification



INDUSTRY

“A particular form or branch of economic or commercial activity.”

“An activity or domain in which a great deal of time or effort is expended.”

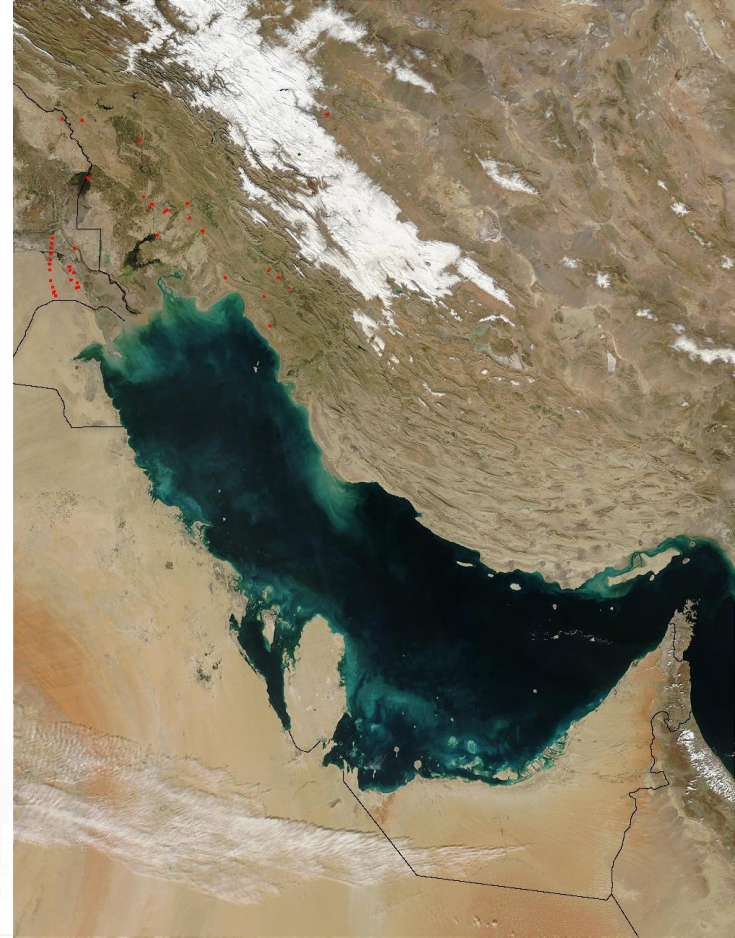
INDUSTRIAL-SCALE

*“Or or on a scale suitable, intended, or necessary for industrial use;
(hence also) large-scale”*

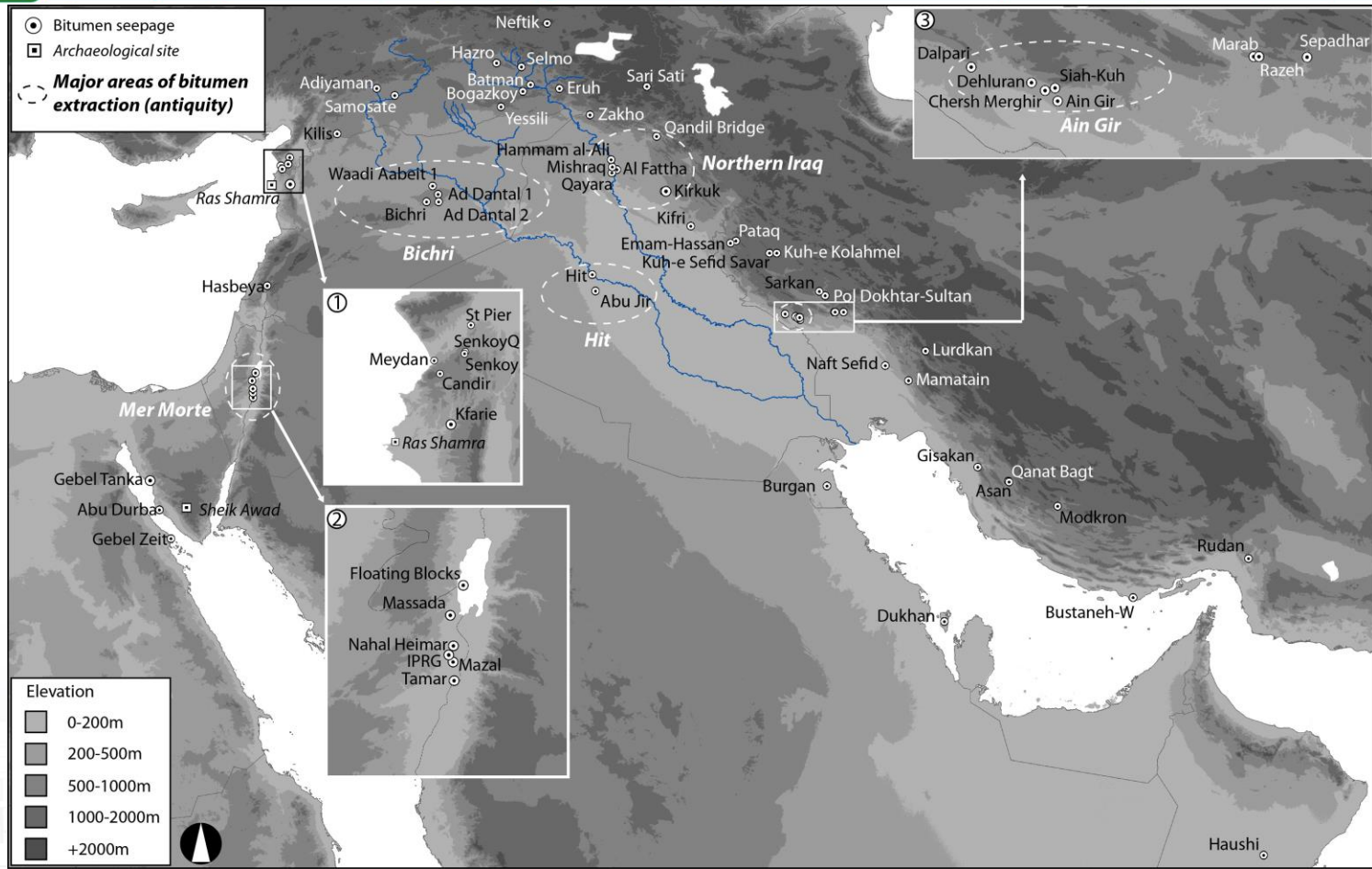


The Gulf as a case-study

- Quasi no seepages used => import
- Crossroads of civilizations
- Constant changing of cultural complex
- Exchange of other materials

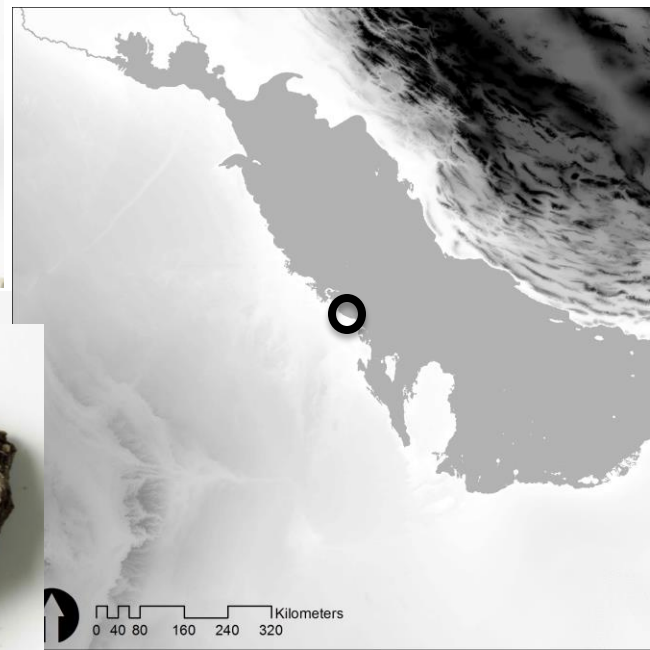


Seepages:



Dosariyah – Arabian Neolithic

Ca. 4000 – 3800 B.C.

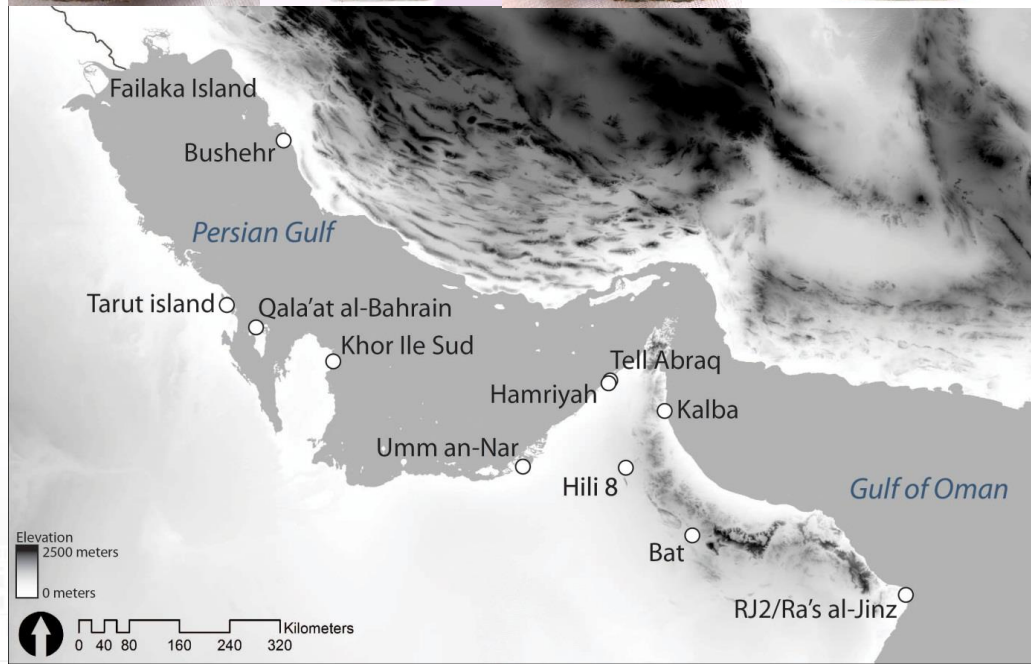


4th millennium B.C.

- No bitumen
- No interregional contacts

3rd millennium B.C.

- Intensive contacts
- Large-scale copper export
- Bitumen sporadic (coastal)
- Northern Iraqi material
- Related to shipping?

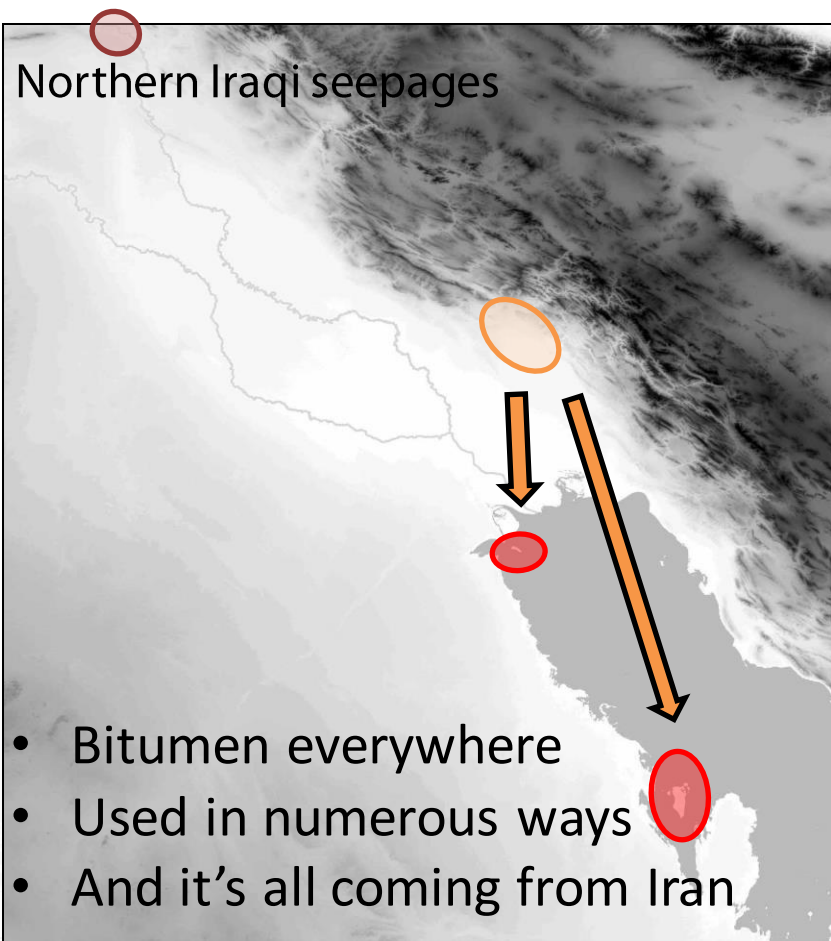




Bahraini Burial Field



2000 B.C. and later on...



- Bitumen everywhere
- Used in numerous ways
- And it's all coming from Iran

Conclusions

- Tools & methods for oil-spill analysis on archaeological materials
- First long-distance trade in petroleum-related products: 6000 years ago
- From a by-product to an industry (ca. 2000 B.C.)