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Stratigraphic Study of the Surface from Middle to Upper Eocene Dammam Formation, United Arab Emirates

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Preface

This presentation is a part of research project entitled "**Stratigraphic study of the surface Middle to Upper Eocene Dammam Formation, United Arab Emirates**" done by undergraduate students:

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Supervised by:

(Dr. Osman Abdelghany and Dr. Mahmoud Abu Saima)

ntroduction

The Dammam Formation was originally described from the Dammam Dome in Saudi Arabia.

It is widely exposed throughout large areas of southern Iraq, Kuwait, Saudi Arabia, Qatar, UAE and Oman. It is exposed in various localities throughout the UAE.

The Dammam Formation consists of a sequence of shallow water shelf carbonates interbedded with marls.

Objectives

The objectives of the study is to do a Lithostratigraphic and biostratigraphic correlation to the assigned outcrops,

To recognize features to examine Dammam Fm. as groundwater aquifer and as a petroleum reservoir.

Geologic Background

- Jabal Hafit Localities (Al Ain)

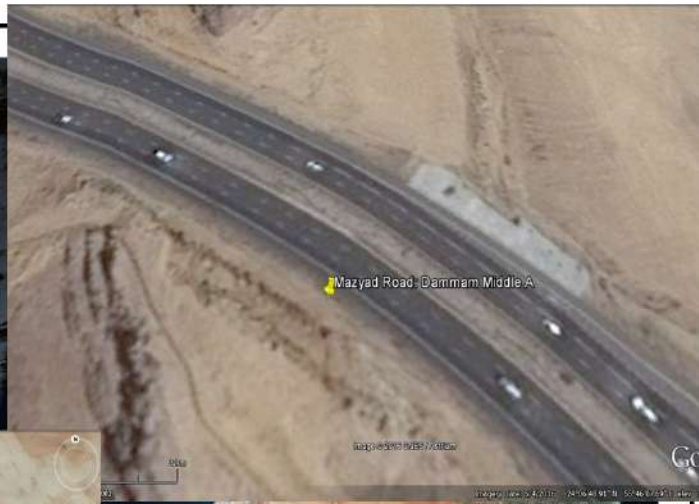
Jabal Hafit has the most complete sequence for studying Eocene and Oligocene rocks in the UAE. Lays southeast of Al Ain city. Jabal Hafit contains exposed sequence of Rus Fm., Dammam Fm. and Asmari Fm.

- Al Faya Range Mt's. (Al Faya)

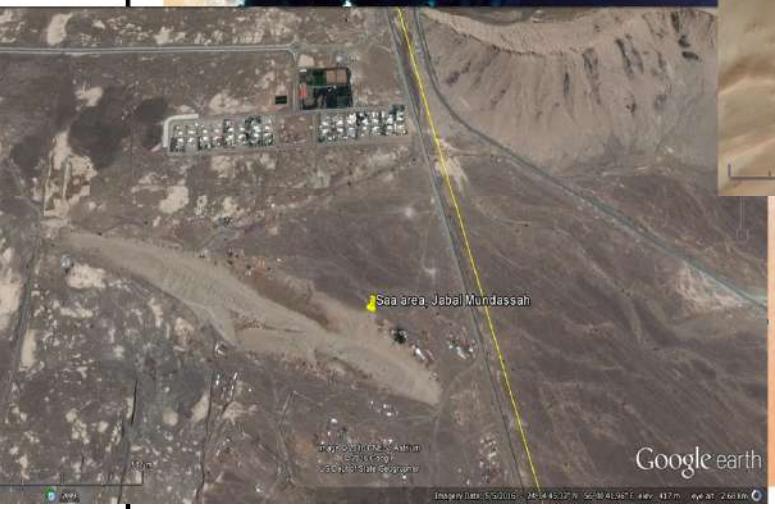
Belongs to a group of regional ridges formed by the folding of the Upper Cretaceous to Lower Tertiary sedimentary rocks exposed along the western margin of the Northern Oman Mountains.

Study Area

Cement RA, J. Hafit, Al Ain



J. Hafit Area, Al Ain



J. Buhays (North), Al Faya

J. Mundassah, Al Ain

J. Buhays (West), Al Faya

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Methodology

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Field Work

20 rock samples were collected from the elected localities of Dammam Fm. in Al Ain (J. Hafit, J. Malaqet & Mundassah) and Al Faya Range Mt's. (J. Buhays & J. Al Aqabah) alongside some Benthic fossils like *Asterocyclina pentagonalis*, *Discocyclina* sp. and *Nummulites* sp.) precisely located by GPS coordinates.

Lab Analysis (Sample Preparation)

The collected rock samples were crushed and grinded for washing to eliminate the unwanted grain sizes, using standard techniques for the extraction of microfossils.

The residual coarse sized grains were examined to check if any Benthic fossils are present to be cleaned and placed together with the previously collected Benthic fossils from the field

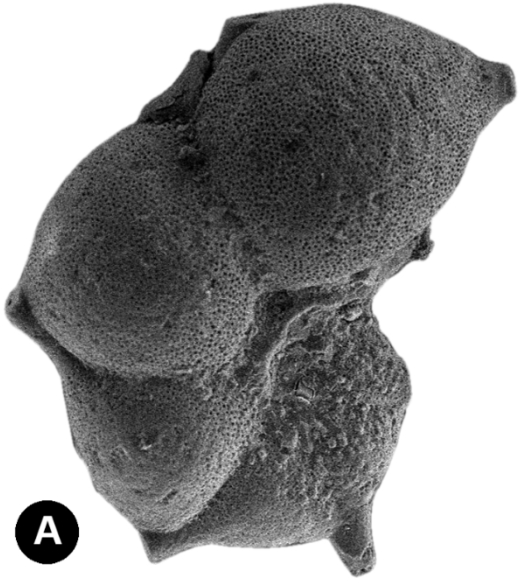
Lab Analysis (Fossils Picking)

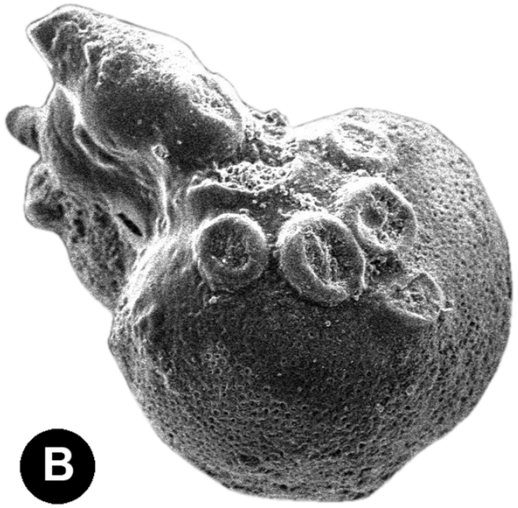
Macro-fossils were easily collected however, micro-fossils required sample processing in order to liberate them from rock samples. For this purpose, some washed crushed rock samples were dispersed on a brass tray under a binocular microscope. Identified index fossils were collected for SEM imaging followed by assessment of the fossils for age determination. The picked fossils were prepared for SEM to image them.

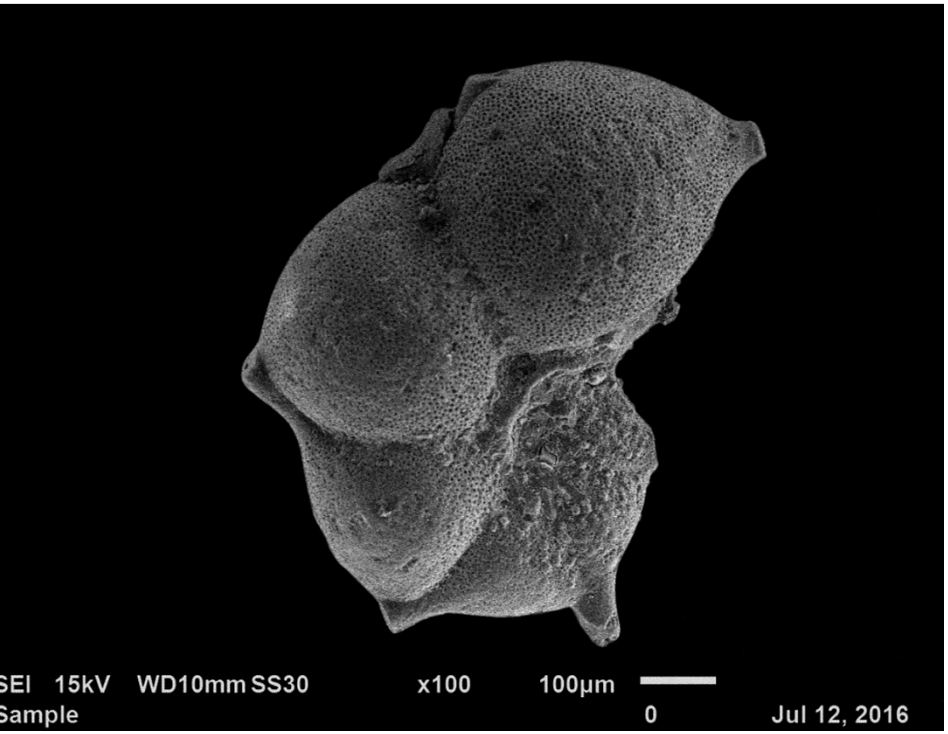
Results

Age Determination

Based on the identified *Hantkenina longispina* (A) *Cribrohantkenina inflata* (B), and larger foraminifera Nummulites sp. (C) the Dammam Formation was deposited within the Middle to Upper Eocene.

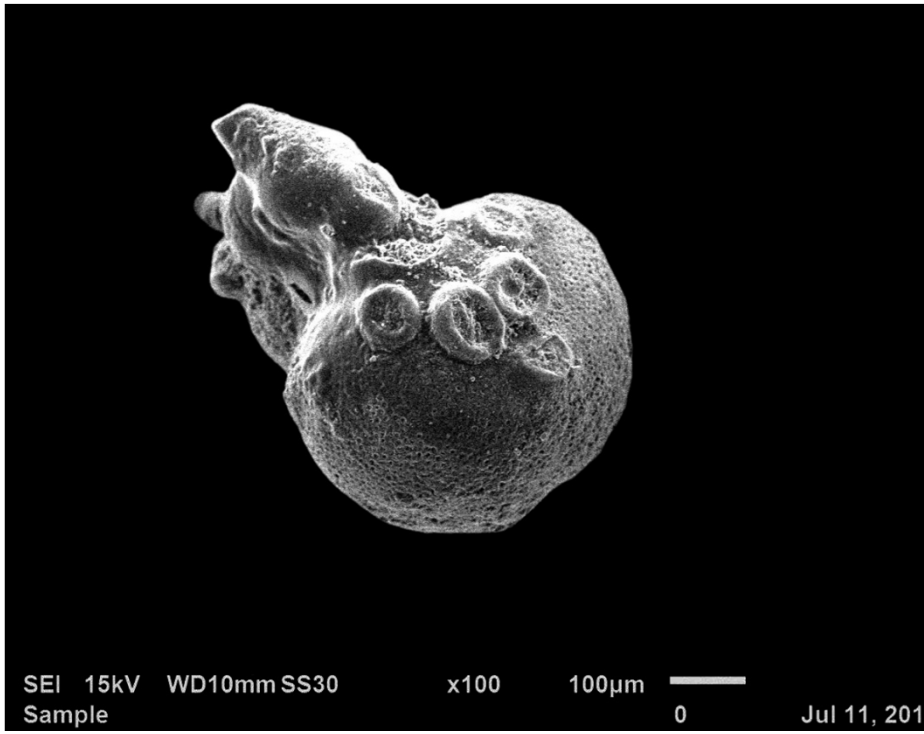






Hantkenina longispina

Middle to Late Eocene



Cribrohantkenina inflate

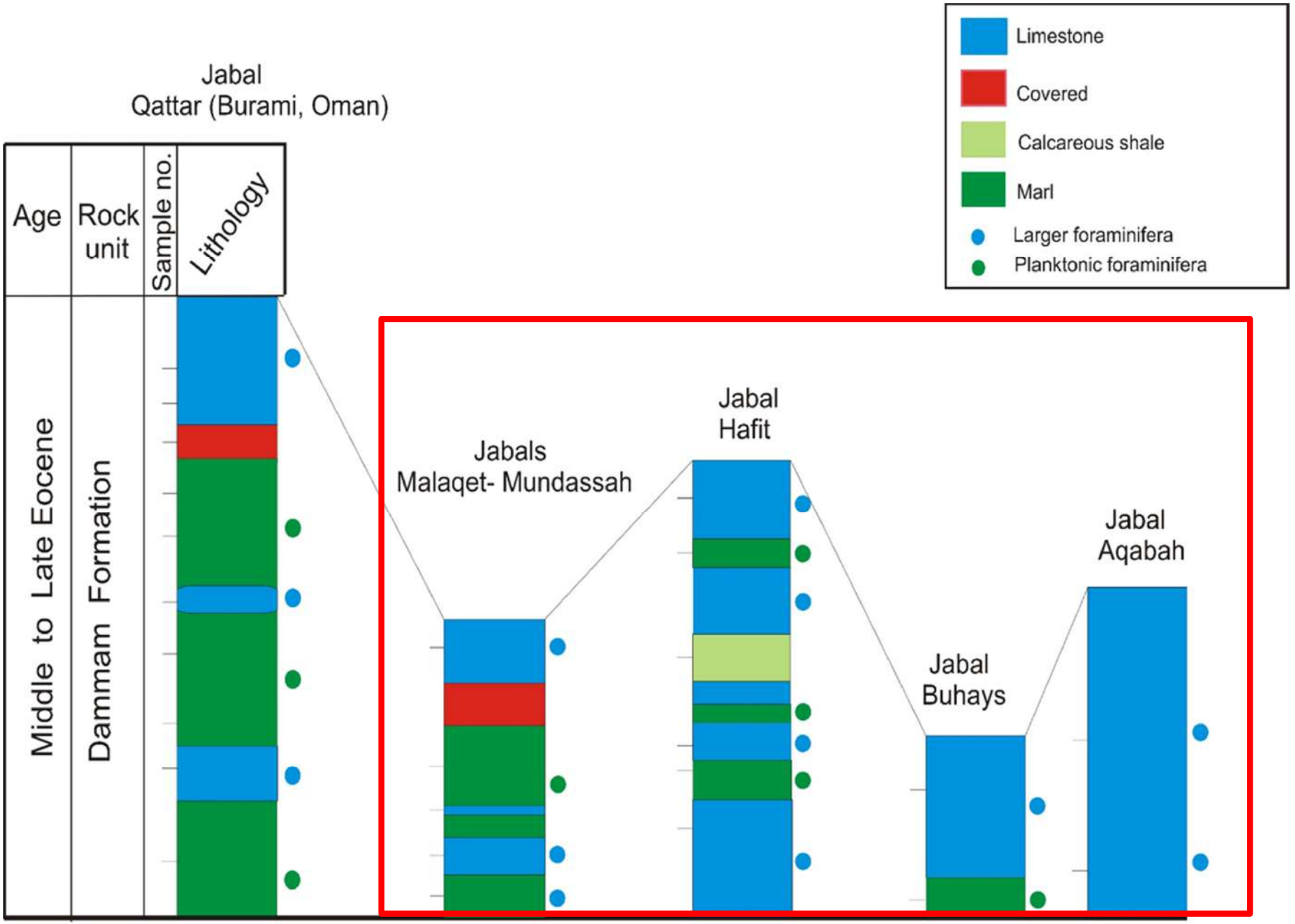
Late Eocene

Paleo-environment

- Nearly Vertical Beds
- Limestone Layers interbedded with Marl, with lots of Gypsum veins through them
- Areas with numerous amount of Nummulites followed by a break in the distribution, followed back by a swarm of Nummulites.
- Various sizes of Nummulites concentrated in certain areas.

Paleo-environment

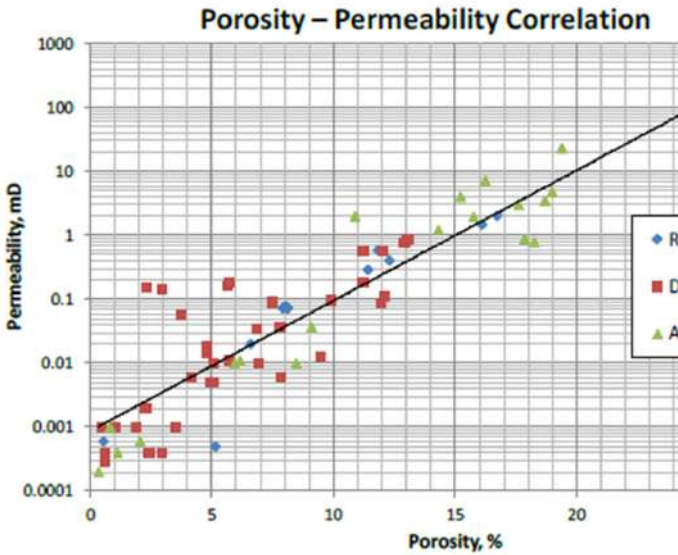
- Exposed Limestone Breccia at the end of the Jabal Hafit outcrop
- Concentration of molluscs, calcareous algae and colonial corals, shows that Dammam Fm. was deposited in a marine inner shelf environments



Stratigraphy of the studied sections showing the occurrence of the identified foraminifera species (Based on Abdelghany, 2002), (not to scale).

As Groundwater Aquifer & Petroleum Reservoir

- Past Studies Prove Dammam Fm. to Have relatively Moderate Porosity
- Dammam Fm. Shows good secondary Porosity due to the processes of diageneses such as chemical dissolution
- a grey dolomitic limestone from this formation, at Jabal Mundassah, was found to contain conspicuous cavities (2-3 cm in diameter and 4 cm depth)



Petrophysical Study of UAE Carbonates
Anita Bhagati, and Carl Sondergeld August 27, 2012, A

grey dolomitic limestone with cavity

Conclusion

- Micro-sized and Large forams were recovered alongside large benthic (*Asterocyclina pentagonalis*)
- The Fossils occurrences indicate deposition in a warm shall marine inner shelf environment.
- The cavities found demonstrate a diagenetic aspect of porosity enhancement in carbonate rocks. These cavities may also grow and interconnect to affect the permeabilit of the carbonate rocks.
- The age for the Dammam in the study area is found to be Middle to Late Eocene.

Recommendations

- More Detailed study supported by deep analysis to the same localities
- Expanding the study to more Dammam Fm. Localities around the country and neighbor countries
- Detailed petrophysical Analysis to Dammam Fm.'s Different Lithological Unites to prove porosity results
- Subjecting more collected fossils (e.g. Nummulites Sp. and *Asterocyclina pentagonalis*) to thin sections and laboratory studies, for possibility of discovering new species within the formation

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thank you
gracias
danke
謝謝
ngiyabonga
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рахмат
Баярлалаа
спасибо
faafetai lava
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