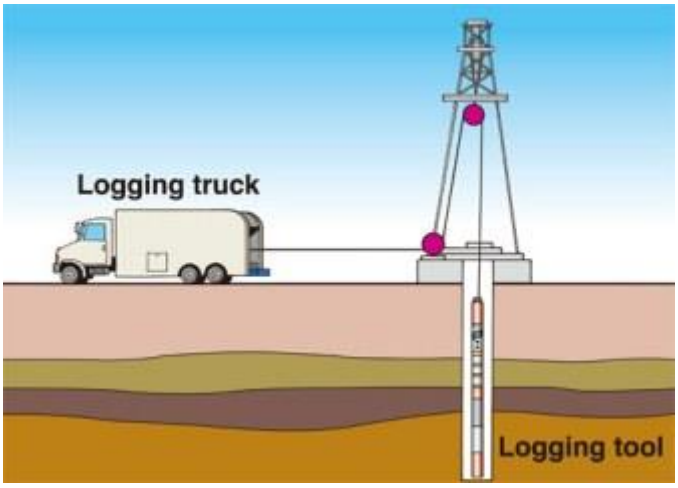

Well logging Case Study

DEFINITION AND SCOPE OF WORK

Winter Semester | GPC510 | 2023-24

Introduction

Hello everyone! Welcome to Well Logging course unit (GPC510). Myself Partha Pratim Mandal, your course instructor. My specialization is experimental petrophysics, rock mechanics, geomechanical modelling, and rock physics. I will meet you over next 13 weeks during tutorial session. It is important to follow the tutorial session every week to understand the practical concept which will benefit you in long term for large scale data analysis/petrophysics/reservoir characterization. I will be available for online discussion after the class. Either python programming or Matlab skills are essential to complete the task.

Regarding the case study please follow the below instructions

The aim of this exercise is to complete basic analysis of a well located in the NWS, Western Australia. You need to download digital log dataset, formation tops, and well completion report. Your interpretation should be focused within a target formation named Brewster member within Upper Vulcan formation as outlined in Figure 1. Each group is assigned a particular well. Choose the correct well name for analysis supplied in short form.

Link to download all information of Ichthys_West_1 (**IW1**), Ichthys_Deep_1 (**ID1**), Ichthys_2AST2 (**I2A**), Gorgonichthys-1 (**G1**) well:

https://wapims.dmp.wa.gov.au/WAPIMS/

Additional information can be downloaded or requested to commonwealth website:

https://nopims.dmp.wa.gov.au/nopims

1. Propose necessary instrumentation requirement to design a sonic tool if department want to build.
2. Perform quality control of wireline logs and marked obvious outlier in the basic well logs.
3. Calculate total porosity from the density and neutron combination and mark the zone with highest porosity.
4. Plot velocity depth profile (compressional and shear) colour coded with porosity.
5. Calculate water saturation (S_w) with Archie's method and generate reservoir flag where volume of shale, V_{sh} <= 0.4 and S_w <= 0.65.
6. Report total porosity, water saturation, and V_{sh} with standard deviation of the reservoir zone.

Geology and well information

The Ichthys gas-condensate field is located in the Browse basin, North West Shelf, Australia with water depth ranging from ~200m to 400 m. This field consists of a ~600 km2 anticline structure. Produced gas and condensate will be brought to an onshore liquefied natural gas (LNG) plant in Darwin through a ~890 km long subsea pipeline. The Brewster Member of the Early Cretaceous Upper Vulcan Formation is one of the main reservoirs in this field (Figure 1). The Brewster Member consists mainly

of thick bedded, massive sandstone (quartz arenite) with a very high net-to-gross (NTG >90%) sand ratio (Syed et al., 2018).

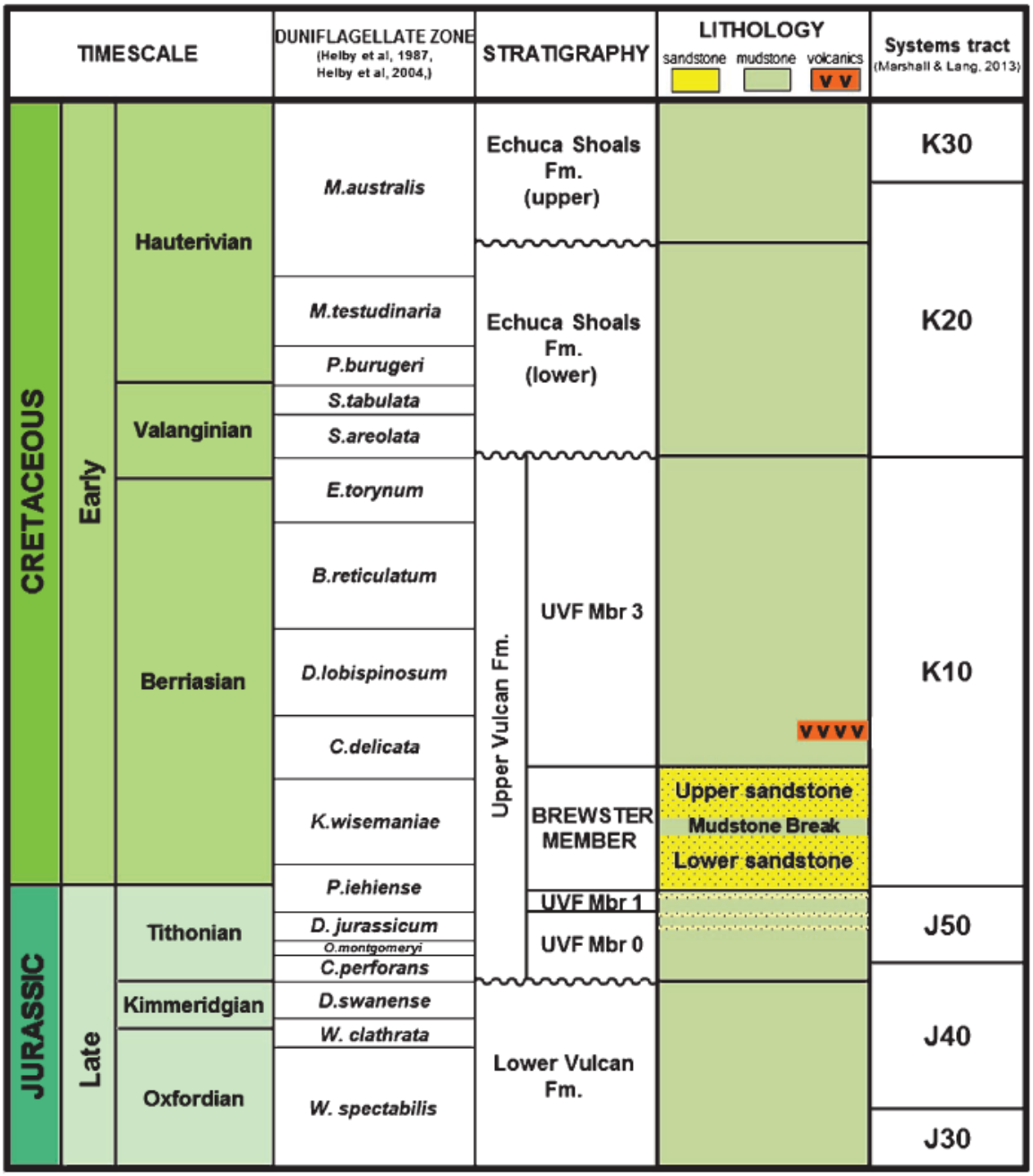

Figure 1 Generalized stratigraphy of the Ichthys field (Arsalan et al., 2017).

The reported exploration wells were drilled in the Exploration Permit WA-285-P on the Northwest Shelf. The wells are in the central part of the Browse Basin, about 420 km north-northeast of Broome (Figure 2).

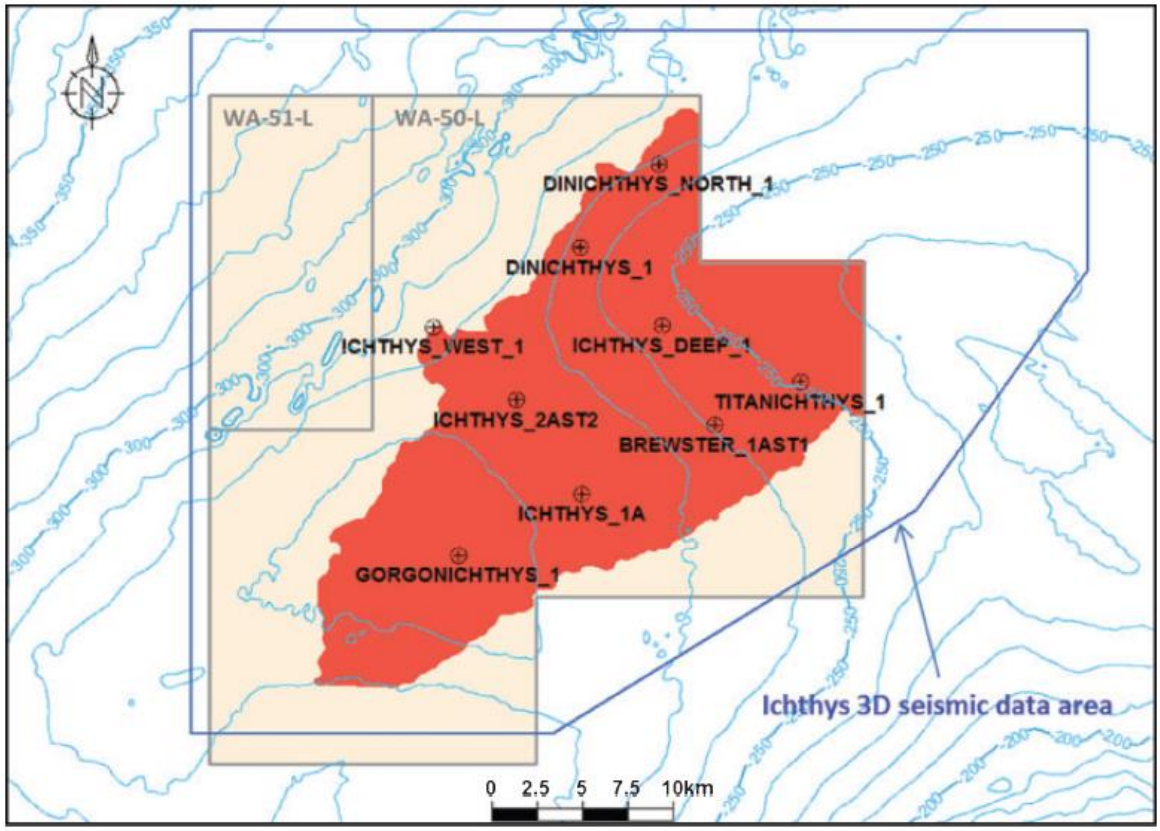

Figure 2 Ichthys filed 3D seismic contour and drilled well location (Arsalan et al., 2017).

References

Arsalan, S. I., Ichizawa, K., & Furuya, K. (2017). Visualisation of geomorphological features and interpretation of the depositional system of the Brewster Member, Ichthys Field. *The APPEA Journal, 57*(1), 288-300.

DMIRS (2019). Petroleum and Geothermal Information (WAPIMS). https://www.dmp.wa.gov.au/Petroleum-and-Geothermal-1497.aspx.

Webpage: https://www.arab-oil-naturalgas.com/oil-well-logging-books/

Case Study Presentation Guidelines

Each group is required to prepare a professional PowerPoint presentation. The presentation should be 15 minutes in length (each student ~4 minutes) and 5 minutes for QA. All group participants should take an active role in this case study.

Marking scheme for group presentations

Content: (50%)

- Is the group presentation well-organized and interesting?
- Has the group answered the case study questions and presented them clearly?
- Have they given relevant concepts/theories/ideas and knowledge to the questions?

Presentation Style: (25%)

- Is the presentation lively and interesting?
- Is it structured effectively with a clear introduction, results, discussion, and conclusion supported by evidence?
- Have the group shown initiative and creativity in the design of the presentation?
- How well do the presenters present themselves? Voice projection, eye contact, confident delivery, and interactions?
- How well prepared are the group to answer or pose questions that are relevant to the topic?

Group skills: (25%)

- Is the presentation clearly an integrated group effort as opposed to individual contributions?
- How well have they co-ordinated their activity and planned their presentation?

Marking of the presentation

Marking total -20	Content - 10	Presentation style - 5	Group skills - 5
Group-1			
Group-2			
Group-3			
Group-4			
Group-5			
Group-6			
Group-7			