

# Seeing the (seismically) invisible in outcrops: faults, fracture corridors and distributed fractures

A 1-day excursion led by G. Bertotti (Delft University of Technology) and R. Lazar (GeomodL International)



Figure 1 – Approaching the outcrops of the excursion, enjoy!

The excursion will take place in the foothills of the Northern Emirates Mountains where the lack of vegetation and recent tectonics allow for the exposure of excellent outcrops (Figure 1)! The Northern Emirates Mountains are a mainly Tertiary fold-and-thrust belt associated with the collision between the Arabian and the Eurasian plates (Figure 2). The outcrops we will visit are located only a few kilometres away from the Resort where the NFR workshop will take place.

The main topic of the excursion will be fracture corridors, faults and distributed fractures and how these are implemented in geomodelling workflows. Faults, fracture corridors and distributed fractures play a key role in reservoir studies and management. In seismic data, faults and fracture corridors are essentially characterized by ..... an interruption of horizons and, therefore, absence of data. This implies that no information can be gathered on their thickness and, even less, on their internal architecture. Distributed fractures, typically very thin and with negligible displacement are equally seismically invisible. To populate subsurface geomodels, geoscientists use stochastic and/or geological rules, the latter often based on outcrop information.

Faults are usually built of a damage zone with numerous, low-strain fractures and a fault core. The factors controlling the fault zone thickness, however, are very poorly known and plots are often used

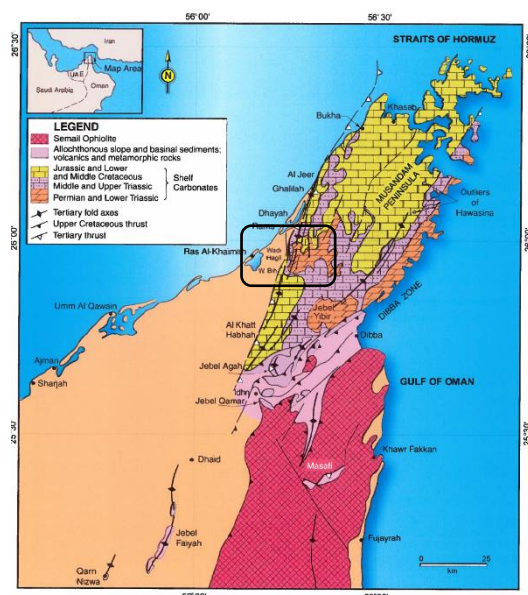


Figure 2 - Geologic map of the excursion area (from Searle, 1983)

relating thickness to fault displacement or length. Resulting relation display large scatter and lack phenomenological justification. The issue of fault thickness is related to the question of where does the transition from the damage zone to the background fracturing take place, that is, to fractures which are genetically unrelated to the fault and are rather associated with far field stresses. Factors controlling the internal architecture of fault zones is even less known and different faults present, for instance, very different structures. *What do the Ras Al Khaimah outcrops tell us about these relations?*

The second question we want to address in the excursion is the impact of the sedimentary architecture on the (vertical) distribution of fractures, fracture corridors and faults. *Are features such as fracture height and fault thickness conditioned by layering and bundles of layers?*

Looking at the high-quality outcrops we will visit in this 1-day excursion we will stimulate discussions and eventually contribute to a better characterization of the subsurface.

### **Logistics**

Given the proximity between the Workshop venue and the outcrops, travelling time will be very limited. In addition, we explicitly chose to visit a limited number of outcrops thereby allowing for ample discussion time! We look forward to your active contribution!

Temperatures in Ras Al Khaimah in February are expected to be mild

Transportation from the Venue to the outcrops will be by busses. Limited walking is foreseen generally in fairly flat plains.