Paper Details	
Id	680
Paper	Organic Geochemistry of Oil and Source Rock Strata in Asmari#2 Well, Dezful Embayment Basin, South-West of Iran
Requested Topic	Petroleum Systems and Basin Analysis
Accepted Topic	Undecided
Keywords	petroleum system, biomarker, source rock, thermal maturity, oil-source rock correlation, isotope
Author	Mr. Ahmad Reza Gandomisani
Co Authors	
Abstract	An oil-source rock correlation is established between produced oil and Jurassic/cretaceous source rocks strata. Overall, the oil data closely match the Jurassic source rock data and are different than the cretaceous source rock data.
Status	Received
Sponsor	National Iranian Oil Company
Presentation Mode Requested	Poster
Presentation Mode Accepted	Undecided
Av Tools	PC
Receipt Date	2010-05-31
Receipt Mode	On line
Hotel Aid	
Travel Aid	
Registration Aid	
Registered	No
Remarks	
Filename	Extended Abstract- Organic geochemistry..doc

AHMAD R GANDOMISANI, Research Department of Petroleum Geology & Geochemistry, National Iranian Oil Company- Exploration Directorate (NIOC.EXP), Tehran, Iran
gandomisani@yahoo.com

Organic Geochemistry of Oil and Source Rock Strata in Asmari#2 Well, Dezful Embayment Basin, South-West of Iran

Summary Objective:
Despite the long history of oil and gas exploration and production, several important issues regarding aspects of the Dezful embayment Basin petroleum system remain unanswered. For example, no oil-source rock correlations have been published, and only minimal organic geochemical analyses have been reported from oil produced in the basin. Additional unconstrained issues in the basin are related to which strata serve as the source rock for the produced hydrocarbons and the thermal maturity of various potential source rock strata. Results of analyses conducted for this study are presented, which bear on some of these issues as they relate to oil. Namely, this study reports the results of geochemical analyses of strata that are possible source rocks for oil (Kazhdumi, Garu and Sargelu; fig.1). Also presented are molecular organic geochemical results and isotopic 13C & Deuterium results from oil, gas and source rock samples, which allow for oil-oil correlations and an oil-source rock correlation. Other new data (vitrinite reflectance, heat flow, etc.) also help to constrain the thermal history of different strata in the basin and, thus, additionally bear on issues related to petroleum system clarification.
An additional objective is to identify the origin of the natural gas in this area on the basis of geochemical and stable isotope data.

Procedures:
Cutting samples suspected of having source potential, based on color or sedimentologic indicators were selected. Encountered fresh samples were sent to Humble Geochemical Services for initial screening, which consisted of TOC (in wt. %) content measurements and Rock-Eval analyses. Based on the initial screening, potential source rocks were chosen for more detailed molecular geochemical analyses. Vitrinite reflectance analyses were also performed at Humble Geochemical Services on 3 samples.

Bitumen within the samples was extracted using a Soxhlet apparatus and a mixture of methanol (66%) and toluene (34%) for 4 hr. Weighed fractions of source rock extract and whole oil were diluted 100_ with hexane and then analyzed via standard (n-C12 and higher) gas chromatography (GC) on a Hewlett-Packard 5890A gas chromatograph. The column was a 22m DB-1 column with an i.d. of 0.20 mm coated with a 0.33 mm methyl silicone film. The remaining fractions of the source rock and bitumen vein extracts, as well as oil samples, were subsequently separated using glass columns with a 10 mL inner diameter filled with silica gel that was flushed with hexane to remove the saturate fraction, followed by a methylene chloride flush to remove the aromatic fraction. Saturate fractions were then treated with high Si/Al ZSM-5 zeolite (‘‘silicalite’’) to remove normal alkanes. All saturate and aromatic fractions were analyzed on a Hewlett-Packard GC–mass selective detector (GC-MSD). Selected ion monitoring of the m/z 191, 217, 218, 231, 259, 245, and 253 was performed.

Two gas samples and six oil/bitumen samples were analyzed geochemically and for their carbon-isotope ratios.

Results and Discussion:

Mesozoic strata and a suite of oil samples from "Asmari#2" well in the Dezful Embayment Basin were studied to determine which strata are source rocks for oil produced in the basin. Analyses included total organic carbon, Rock-Eval pyrolysis (28 samples- Fig.2), vitrinite reflectance (3 samples), and conventional biomarker (8 sample for GC and GCMS-Fig.3) and isotopic analyses on source rock extracts and HC of reservoirs (8 samples- Fig 4). Geochemical and isotope data for gases from the Upper Sargelu and Mus Formations suggest thermogenic gases.

Burial and thermal history models were constructed using PetroMod 1D basin modelling software. Well reports and lithostratigraphic descriptions were used as input data for the conceptual model of this well. Heat was modeled to enter the system at its base (Fig.5)

Results reveal that Jurassic organic-rich marine shale samples appear to be oil prone and mature (Early wet gas Window). Both Lower and Middle Cretaceous samples contain organic matter of sufficient quantity and good quality to be have low thermal maturity (Early Oil Window).

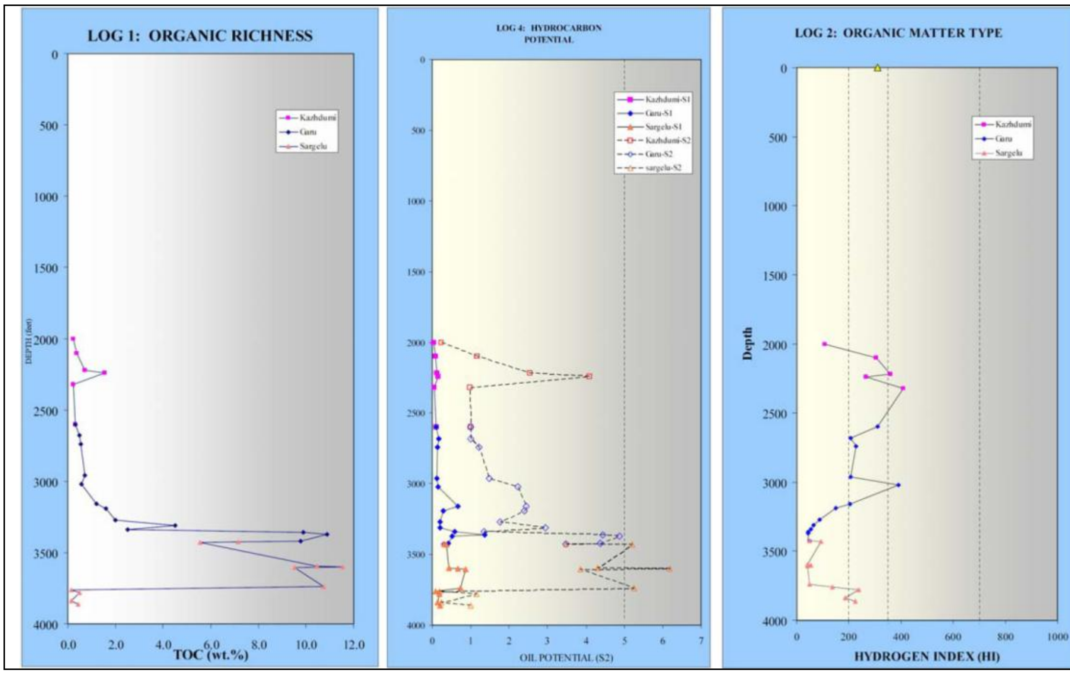
An oil-source rock correlation is established between produced oil and Jurassic/cretaceous source rock strata. Overall, the oil data closely match the Jurassic source rock data and are different than the cretaceous source rock data.

Oil-oil correlations result in the establishment of one genetic family that can be divided into subfamilies based on degree of oxicity in the source environment, differences in thermal maturity, and differences in clay versus carbonate content of the source rock. Although there are differences in the oil samples based on the biomarker results, all oils are grouped into one genetic family.

A bitumen vein is classified as dead-oil solid bitumen using biomarker data. Age-related biomarkers suggest it is derived from a pre-Jurassic source rock. Similar veins in other basins globally are linked to very rich source rocks.

Epoch Sub Epoch	Formation	Thickness (m)	Potential Sorce Rock	Reservoir Rock	Cap Rock
Maastrichtian					
Campanian	Gurpi	195			
Santonian	Ilam	60			
Coniacian					
Toronian					
Cinomanian	Sarvak	950			
Albian	Kazhdumi	280			
Aptian	Darian	330			
Neocomian	Garau	935			
Upper Jurassic	Gotnia	310			
Middle Jurassic	Sargelu	180			
Lower Jurassic	Alan/Mus/Adaiyah	150			
Triassic	Dashtak	TD			

Fig.1- possible source rocks



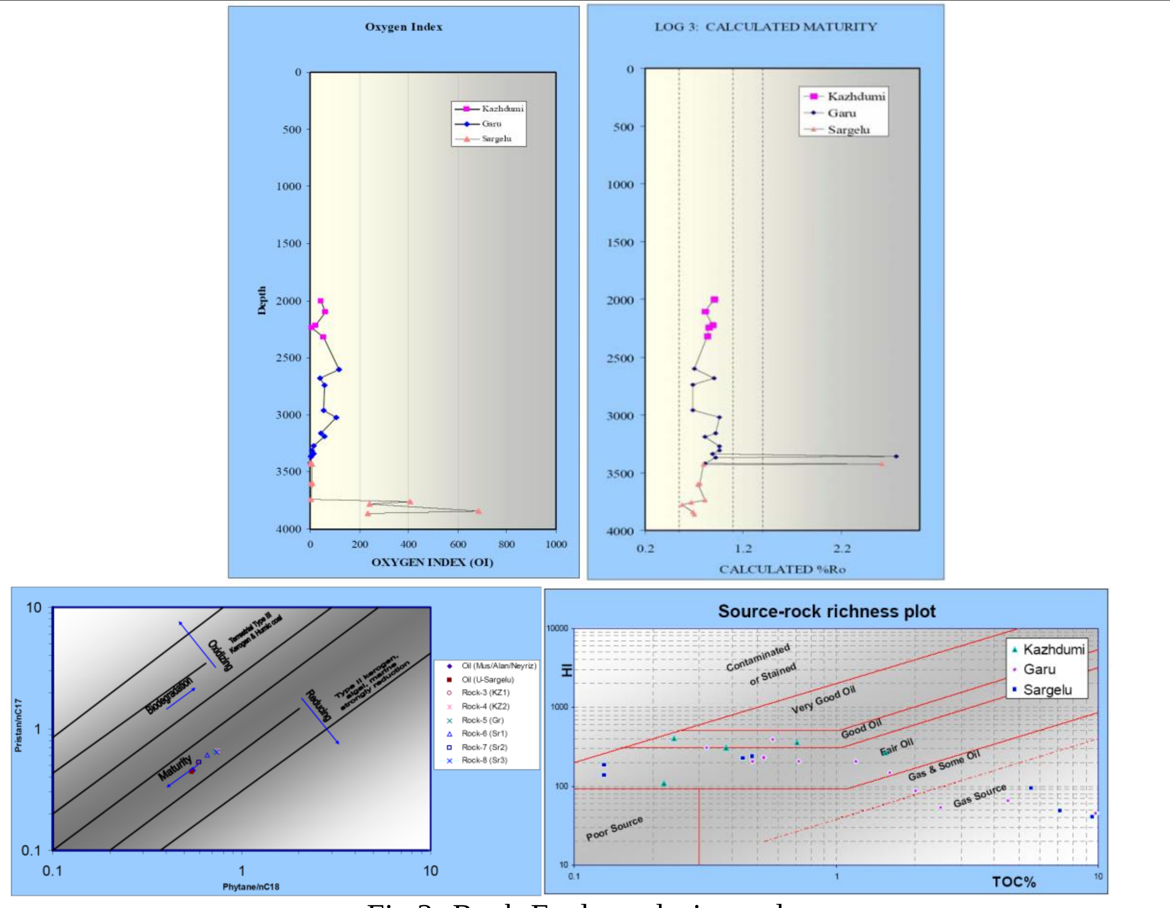
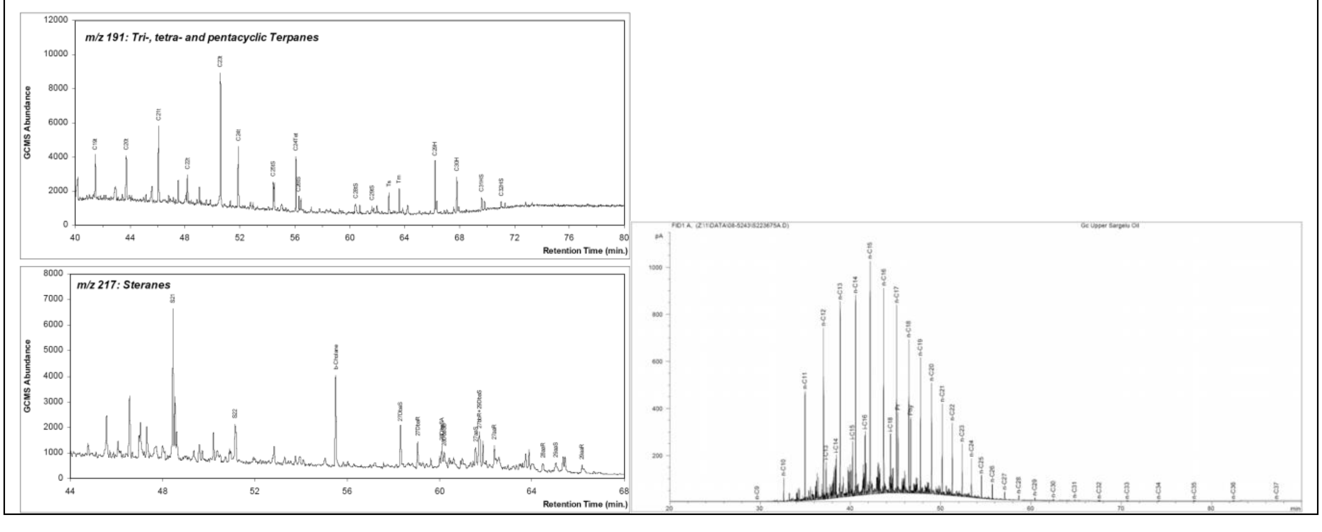


Fig.2- Rock-Eval pyrolysis results



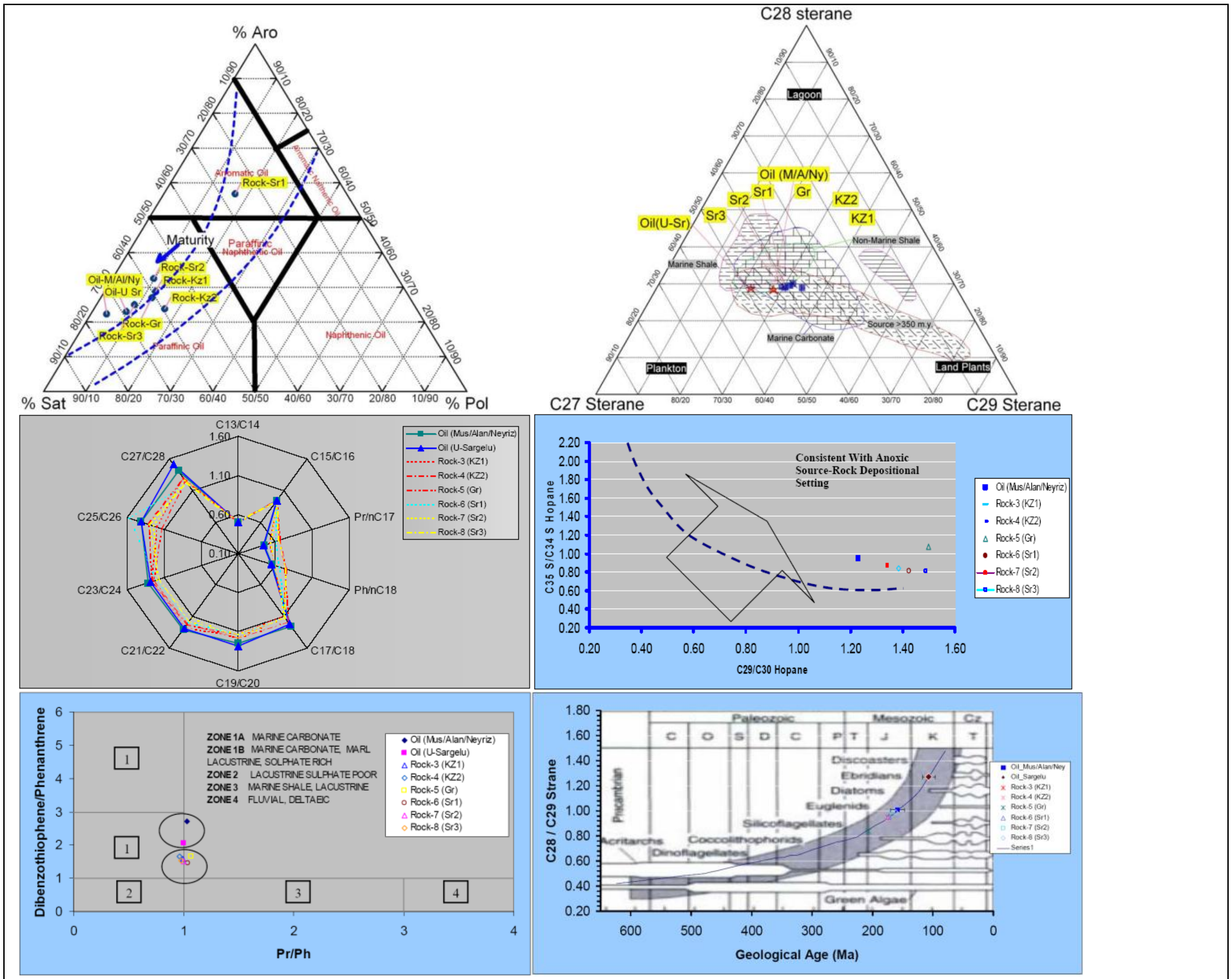
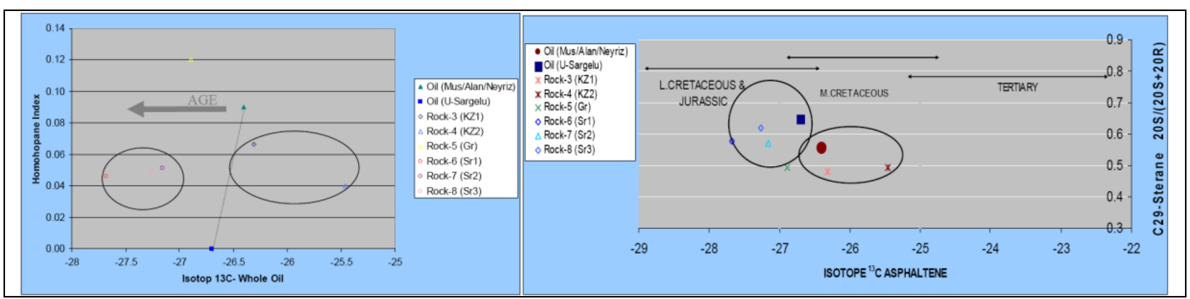


Fig.3- GC & GCMS results



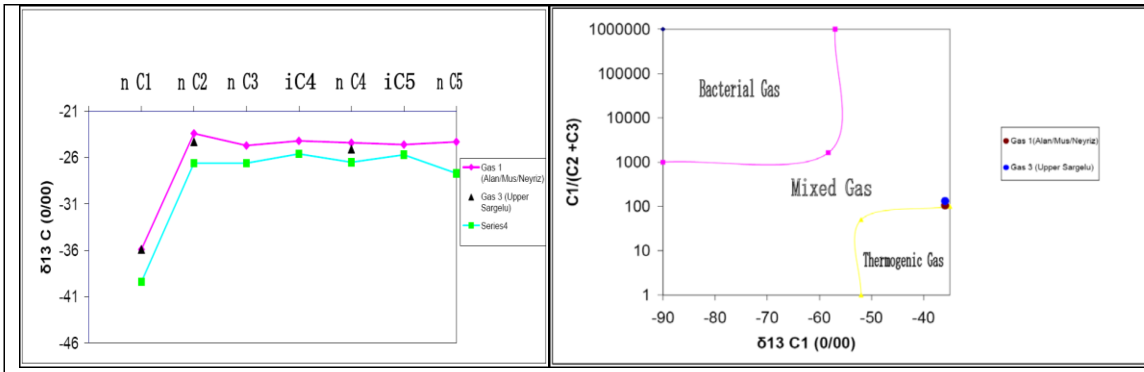


Fig.4- Isotope results

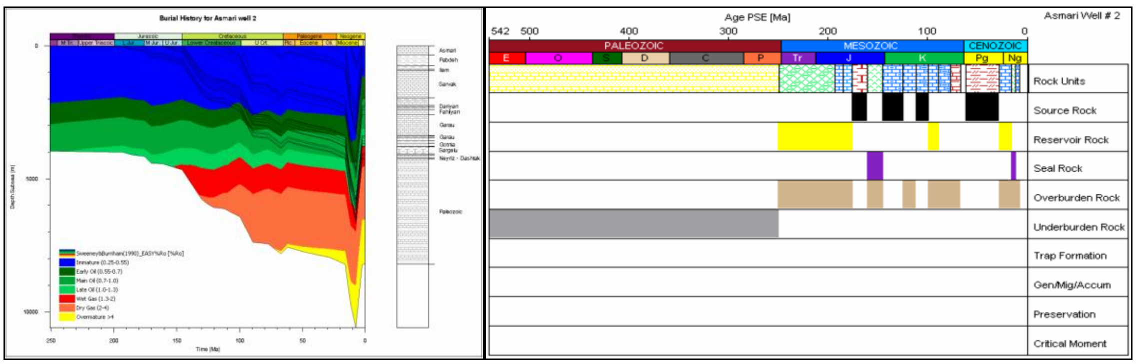


Fig.5- Burial and thermal history modeling results