GEOS4 GmbH · Peter-Huchel-Chaussee 88 · 14552 Michendorf · Germany

FIRST ANNOUNCEMENT

GEOS4 partnership with GFZ on Retention and Transport

GEOS4 GmbH
Peter-Huchel-Chaussee 88
14552 Michendorf · Germany

Phone +49 (0)331.288 17 80
Fax +49 (0)331.288 17 82

info@geos4.com
www.geos4.com

1st October, 2017

PROJECT OPEN FOR SPONSORSHIP IN 2018

We are very proud to offer this highly topical project for co-sponsorship in 2018:

Quick Bound Biomarkers (QBB)

- *2-years duration*
- *To be co-sponsored at 35k€ per year*
- *Discounted at 99k€ per year when co-sponsoring **all three projects new in 2018***
- *Minimum participant quota will apply*

Kick-off March 1, 2018

Please let me know if this project could be of major interest and you are giving serious consideration for 2018 funding. Email: horsfield@geos4.com Tel: +49 331 288 1780.

Best wishes,

B. Horsfield

Quick Bound Biomarkers (QBB)

Key Words: oil-source and oil-oil correlation

Background:

Biomarker carbon skeletons occur in both free and bound forms in sedimentary organic matter. Covalently bound steroids and hopanoids have been documented in humic substances, kerogen and petroleum asphaltenes. The ratio of free to bound occurrence in source rocks is in part a function of organofacies, and thus Type I kerogen has a small bound fraction whereas Type IIS is dominated by bound biomarkers. The bound biomarker fraction, being less susceptible to contamination, continues to provide key information on the evolution of primitive life in the Proterozoic.

Open system pyrolysis in high pressure hydrogen (HyPy) and selective chemical degradation are the techniques most frequently employed to release bound biomarkers. We have now developed the micro-scale sealed vessel catalytic hydrogenation (MSSV-HY) method to release bound biomarkers, which utilises tetralin and various catalysts. In the initial phase we found that results comparable with those from the HyPy technique were obtained using a combination of high temperature (400 ºC), short residence time (120 mins), high tetralin/kerogen ratio (5), and a dispersed molybdenum sulphide catalyst (Fig. 1-1). We have now established that PtO2 and Pt-black can also be used, and they have the advantage of being easier to prepare than the molybdenum catalyst.

Goal:

We wish to test the applicability of the new method to petroleum systems in general, in cooperation with industry partners.

Area(s) of study:

The initial focus shall be on genetically related kerogens, source asphaltenes and petroleum asphaltenes, crude oils that are variably biodegraded, co-sourced crude oils (e.g. Barents Sea, NW Germany, Gulf of Mexico, Brazil), and organic matter subjected to natural radioactive bombardment, as provided by the sponsors.

Approach:

Forty samples shall be analysed initially, beginning with screening analyses, followed by GC-MS analysis of steranes and hopanes. MSSV-Hy optimisation tests will be conducted by varying operating conditions before conducting final degradation experiments.

Experience and manpower:

Brian Horsfield
Kai Mangelsdorf
Shengyu Yang
The team is the leading developer of MSSV pyrolysis methods, and has extensive experience in unconventional and conventional plays worldwide.
1 full-time postdoc with 3+ years experience in pyrolysis + biomarker geochemistry will be assigned to the project.

Deliverables:

A database of free versus bound biomarkers will be assembled for the petroleum systems under analysis.

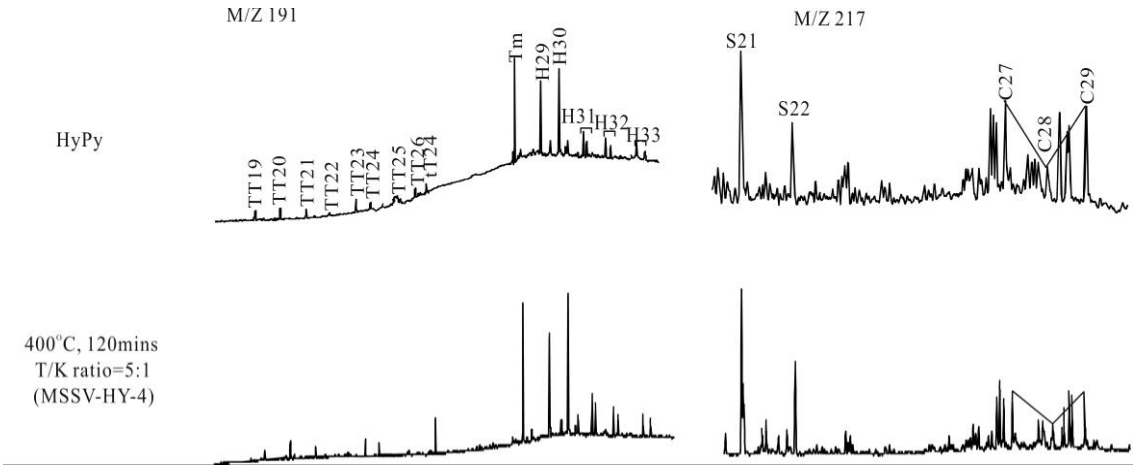

Fig. 1-1: Comparison of biomarkers released using HyPy and MSSV-Hy (Wu and Horsfield, 2017).

Literature:

Wu L. and Horsfield B. (2017) Releasing bound biomarkers from kerogen matrices using micro-scale sealed vessel catalytic hydrogenation (to be submitted).