

## 15 Oral Presentation

### Generation and Alteration of Gas in the Austrian Molasse Basin

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The Molasse Basin, extending from Geneva to Vienna, is the northern foreland basin of the Alps and a minor oil and gas province. It formed due to overthrusting of the Alpine nappes on the European foreland and was filled with shallow to deep marine sediments since Eocene time. Within the Austrian sector two petroleum systems can be distinguished: A thermal petroleum system comprising Lower Oligocene source and Cenomanian and Eocene reservoirs rocks; A biogenic (bacterial) gas system in Oligocene and Miocene strata.

Typically the thermogenic gas contains significant amounts of higher hydrocarbons (C<sub>2</sub>H<sub>6</sub>, C<sub>3</sub>H<sub>8</sub>) and is classified as “wet”. Moreover the hydrocarbons are isotopically heavy ( $\delta^{13}\text{C} > -45\text{‰}$ ). In contrast, the primary biogenic gas consists almost exclusively of methane (“dry”) and is isotopically light ( $\delta^{13}\text{C} < -50\text{‰}$  relative to PDB). Biodegradation of pre-existing oils leads to formation of relatively dry “secondary” biogenic gas, which is isotopically heavier than primary biogenic gas.

The aim of the present study is to understand the generation, migration and alteration of gaseous hydrocarbons in the Molasse Basin. To reach this goal, both analysis of hydrocarbon gases and CO<sub>2</sub> and diagenetic studies on potential reservoir rocks have been performed.

The molecular composition and C (-50 to -70‰) and H isotope ratios (-200 to -250‰) of gas and condensate samples from Oligocene and Miocene reservoirs have been determined. These data show that some gas deposits, considered bacterial in origin, contain wet gas (C<sub>1</sub>/[C<sub>2</sub>+C<sub>3</sub>]: 20-300) and locally even liquid hydrocarbons. The results from GC and IRMS point out that chemical characteristics of gas fields in the Molasse Basin are a result of interplay of different processes, like thermogenic gas generation, primary (from solid organic matter) and secondary biogenic gas generation (from biodegradation of pre-existing oils), migration and alteration.