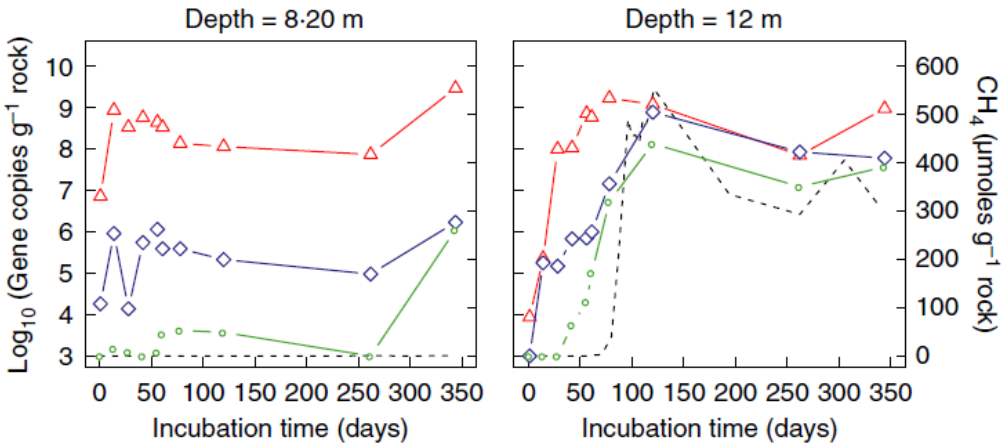
Biostimulation to detect methanogenic consortia in organic-rich rocks

Biostimulation was tested as a method to detect and quantify the methanogenic consortia in organic-rich rocks by increasing bacterial and archaeal numbers above the detection levels in microcosms. Currently active heterotrophic and syntrophic bacterial consortia, methanogens, and methane accumulation are present in rock samples. Syntrophs and heterotrophs are dominated by Firmicutes, whereas archaeal diversity are limited to methanogens. Methane-producing microcosms are characterized by a higher Firmicutes diversity.



Monitoring of total bacterial (open square) and methanogens (open circle) population in large microcosms. Methane production which occurs for microcosm 12 m is also reported (dotted line)

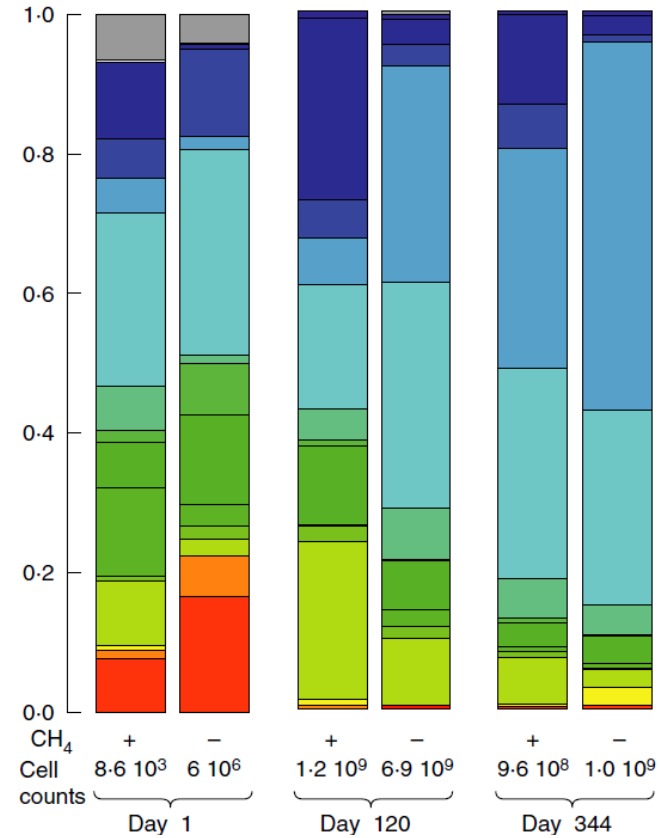


Figure 4 Comparative bacterial diversity at days 1, 120 and 344 for the methane-positive and methane-negative 12 m microcosms. Actinobacteria: (■) unclassified Actinobacteria. Bacteroidetes: (■) *Parabacteroides* sp.; (■) Unclassified *Parabacteroides*. Chloroflexi: (■) unclassified Chloroflexi. Firmicutes: (■) *Bacillus* sp.; (■) other Bacillales; (■) *Clostridium* (*sensu* stricto); (■) *Sedimentibacter* sp.; (■) *Clostridium* XIVa; (■) *Desulfosporosinus* sp.; (■) *Clostridium* XI; (■) *Sporacetigenium*-related unclassified Clostridiales; (■) other Clostridiales; (■) Unclassified Firmicutes. Proteobecteria: (■) *Serratia* sp.; (□) Other Proteobecteria.

Meslé M., Periot C., Dromart G., and Oger P. (2013) Biostimulation to identify microbial communities involved in methane generation in shallow, kerogen-rich shales, *Journal of Applied Microbiology*, 114, 55-70.