Compound-specific isotopes of methanogenic precursors in coals: Laboratory, field and modeling studies

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Representative sampling of coalbed methane wells in Powder River Basin, WY/MT

Influxes of shallow, high-sulfate waters interfere with methanogenesis

- Shallow, basin-edge environment corresponds to lower values of $\delta^{13}C_{CH_4}$ and $\delta^{13}C_{CO_2}$
- Separation between $\delta^{13}C_{CH_4}$ and $\delta^{13}C_{CO_2}$ ($\alpha^{13}C_{CO_2-CH_4}$) is smaller at basin edge than basin center, probably due to sulfate reduction
- Pathway-independent isotope tracers may record mass balance and extent of methanogenesis

In progress:
- Compound-specific isotope ratios of acetate
- Carbon isotope mass balance modeling