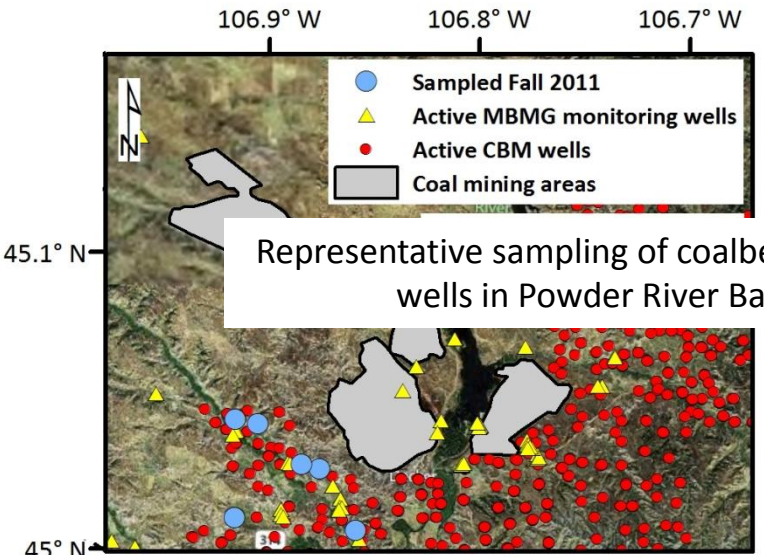
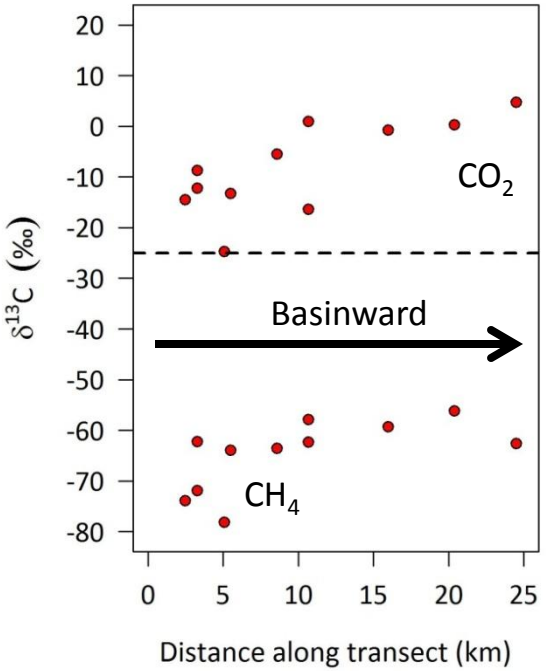
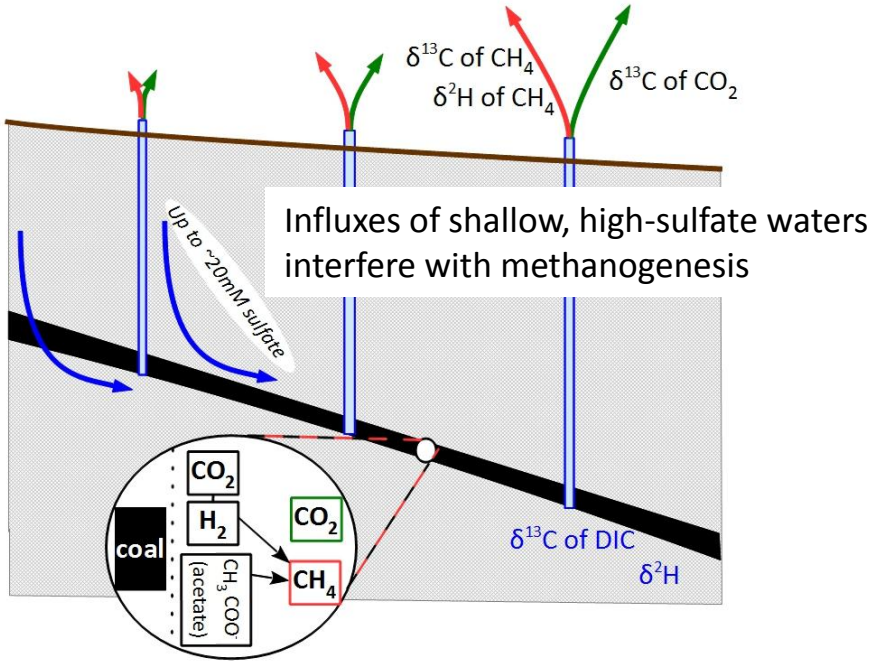
Compound-specific isotopes of methanogenic precursors in coals: Laboratory, field and modeling studies

Jennifer McIntosh, University of Arizona, Department of Hydrology & Water Resources, Tucson, AZ



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 $\delta^{13}C_{CH4}$ and $\delta^{13}C_{CO2}$
- Separation between $\delta^{13}C_{CH4}$ and $\delta^{13}C_{CO2}$ ($\alpha^{13}C_{CO2\text{-}CH4}$) 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