



## **Characterizing the variability in chemical composition of flowback and produced waters – results from lab and field studies**

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The huge volumes and unknown composition of flowback and produced waters cause major public concerns about the environmental and social compatibility of hydraulic fracturing and the exploitation of gas from unconventional reservoirs. Flowback and produced waters contain not only residues of fracking additives but also chemical species that are dissolved from the target shales themselves. Shales are a heterogeneous mixture of minerals, organic matter, and formation water and little is actually understood about the fluid-rock interactions occurring during hydraulic fracturing of the shales and their effects on the chemical composition of flowback and produced water. To overcome this knowledge gap, interactions of different shales with different artificial stimulation fluids were studied in lab experiments under ambient and elevated temperature and pressure conditions. These lab experiments showed clearly that fluid-rock interactions change the chemical composition of the initial stimulation fluid and that geochemistry of the fractured shale is relevant for understanding flowback water composition. In addition, flowback water samples were taken after hydraulic fracturing of one horizontal well in Pomeranian region, Poland and investigated for their chemical composition. With this presentation, results from lab and field studies will be presented and compared to decipher possible controls on chemical compositions of flowback and produced water.