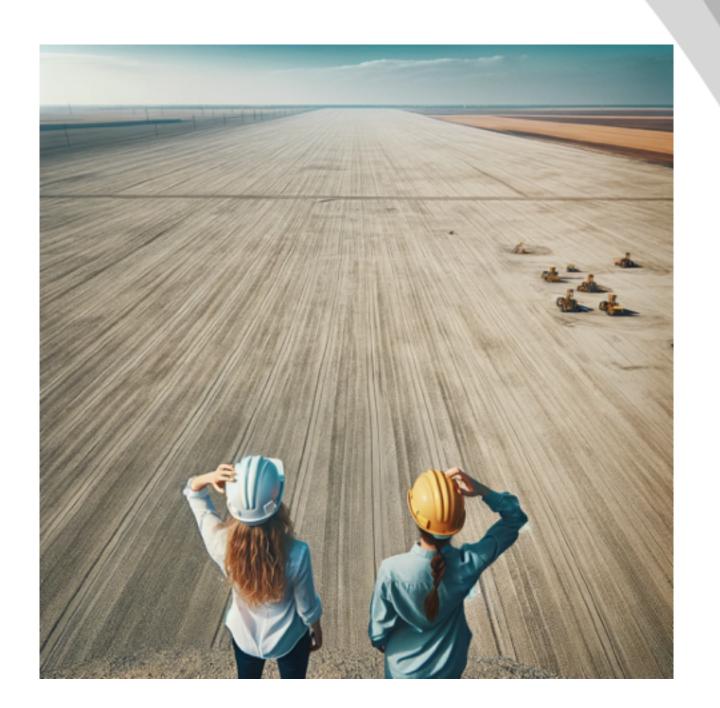


Problem

CO₂ project lasts years thus can drill more wells but:

- many location options
- expensive



Operators deciding well locations should be informed by

- ► current knowledge of the CO₂ plumes
- physics simulations of plume forecasts



Solution: Bayesian experimental design

Chose acquisition design $\mathbf{W}[\mathbf{w}]$ that allows for maximal information gain

$$y = W(x)$$

where W is a binary sampling mask derived from density w

Collect data by maximizing the Kullback-Leibler divergence:

$$\max_{\mathbf{W}} D_{KL}(p(\mathbf{x} | \mathbf{y}) | | p(\mathbf{x})).$$

Maximize Expected information gain (EIG) averages over all possible designs

$$\max_{\mathbf{W}} \{ EIG(\mathbf{W}) = \mathbb{E}_{p(\mathbf{y}|\mathbf{W})} \left[D_{KL}(p(\mathbf{x}|\mathbf{y})||p(\mathbf{x})) \right] \}.$$