

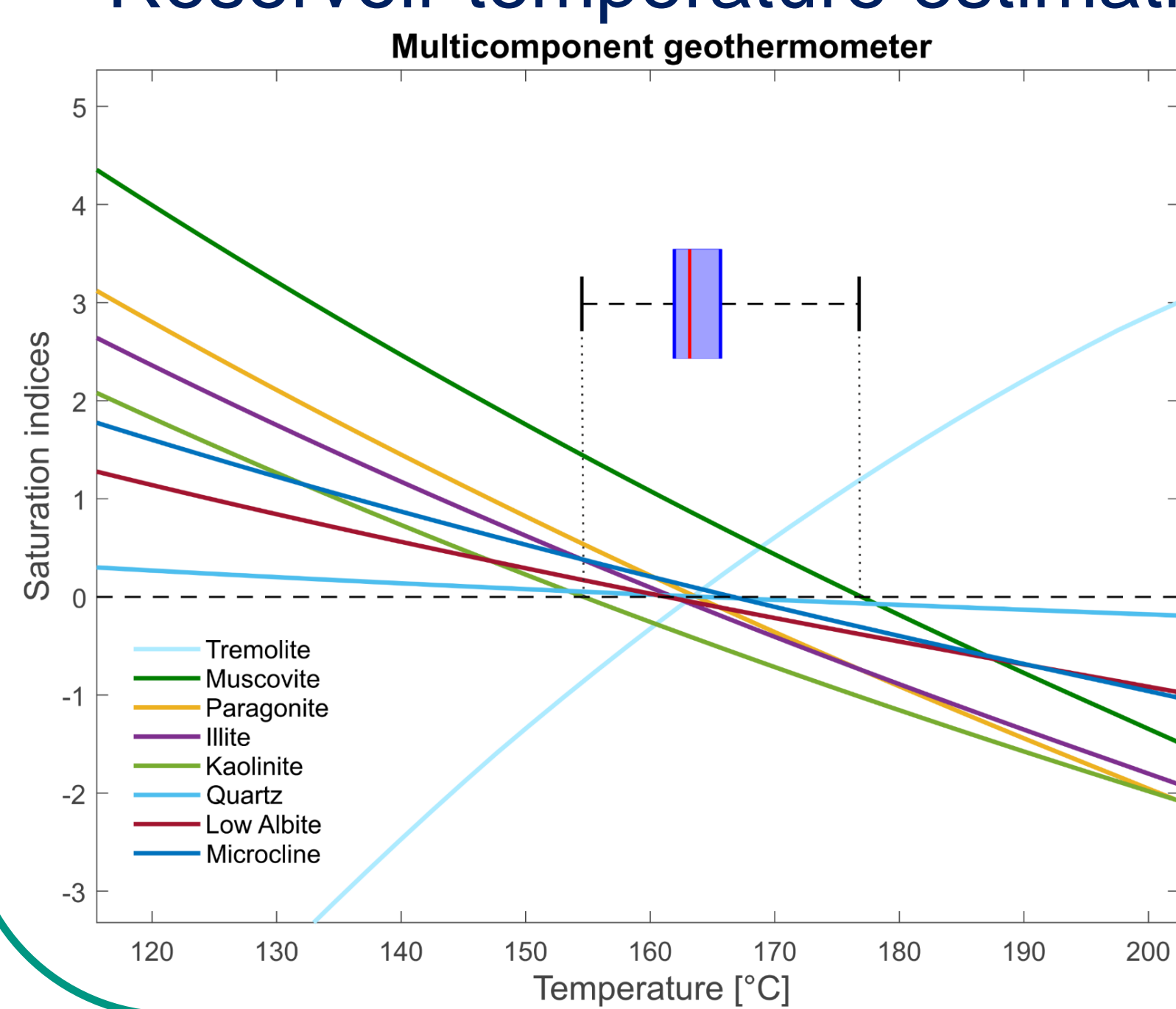
Geothermometer temperature predictions for DeepStor

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1. MuT_predict

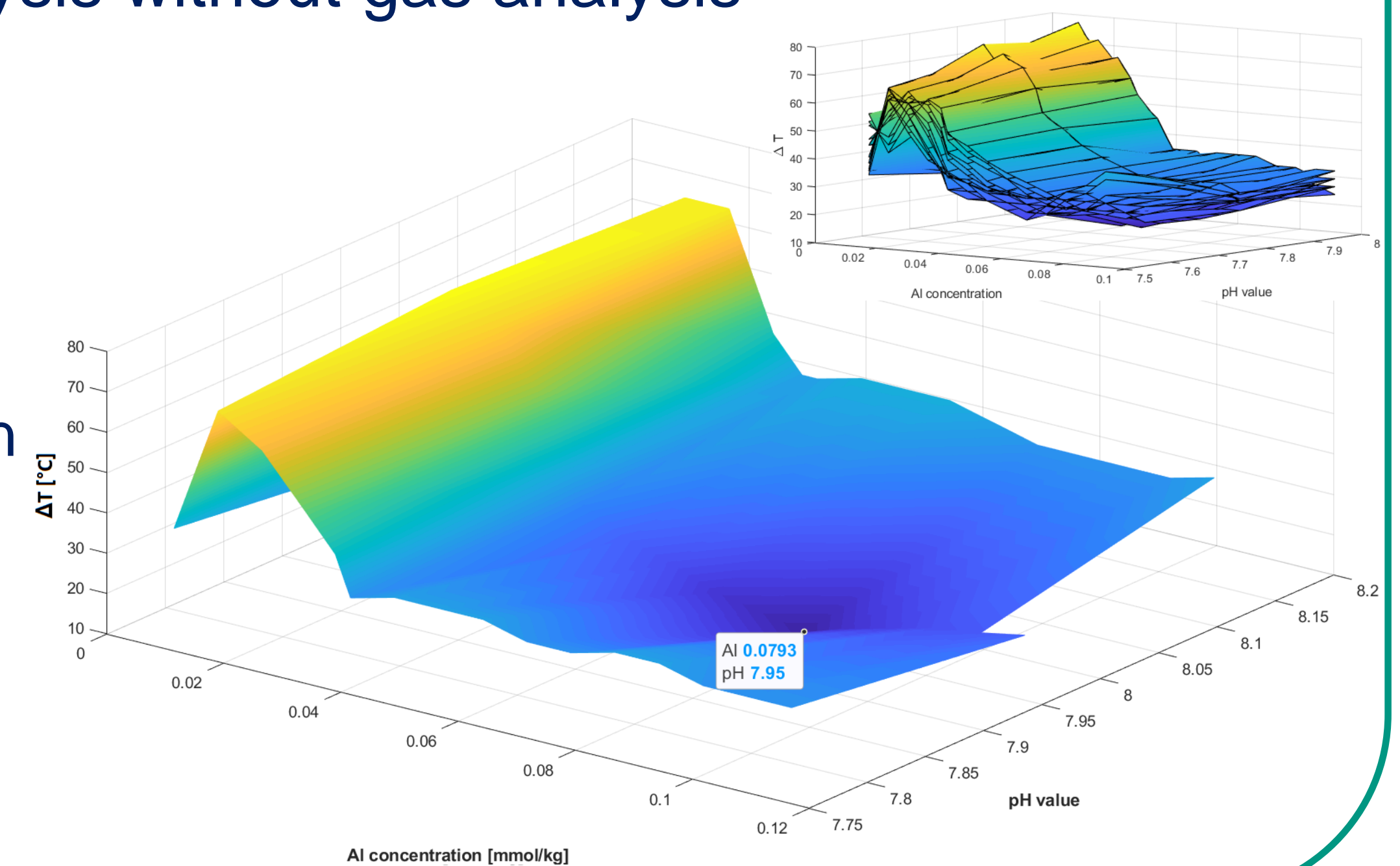
Reservoir temperature estimation from a standard chemical water analysis without gas analysis



Assuming a chemical equilibrium between reservoir rock and hot water

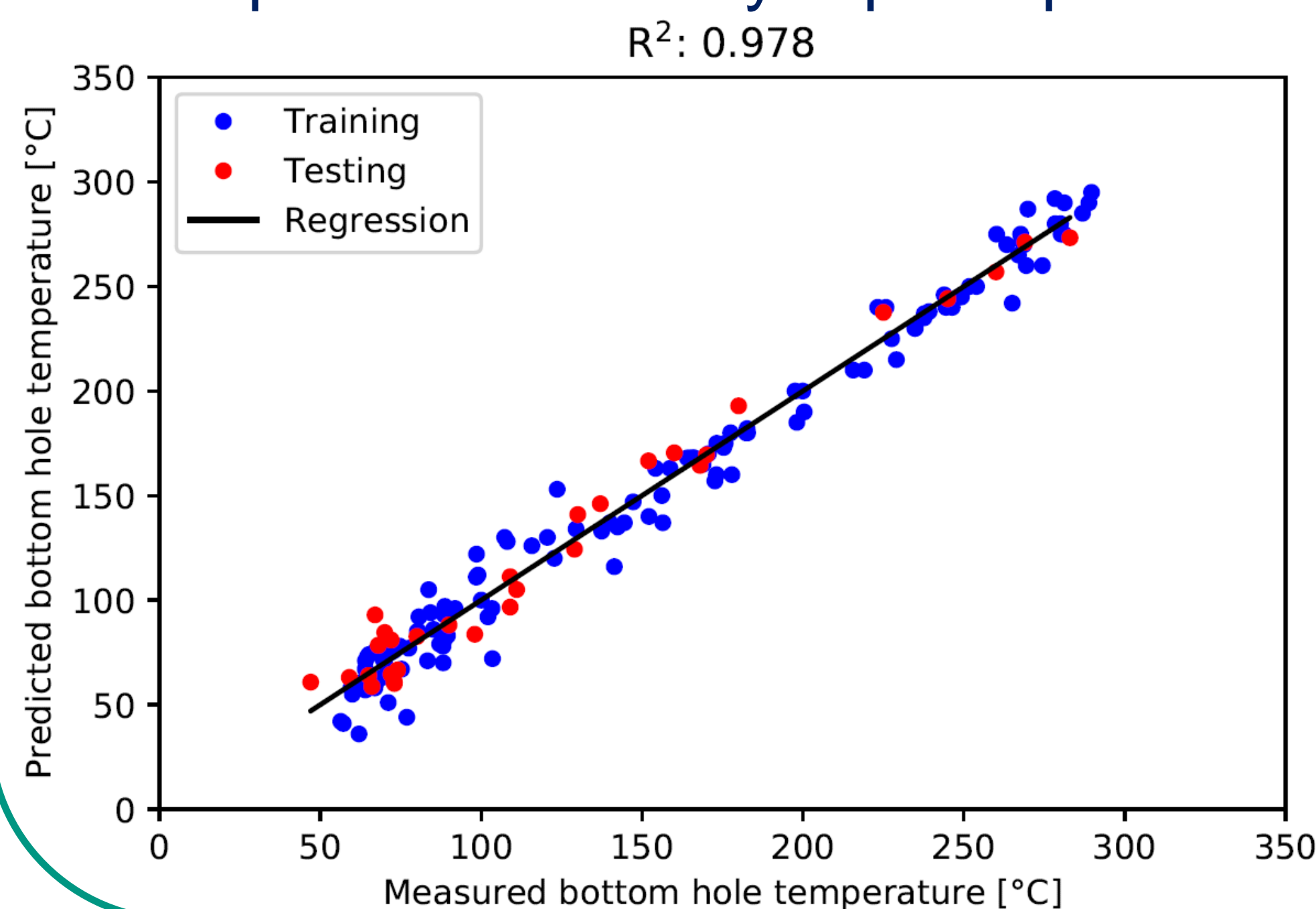
Using the saturated state of reservoir minerals (SI = 0) for temperature estimation (indicated by box plot) [left figure]

Multidimensional optimisation of several parameters: aluminium concentration, pH, steam loss / dilution [right figure]



2. Artificial neural network geothermometer

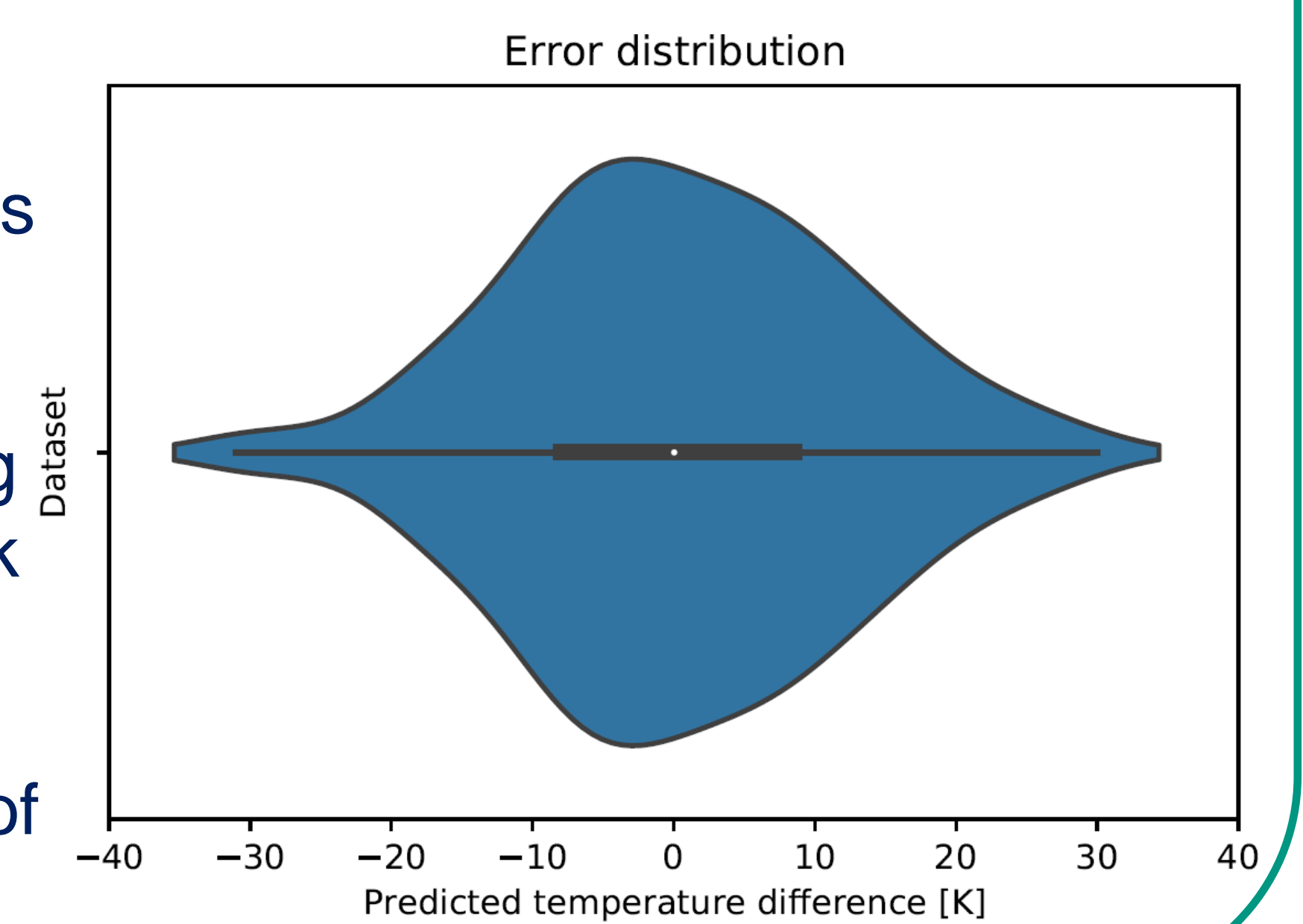
A supervised multilayer perceptron is trained with high-quality geochemical data and in-situ temperature logs



Minimising cross-entropy losses by adjusting weights within neurons fitting input parameters to the target value

Training and testing of the network minimising the error without overfitting the neural network [left figure]

Performance metrics of the error distribution of the dataset of the neural network [right figure]

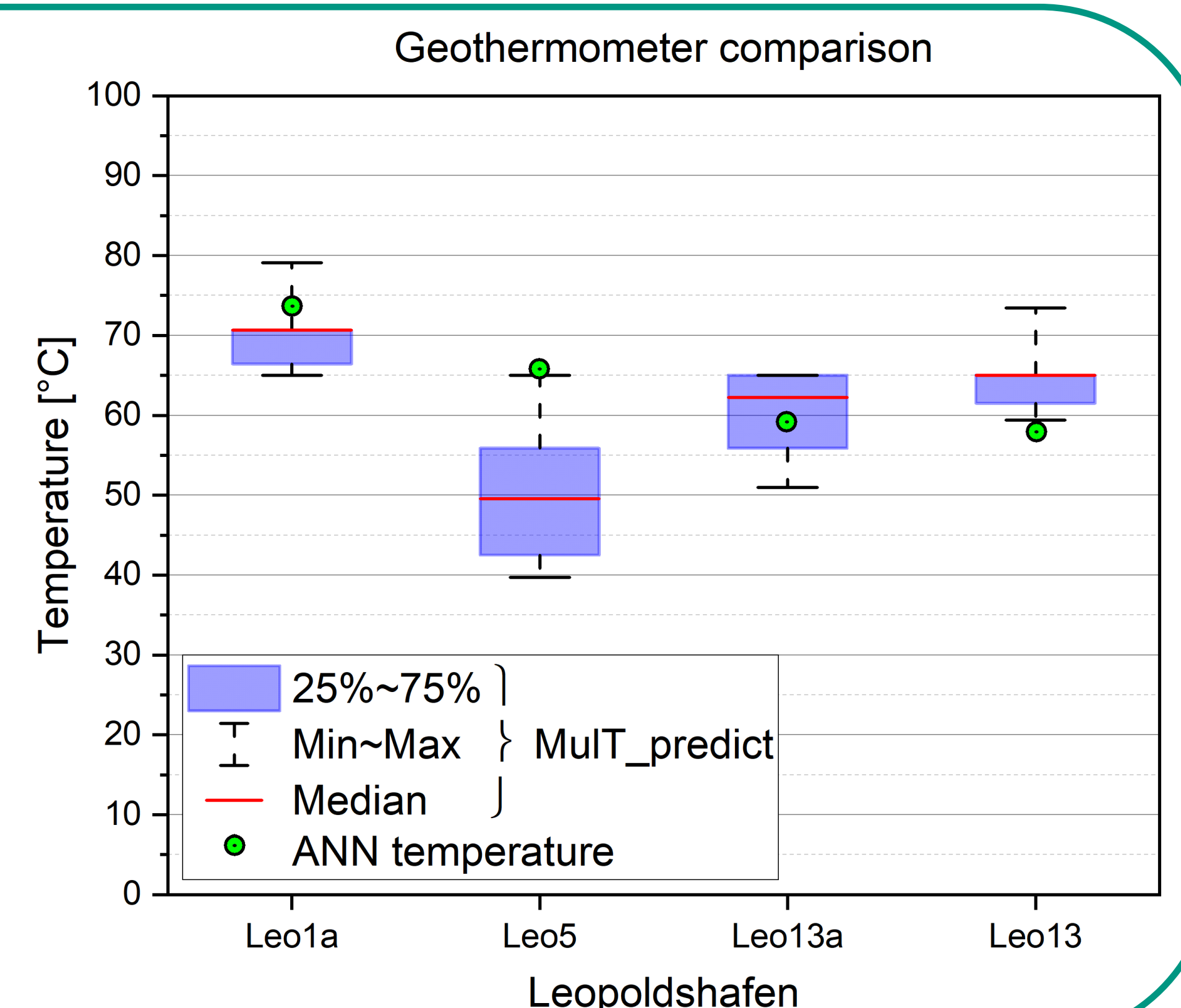


3. Comparison of results

Comparison of the reservoir temperature estimations of the nearby Leopoldshafen wells, close to the future **DeepStor** site [right figure]

The boxplots represent the optimised reservoir temperature prediction of **MuT_predict**, while the green filled circles are the results of the **Artificial neural network geothermometer**

Regarding the depth, Leo1a is similar to the planned exploration drilling. Thus, the estimated reservoir temperature is **~70°C**



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