The central-loop configuration for 1D SNMR surveys, where the receiver loop is smaller than the transmitter loop, was first presented by Berhouzmand et al. (2016). They compared its characteristics with the classical coincident-loop configuration, and demonstrated that it is superior in many aspects such as sensitivity distribution behavior, resolution at large depth and signal to noise ratio. Based on these findings, we investigate the potential of the multi-central-loop configuration, where several smaller receivers are placed within the transmitting loop, and all the data sets are processed and inverted together. The objective is to take advantage of the complementary resolution and sensitivity features of the different configurations, in order to improve the quality of the inverted model. We present here preliminary tests and results obtained with synthetic and field data.

Another possibility that would provide similar benefits and raise similar questions, is to invert simultaneously several data sets obtained independently (at different times), using varying transmitter sizes or excitation pulse lengths. We investigate these aspects using a QT inversion approach (MRSMatlab, Müller-Petke et al., 2016). We acknowledge that the main challenge is to adopt the regularization of the inversion process, so as to handle correctly the noise originating from different data sets, although it seems less needed for the multi-central-loop configuration than for independent data sets. Finally, we introduce a new method for the interpretation of SNMR data based on statistical analysis of a large number of models, called the prediction-focused approach (PFA, Hermans et al., 2016). We observe that the efficiency of the method benefits from the use of the multi-central-loop configuration.