

## **MRSmatlab – a toolbox for modeling, processing, and inverting surface-NMR data**

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Surface NMR is a geophysical technique used for exploring shallow groundwater occurrences. Over the last decade, significant improvements have been made by several groups worldwide, covering the fields of data acquisition, processing, forward modeling, and inversion. We have combined many of the recent advances into a single open-source software toolkit (MRSmatlab) that consists of various modules for data processing, forward modeling, and inversion. The processing module is designed for use with data formats of all currently available commercial surface-NMR systems, featuring import of raw as well as preprocessed data. The module comprises enhanced data inspection, digital filtering, spike suppression, data fitting, and noise reduction employing one or more reference channels. Forward modeling currently handles setups of coincident transmitter and receiver loops of circular, square, or figure-8 geometry, and can account for 1D electrical-conductivity structures. Single and double-pulse experiments can be modeled to study the effect of water content and the T1 relaxation parameter on synthetic surface-NMR data. The inversion module supports traditional 1D initial amplitude inversion (IV inversion), as well as the recently introduced inversion of the full surface-NMR dataset (QT inversion). Inversion of double-pulse data to obtain the T1 relaxation parameter is also enabled (T1 inversion). The software package is frequently maintained, under continuous development, and planned to be publicly available through a webserver.

(Figure on page 2)

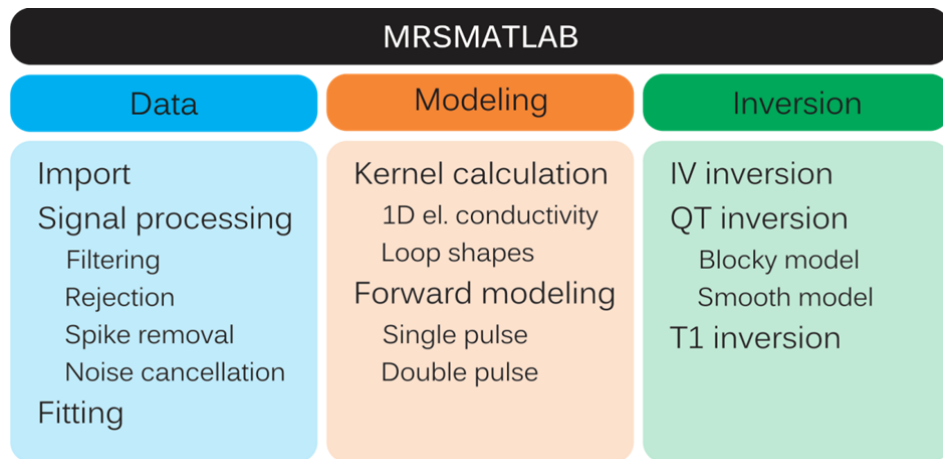


Figure: MRS matlab modules