

Donders Repository: Data Sharing Collection:

Validation of Volume Conduction Models with Stereotactic EEG Data

Maria Carla Piastra, June 2020. Updated in August 2023.

In the folder “data” are the anatomical (CT and MRI scans) and electrophysiological (stereotactical EEG, i.e., sEEG) data in BIDS format of the three subjects named s1, s2, and s3, corresponding to how they appear in the manuscript. In the analysis (i.e., the scripts and intermediary output files) which predates the preparation of the BIDS dataset these subjects are referred to as subj0, subj3, and subj4.

In the folder “scripts_matlab” there are two sub-folders, “analysis” where three *FieldTrip* (<https://www.fieldtriptoolbox.org>) pipeline scripts are stored and “functions”, where there are some MATLAB functions used in the pipeline.

In “analysis” the three pipelines consist of:

- seeg_processing.m: analysis of sEEG dataset and extraction of electric artefacts corresponding to intracranial electrical stimulations
- create_vc_model.m: creation of volume conduction head models, i.e., three hexahedral meshes for each subject, with three (brain, skull, scalp), four (+CSF) and five (white and grey matter distinction) compartments
- compare_m_s.m: script where the measured and simulated potentials are compared by means of absolute and relative errors

In the folder “scripts_python”, the Python script `boxplots_rms_distance.{py,ipynb}` to create figures is stored. In addition, in the sub-folder “compute_fwd_solutions”, there are the Python scripts (`fwd_s{0,3,4}_{3,4,5}.c.py`) used to compute the sEEG forward solutions in *DUNEuro* (<http://duneuro.org>).

There are three output folders:

- “output_matlab”: all output files produced by any of the scripts in “script_matlab”, e.g., meshes, segmentation results, dipoles and electrodes descriptions, errors.
- “output_python”: forward model solutions computed in DUNEuro for three subjects and three head models each
- “output_seg3d”: volumetric masks produced in *Seg3D* (<http://www.sci.utah.edu/cibc-software/seg3d.html>) which are used to compute the meshes

In “figures”, the figures of the paper produced with MATLAB/Python scripts are stored.