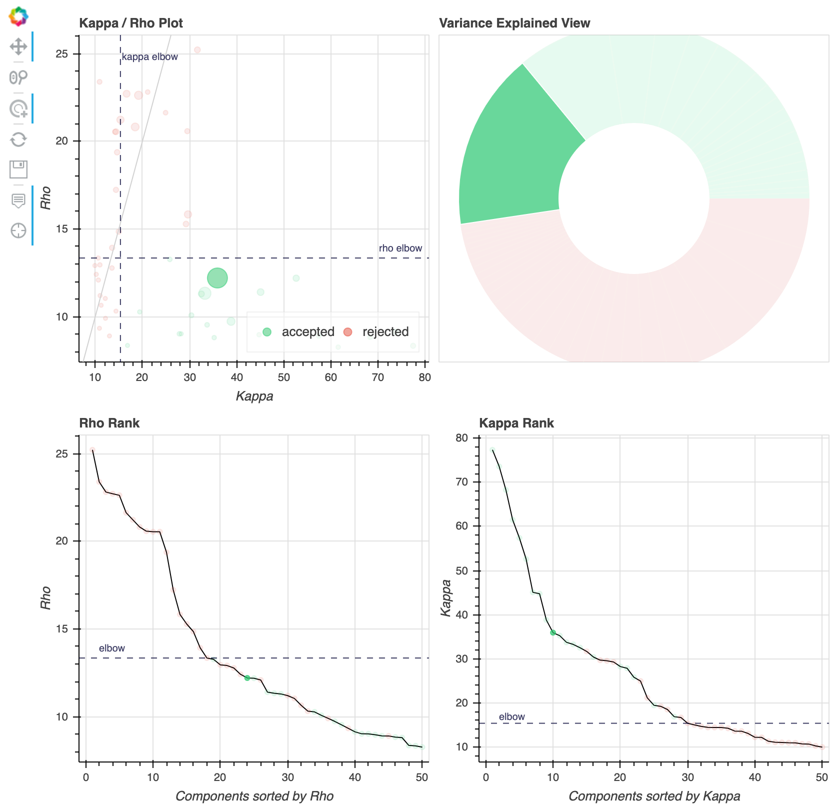
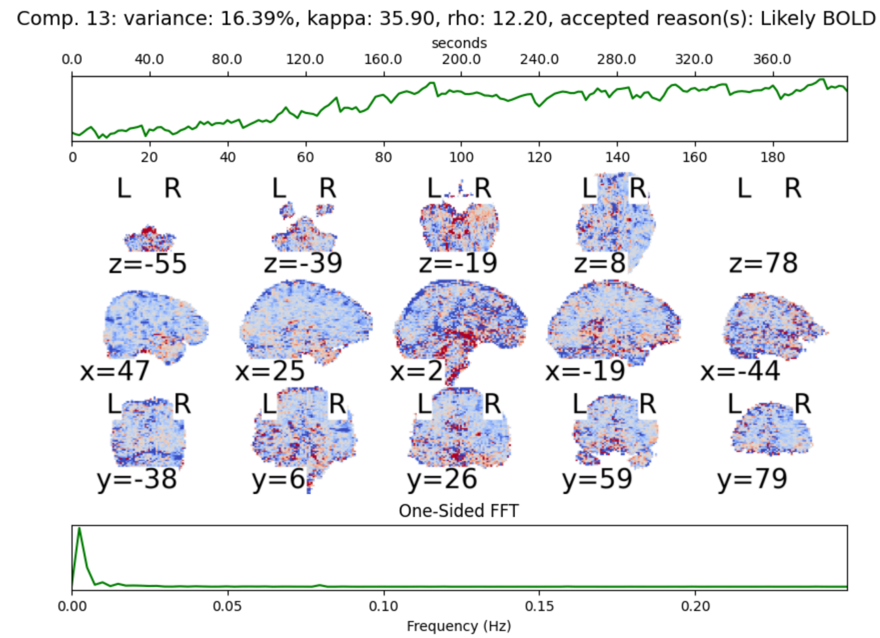
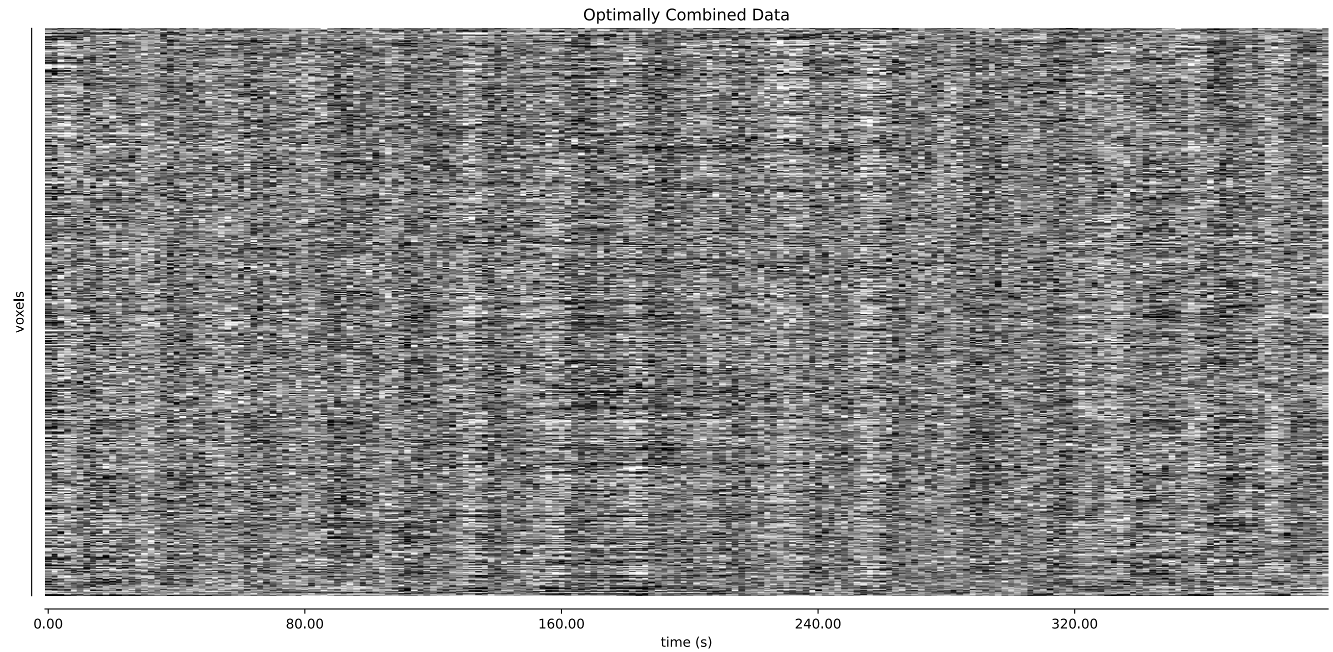
ICA components



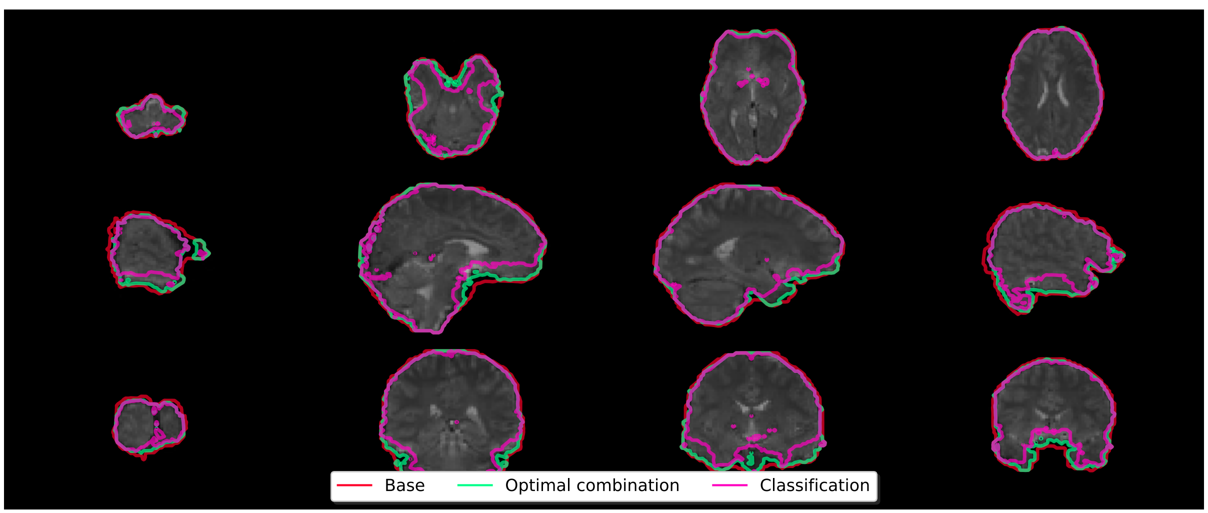


Carpet plots

Optimally combined | Denoised | Accepted | Rejected

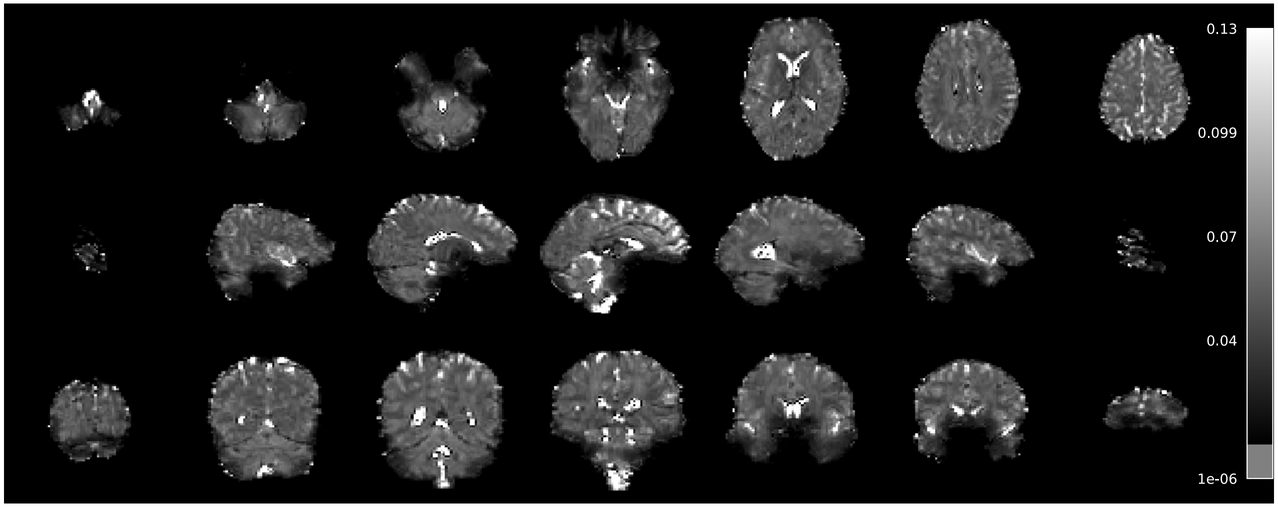


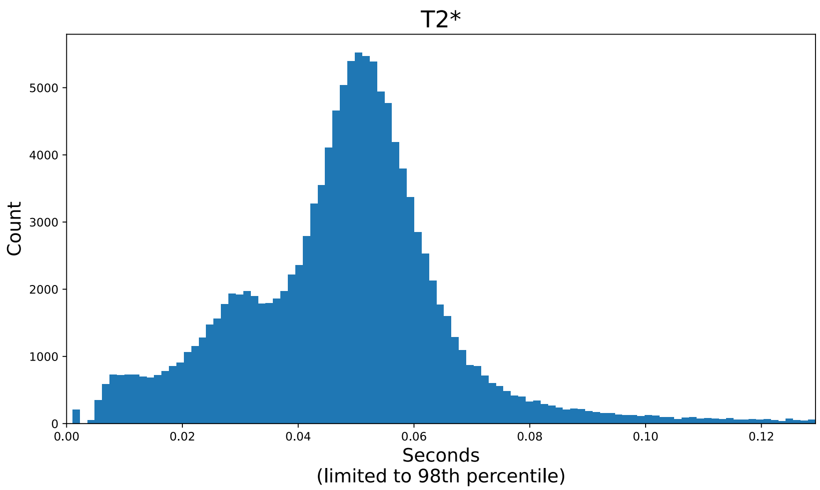
Adaptive mask



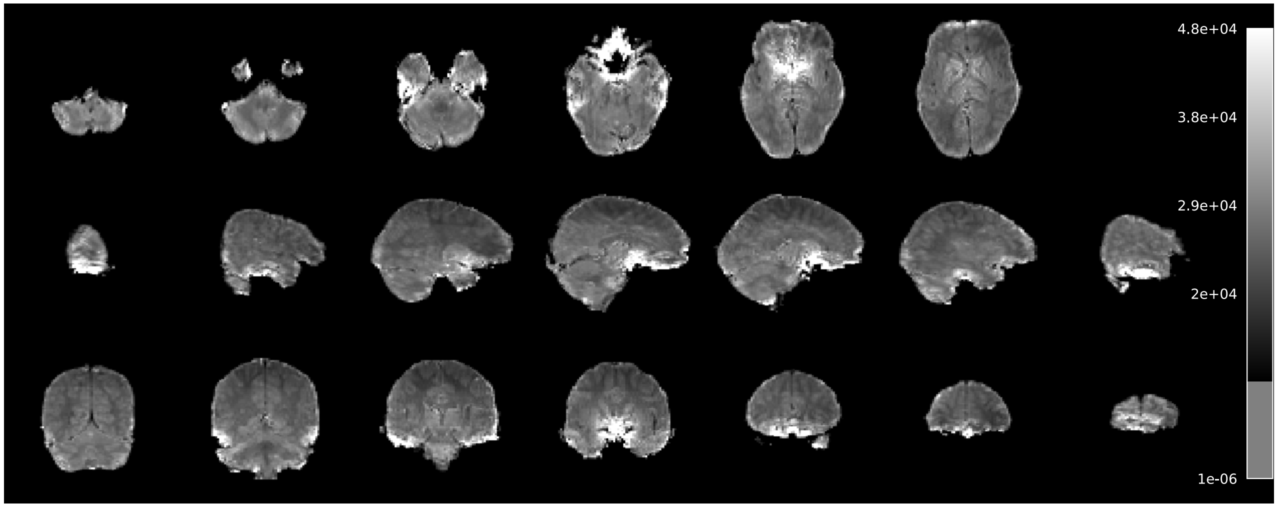
T2* and S0

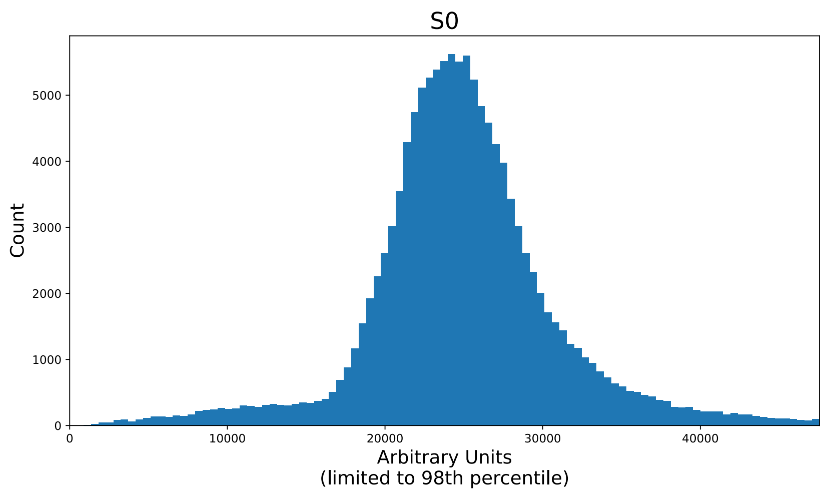
T2*



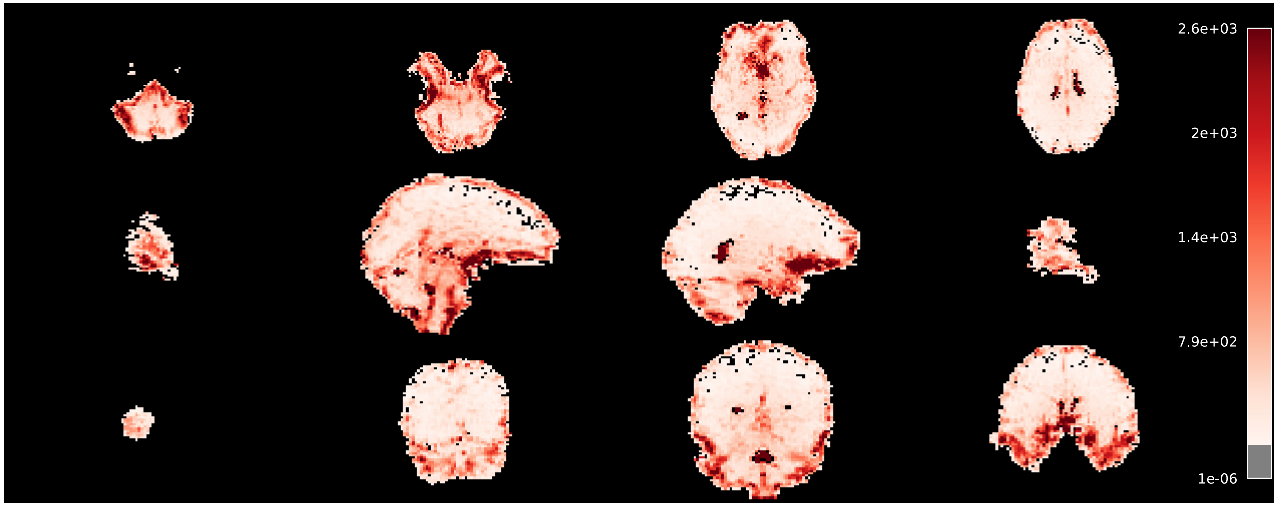


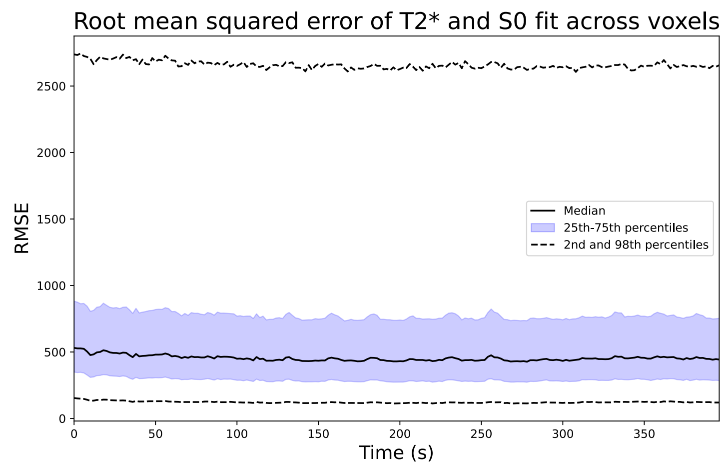
S0





T2* and S0 model fit (RMSE). (Scaled between 2nd and 98th percentiles)





Info

Tedana command used:

```
tedana -d /Users/nar423/Documents/Data/tedana/sub-03_MOTOR/inputs/sub-
03_MOTOR_rm10_1_mc_brain.nii.gz /Users/nar423/Documents/Data/tedana/sub-03_MOTOR/inputs/sub-
03_MOTOR_rm10_2_mc_brain.nii.gz /Users/nar423/Documents/Data/tedana/sub-03_MOTOR/inputs/sub-
03_MOTOR_rm10_3_mc_brain.nii.gz /Users/nar423/Documents/Data/tedana/sub-03_MOTOR/inputs/sub-
03_MOTOR_rm10_4_mc_brain.nii.gz /Users/nar423/Documents/Data/tedana/sub-03_MOTOR/inputs/sub-
03_MOTOR_rm10_5_mc_brain.nii.gz -e 10.8 28.03 45.26 62.49 79.72 --tree minimal --mix
/Users/nar423/Documents/Data/tedana/sub-03_MOTOR/output.extReg_motion/desc-ICA_mixing.tsv --out-dir
/Users/nar423/Documents/Data/tedana/sub-03_MOTOR/output.minimal --mask
/Users/nar423/Documents/Data/tedana/sub-03_MOTOR/inputs/sub-03_MOTOR_SBREF_1_bet_mask_ero.nii.gz --
```

```
verbose --debug
```

System:	Darwin
Node:	FSMC02CQ5YRML85
Release:	20.5.0
System version:	Darwin Kernel Version 20.5.0: Sat May 8 05:10:33 PDT 2021; root:xnu-7195.121.3~9/RELEASE_X86_64
Machine:	x86_64
Processor:	i386
Python:	3.9.17 (main, Aug 29 2023, 11:17:00) [Clang 13.0.0 (clang-1300.0.29.30)]
Tedana version:	24.0.2.dev99+gd6d3ccc
Other library versions:	{'bokeh': '2.2.3', 'mapca': '0.0.5', 'matplotlib': '3.7.2', 'nibabel': '5.1.0', 'nilearn': '0.10.4', 'numpy': '1.25.2', 'pandas': '2.0.3', 'scikit-learn': '1.3.0', 'scipy': '1.11.2', 'threadpoolctl': '3.2.0'}

About tedana

The minimal decision tree (tedana community et al. 2024) is a simplified version of the MEICA decision tree (Kundu et al. 2013, DuPre et al. 2021) without many criteria that do not rely on kappa and rho thresholds. TE-dependence analysis was performed on input data using the tedana workflow (DuPre et al. 2021). A user-defined mask was applied to the data. An adaptive mask was then generated using the dropout method(s), in which each voxel's value reflects the number of echoes with 'good' data. An adaptive mask was then generated using the dropout method(s), in which each voxel's value reflects the number of echoes with 'good' data. A two-stage masking procedure was applied, in which a liberal mask (including voxels with good data in at least the first echo) was used for optimal combination, T2*/S0 estimation, and denoising, while a more conservative mask (restricted to voxels with good data in at least the first three echoes) was used for the component classification procedure. A monoexponential model was fit to the data at each voxel using log-linear regression in order to estimate T2* and S0 maps. For each voxel, the value from the adaptive mask was used to determine which echoes would be used to estimate T2* and S0. Multi-echo data were then optimally combined using the T2* combination method (Posse et al. 1999). The following metrics were calculated: countsigFS0, countsigFT2, dice_FS0, dice_FT2, kappa, normalized variance explained, rho, signal-noise_t, variance explained. Kappa (kappa) and Rho (rho) were calculated as measures of TE-dependence and TE-independence, respectively. A t-test was performed between the distributions of T2*-model F-statistics associated with clusters (i.e., signal) and non-cluster voxels (i.e., noise) to generate a t-statistic (metric signal-noise_z) and p-value (metric signal-noise_p) measuring relative association of the component to signal over noise.

Next, component selection was performed to identify BOLD (TE-dependent) and non-BOLD (TE-independent) components using a decision tree.

This workflow used numpy (Van Der Walt et al. 2011), scipy (Virtanen et al. 2020), pandas (McKinney et al. 2010, pandas development team et al. 2020), scikit-learn (Pedregosa et al. 2011), nilearn, bokeh (Team et al. 2018), matplotlib (Hunter et al. 2007), and nibabel (Brett et al. 2019). This workflow also used the Dice similarity index (Dice et al. 1945, Sorensen et al. 1948).

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