Summary

- Subject ID: 486306438
- Structural images: 1 T1-weighted
- ASL series: 1
    - Task: rest (1 run)
- Standard output spaces: MNI152NLin2009cAsym
- Non-standard output spaces:
- FreeSurfer reconstruction: Not run

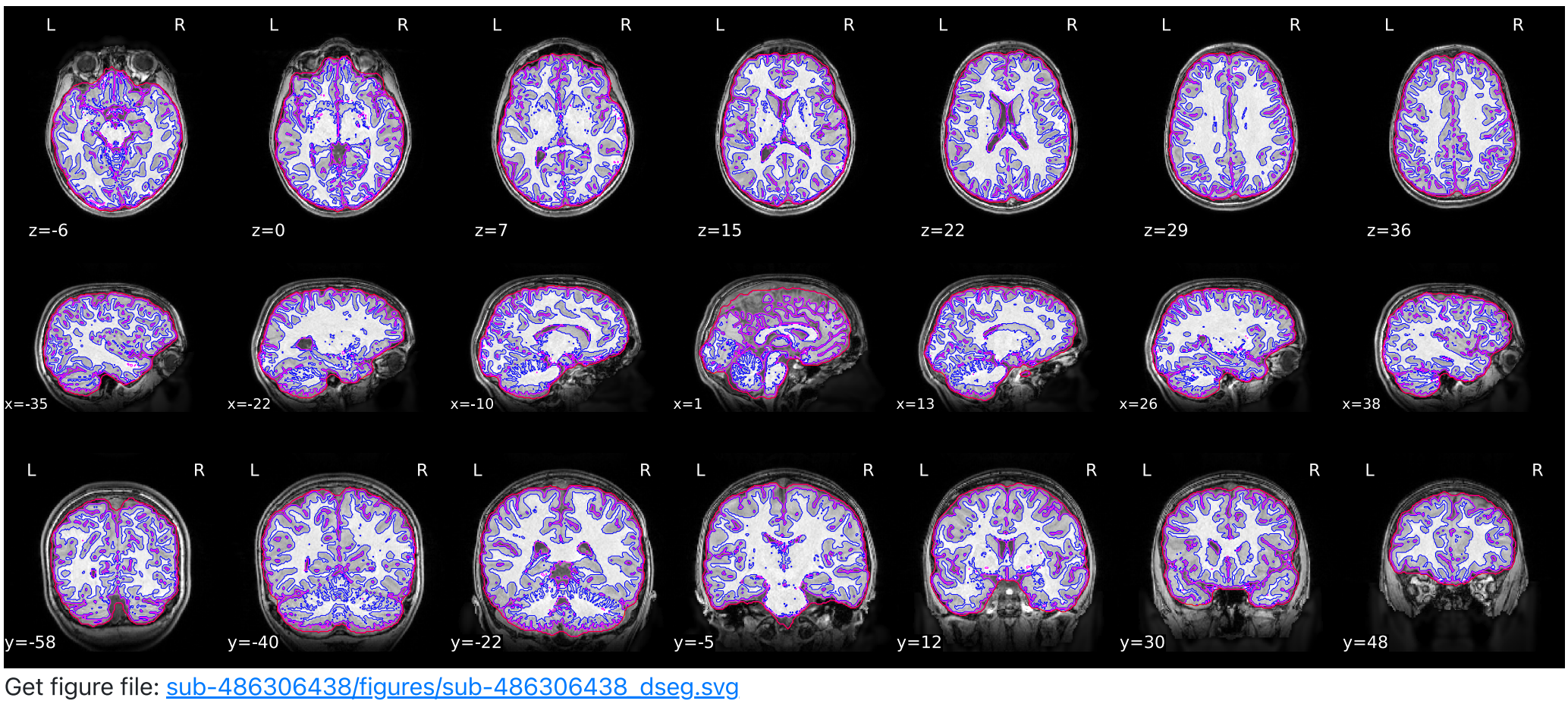
Anatomical

Anatomical Conformation

- Input T1w images: 1
- Output orientation: RAS
- Output dimensions: 192x256x160
- Output voxel size: 0.94mm x 0.94mm x 1mm
- Discarded images: 0

Brain mask and brain tissue segmentation of the T1w

This panel shows the template T1-weighted image (if several T1w images were found), with contours delineating the detected brain mask and brain tissue segmentations.

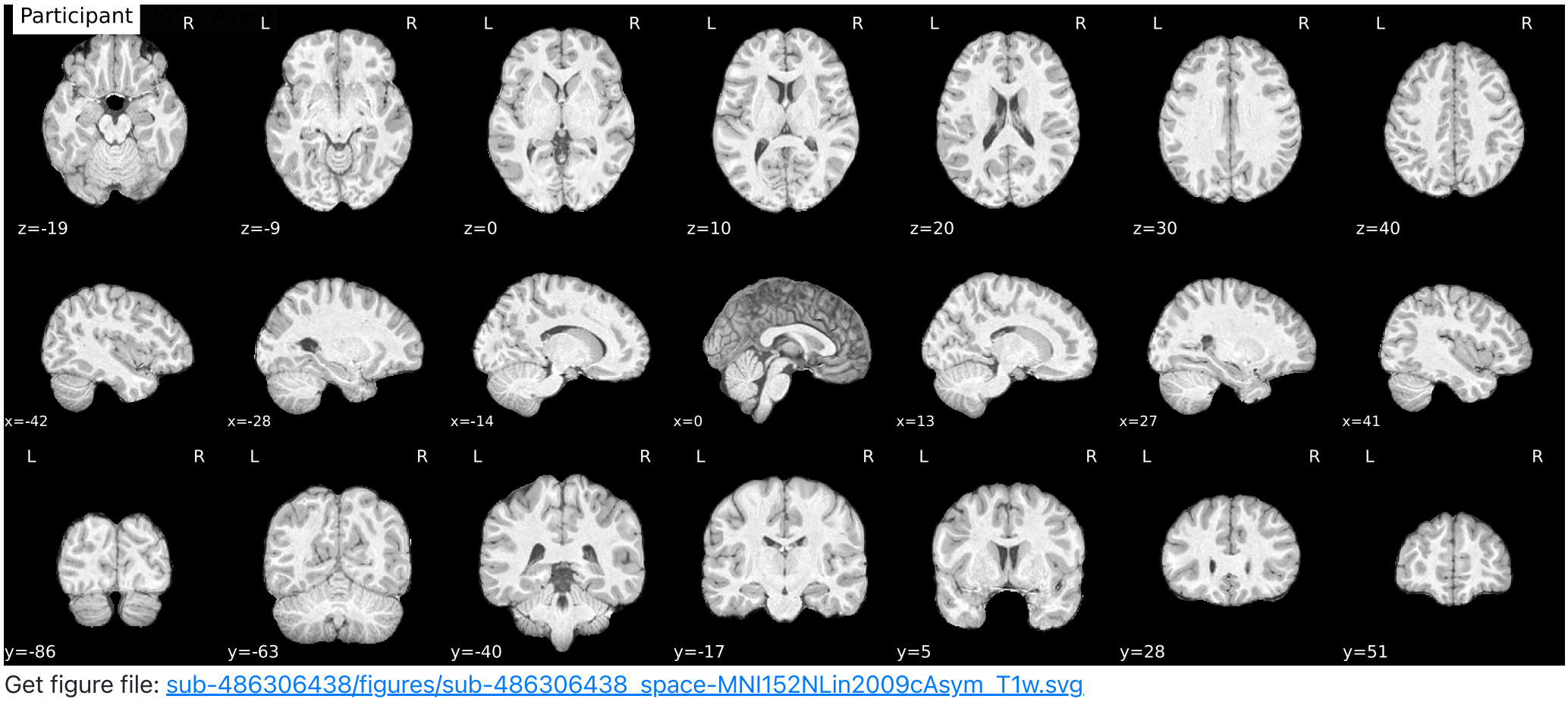


Get figure file: sub-486306438/figures/sub-486306438_dseg.svg

Spatial normalization of the anatomical T1w reference

Results of nonlinear alignment of the T1w reference one or more template space(s). Hover on the panels with the mouse pointer to transition between both spaces.

Spatial normalization of the T1w image to the `MNI152NLin2009cAsym` template.



Get figure file: sub-486306438/figures/sub-486306438_space-MNI152NLin2009cAsym_T1w.svg

Arterial Spin Labelling

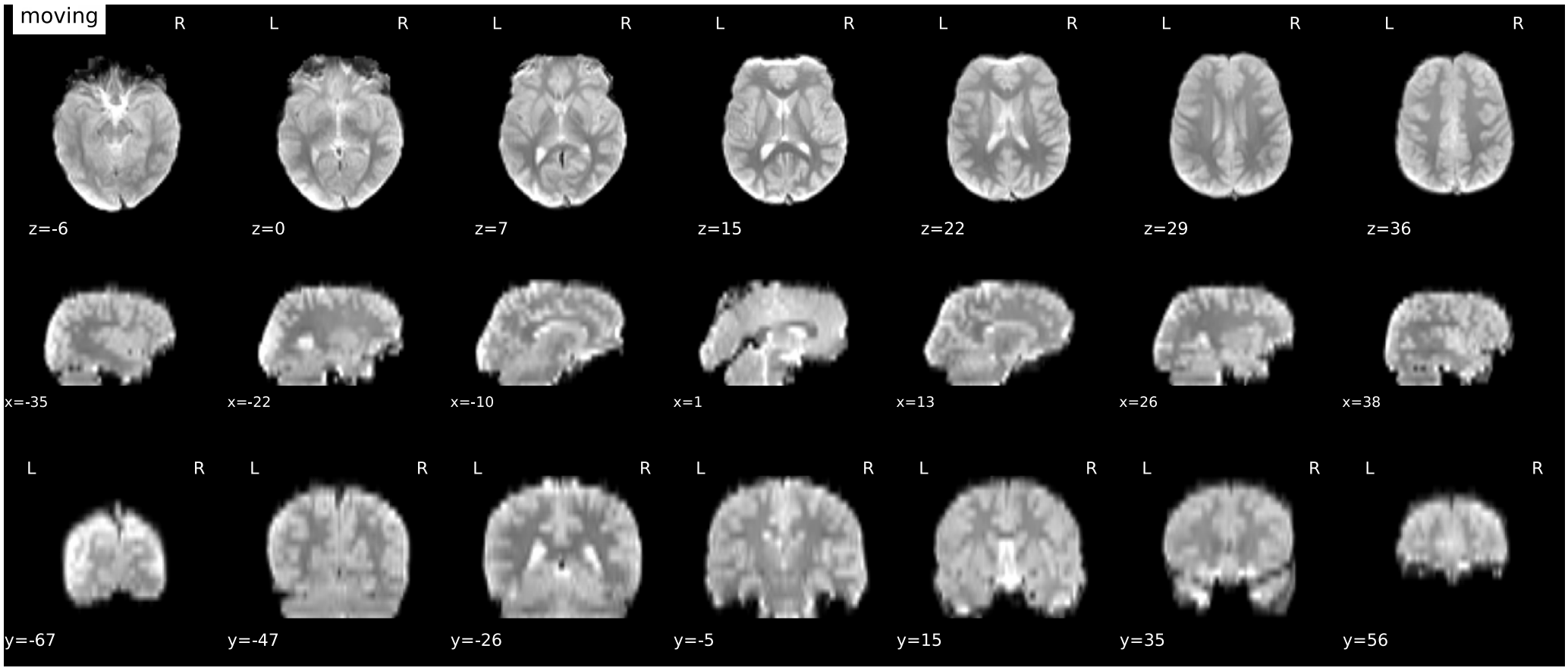
Reports for: session PNC1, task rest, acquisition se.

Summary

- Repetition time (TR): 4s
- Phase-encoding (PE) direction: Anterior-Posterior
- Slice timing correction: Applied
- Susceptibility distortion correction: None
- Registration: FSL `flirt` rigid registration - 6 dof
- Confounds collected: std_dvars, dvars, framewise_displacement, trans_x, trans_y, trans_z, rot_x, rot_y, rot_z
- Motion summary measures: FD : 0.091, relRMS: 0.0004
- Coregistration quality: Dice Index: 0.9978, Jaccard Index: 0.9956, Cross Cor.: 0.9972, Coverage: 1.0
- Normalization quality: Dice Index: 0.9693, Jaccard Index: 0.9404, Cross Cor.: 0.9611, Coverage: 0.9697
- Quality evaluation index : cbf: 0.7934,score: 0.8065,scrub: 0.8535, basil: 0.8466, pvc: 0.8426
- Mean CBF (mL 100/g/min) : GM CBF: 75.49, WM CBF: 31.64, GM/WM CBF ratio: 2.39
- Percentage of negative voxel : cbf: 0.74, score: 0.69, scrub: 0.21, basil: 0.0, pvc: 0.0

Alignment of asl and anatomical MRI data (surface driven)

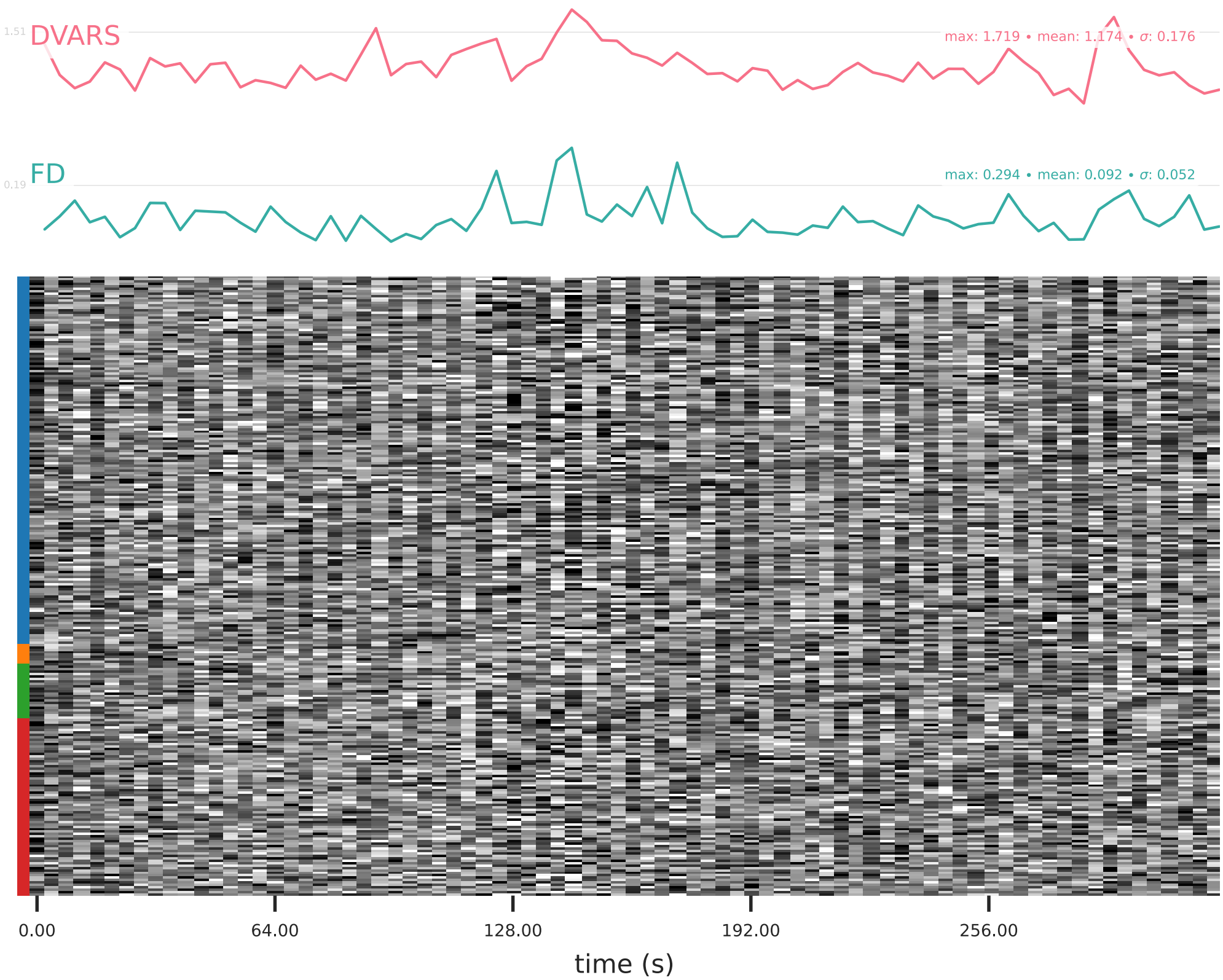
FSL `flirt` was used to generate transformations from EPI-space to T1w-space - The white matter mask calculated with FSL `fast` (brain tissue segmentation) was used for BBR. Note that Nearest Neighbor interpolation is used in the reportlets in order to highlight potential spin-history and other artifacts, whereas final images are resampled using Lanczos interpolation.



Get figure file: sub-486306438/figures/sub-486306438_ses-PNC1_task-rest_acq-se_desc-flirtbbr_asl.svg

ASL Summary

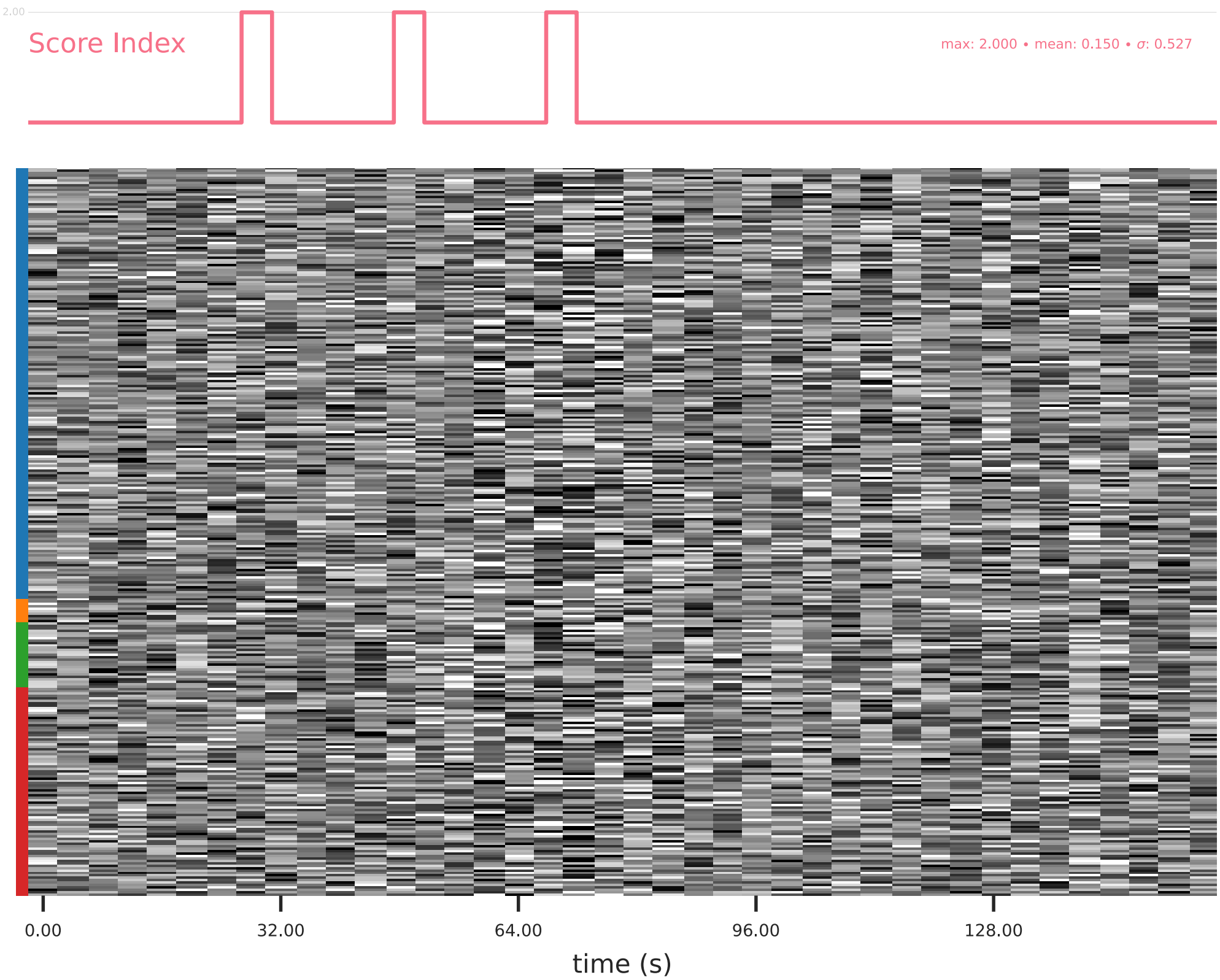
Summary statistics are plotted, which may reveal trends or artifacts in the asl data. DVARS and FD show the standardized DVARS and framewise-displacement measures for each time point. A carpet plot shows the time series for all voxels within the brain mask. Voxels are grouped into cortical (blue), and subcortical (orange) gray matter, cerebellum (green) and white matter and CSF (red), indicated by the color map on the left-hand side.



Get figure file: sub-486306438/figures/sub-486306438_ses-PNC1_task-rest_acq-se_desc-carpetplot_asl.svg

CBF Summary

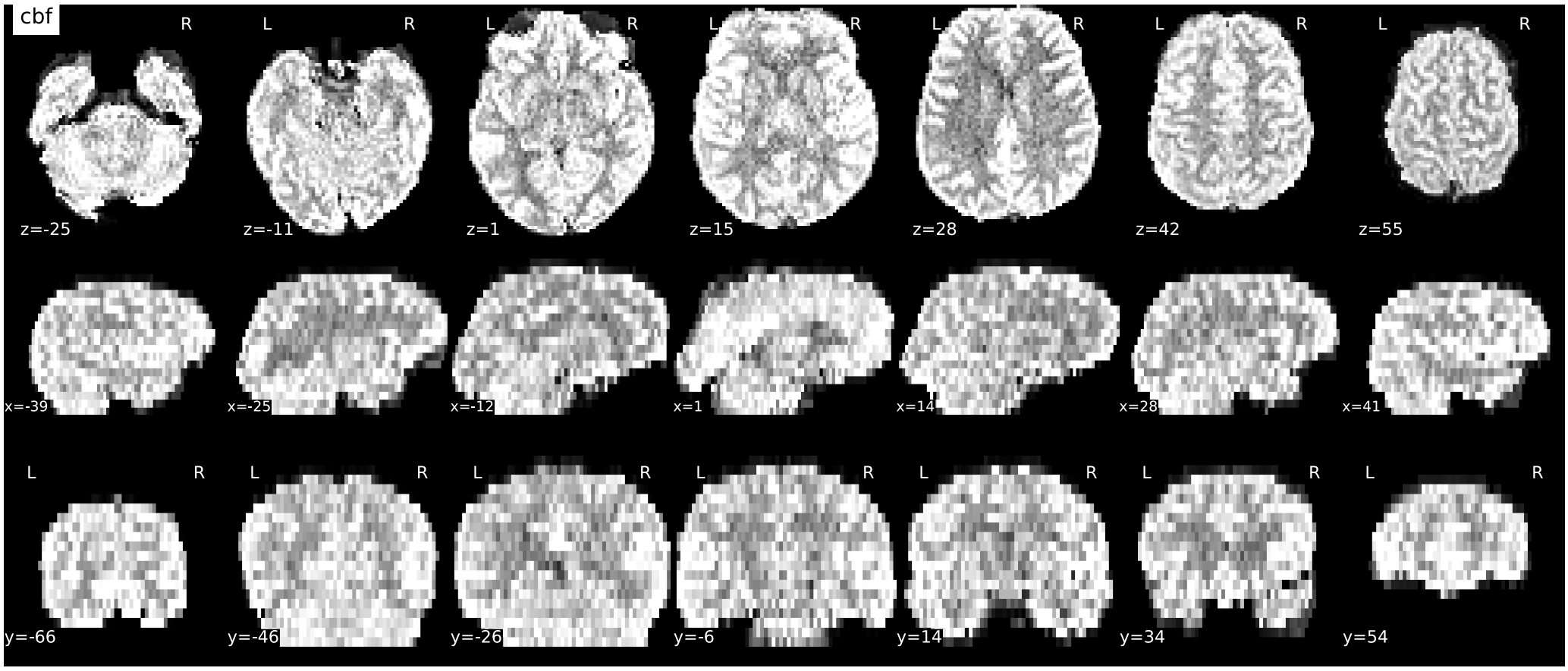
This carpet plot shows the time series for all voxels within the brain mask for CBF. Voxels are grouped into cortical (blue), and subcortical (orange) gray matter, cerebellum (green), white matter and CSF (red), indicated by the color map on the left-hand side. The score Index with value greater than zero indicates which volume(s) are removed by SCORE.



Get figure file: sub-486306438/figures/sub-486306438_ses-PNC1_task-rest_acq-se_desc-cbftsplot_asl.svg

CBF maps

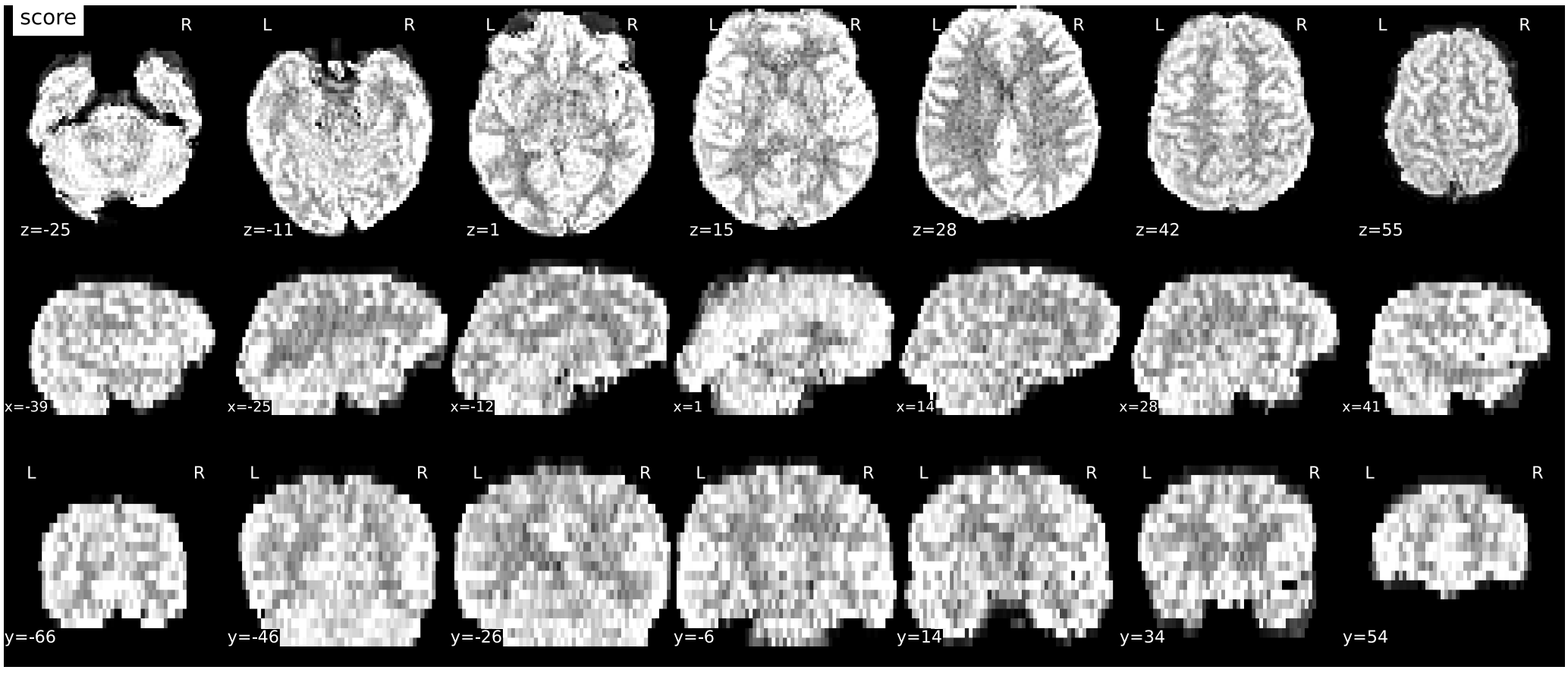
The maps plot cerebral blood flow (CBF) for basic CBF. The unit is mL 100/g/min



Get figure file: sub-486306438/figures/sub-486306438_ses-PNC1_task-rest_acq-se_desc-cbfplot_asl.svg

SCORE CBF maps

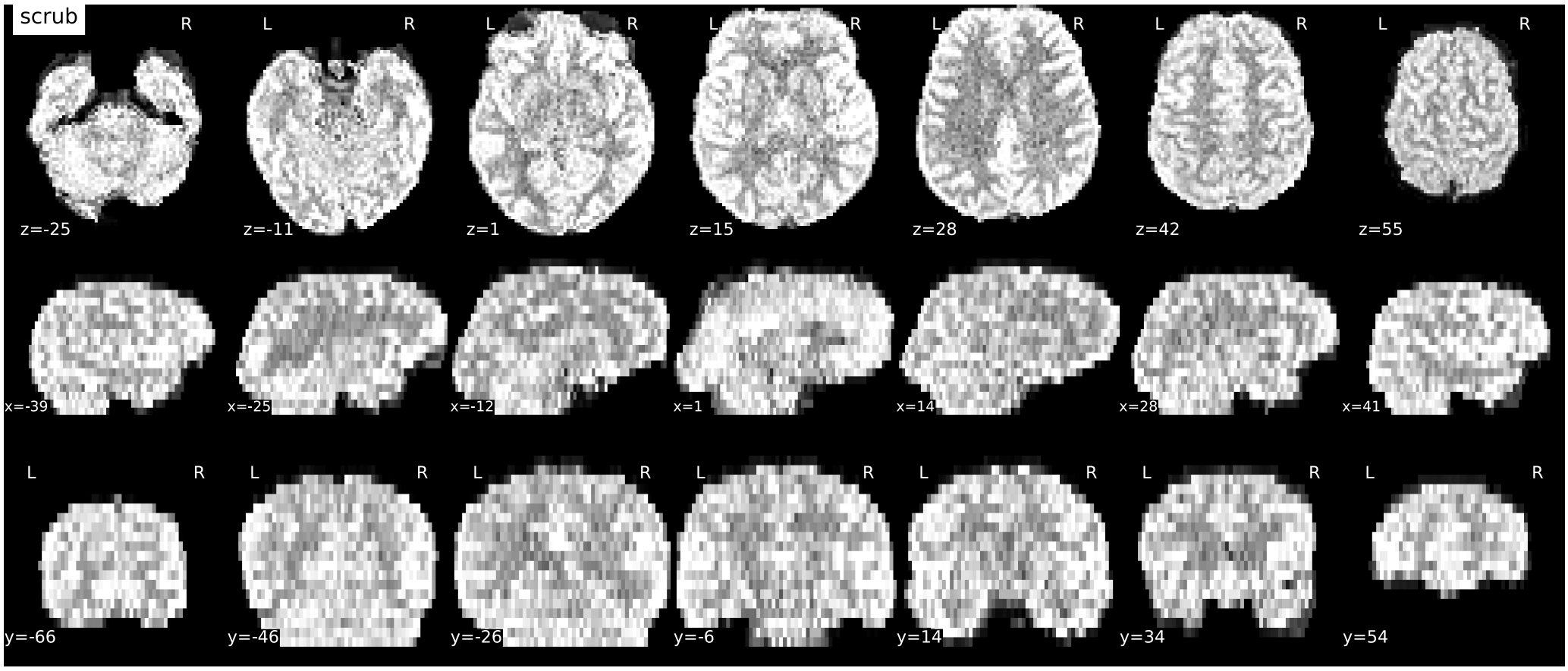
The maps plot cerebral blood flow (CBF) for SCORE-corrected CBF. The unit is mL 100/g/min



Get figure file: sub-486306438/figures/sub-486306438_ses-PNC1_task-rest_acq-se_desc-scoreplot_asl.svg

SCRUB CBF maps

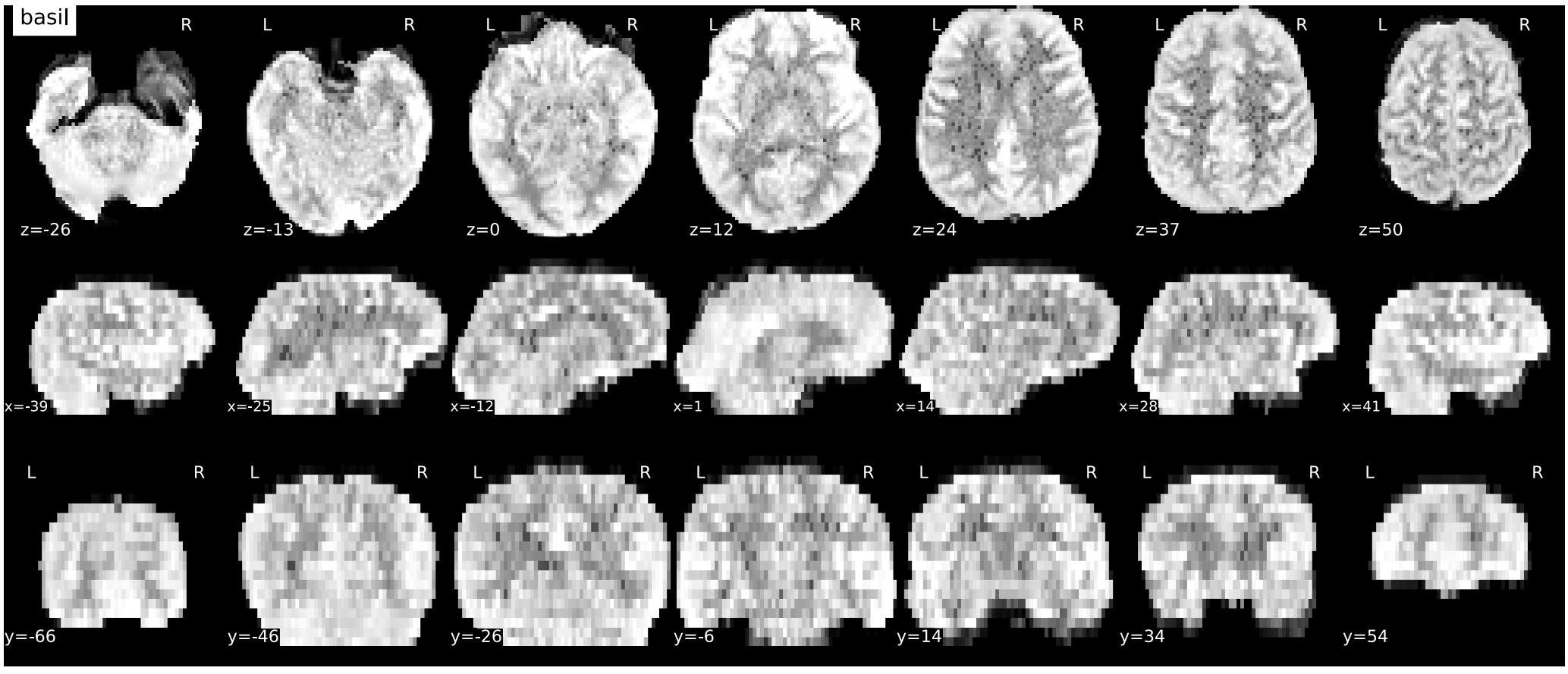
The maps plot cerebral blood flow (CBF) for SCRUB-corrected CBF. The unit is mL 100/g/min



Get figure file: sub-486306438/figures/sub-486306438_ses-PNC1_task-rest_acq-se_desc-scrubplot_asl.svg

BASIL CBF maps

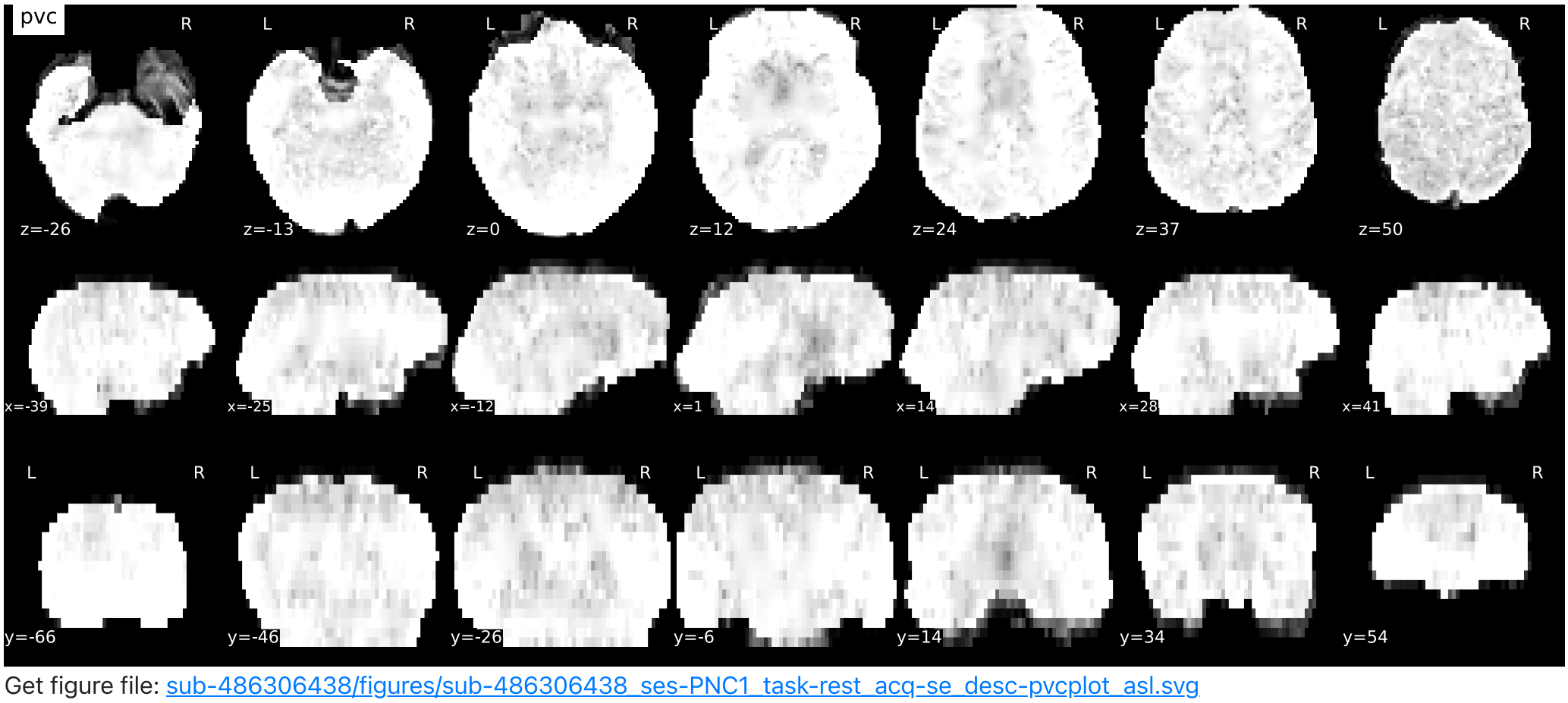
The maps plot cerebral blood flow (CBF) for BASIL-estimated CBF. The unit is mL 100/g/min



Get figure file: sub-486306438/figures/sub-486306438_ses-PNC1_task-rest_acq-se_desc-basilplot_asl.svg

PVC CBF maps

The maps plot cerebral blood flow (CBF) for partial volume-corrected CBF. The unit is mL 100/g/min



Get figure file: sub-486306438/figures/sub-486306438_ses-PNC1_task-rest_acq-se_desc-pvcplot_asl.svg

About

- ASLPrep version: 0.2.6
- ASLPrep command: `/usr/local/miniconda/bin/aslprep /cbica/projects/GURLAB/projects/aslpipeline/bids_data/PNCdata /cbica/projects/GURLAB/projects/aslpipeline/aslprepoutput/pncdata participant --participant_label 486306438 --nprocs 8 -w /cbica/projects/GURLAB/projects/aslpipeline/aslwkdir/pncdata --fs-license-file /cbica/software/external/freesurfer/centos7/6.0.0/license.txt --skip_bids_validation --anat-derivatives /cbica/projects/GURLAB/projects/aslpipeline/aslprepoutput/pncdata/aslprep/sub-486306438/anat/ --basil --scorescrub`
- Date preprocessed: 2020-12-07 05:57:39 -0500

Methods

We kindly ask to report results preprocessed with this tool using the following boilerplate.

HTML | Markdown | LaTeX

Results included in this manuscript come from preprocessing performed using *aslprep* 0.2.6, which is based on *Nipype* 1.6.0 (Gorgolewski et al. (2011); Gorgolewski et al. (2018); RRID:SCR_002502).

Anatomical data preprocessing

A total of 1 T1-weighted (T1w) images were found within the input BIDS dataset.The T1-weighted (T1w) image was corrected for intensity non-uniformity (INU) with `N4BiasFieldCorrection` (Tustison et al. 2010), distributed with ANTs 2.3.1 (Avants et al. 2008, RRID:SCR_004757), and used as T1w-reference throughout the workflow. The T1w-reference was then skull-stripped with a *Nipype* implementation of the `antsBrainExtraction.sh` workflow (from ANTs), using OASIS30ANTs as target template. Brain tissue segmentation of cerebrospinal fluid (CSF), white-matter (WM) and gray-matter (GM) was performed on the brain-extracted T1w using `fast` (FSL 6.0.3:b862cdd5, RRID:SCR_002823, Zhang, Brady, and Smith 2001). Volume-based spatial normalization to one standard space (MNI152NLin2009cAsym) was performed through nonlinear registration with `antsRegistration` (ANTs 2.3.1), using brain-extracted versions of both T1w reference and the T1w template. The following template was selected for spatial normalization: *ICBM 152 Nonlinear Asymmetrical template version 2009c* [Fonov et al. (2009), RRID:SCR_008796; TemplateFlow ID: MNI152NLin2009cAsym],

Functional data preprocessing

For each of the 1 ASL runs found per subject (across all tasks and sessions), the following preprocessing was performed. First, a reference volume and its skull-stripped version were generated . Head-motion parameters with respect to the ASL reference (transformation matrices, and six corresponding rotation and translation parameters) are estimated before any spatiotemporal filtering using `mcflirt` (FSL 6.0.3:b862cdd5, Jenkinson et al. 2002). ASL runs were slice-time corrected using `3dTshift` from AFNI 20160207 (Cox and Hyde 1997, RRID:SCR_005927). The ASL reference was then co-registered to the T1w reference using `flirt` (FSL 6.0.3:b862cdd5, Jenkinson and Smith 2001) with the boundary-based registration (Greve and Fischl 2009) cost-function. Co-registration was configured with nine degrees of freedom to account for distortions remaining in the ASL reference. The asl time-series (including slice-timing correction when applied) were resampled onto their original, native space by applying the transforms to correct

for head-motion. These resampled asl time-series will be referred to as *preprocessed asl in original space*, or just *preprocessed asl*. The CBF was quantified from *preproccessed* ASL data using a relatively basic model (Detre et al. 1992) (Alsop et al. 2015). CBF are susceptible to artifactsdue to low signal to noise ratio and sensitivity to motion, Structural Correlation based Outlier Rejection (SCORE) algothim was applied to the CBF to discard few extreme outliers (Dolui et al. 2017). Furthermore,Structural Correlation with RobUst Bayesian (SCRUB) algorithms was applied to the CBF by iteratively reweighted CBF with structural tissues probalility maps (Sudipto Dolui David A. Wolk and Detre 2016). Alternate method of CBF computation is Bayesian Inference for Arterial Spin Labeling (BASIL) as implmented in FSL which is based on Bayeisan inference principles (Chappell et al. 2009). BASIL computed the CBF from ASL incoporating natural varaibility of other model parameters and spatial regularization of the estimated perfusion image. BASIL also included correction for partial volume effects (Chappell et al. 2011). The ASL and CBF dreivatives were resampled into standard space, generating a *preprocessed ASL and computed CBF in MNI152NLin2009cAsym space*. First, a reference volume and its skull-stripped version were generated . Several confounding time-series were calculated based on the *preprocessed ASL*: framewise displacement (FD) and DVARS. FD and DVARS are calculated for each ASL run, both using their implementations in *Nipype* (following the definitions by Power et al. 2014). The head-motion estimates calculated in the correction step were also placed within the corresponding confounds file.

The following quality control (qc) measures was estimated: framewise displacement and relative root mean square dice index. Other qc meaure include dice and jaccard indices, cross-correlation and coverage that estimate the coregistration quality of ASL and T1W images and normalization quality of ASL to template. Quality evaluation index (QEI) was also computed for CBF (S. A. N. Sudipto Dolui Ronald Wolf 2016). The QEI is automated for objective quality evaluation of CBF maps and measured the CBF quality based on structural similarity,spatial variability and the percentatge of voxels with negtaive CBF within Grey matter All resamplings can be performed with *a single interpolation step* by composing all the pertinent transformations (i.e. head-motion transform matrices, susceptibility distortion correction when available, and co-registrations to anatomical and output spaces). Gridded (volumetric) resamplings were performed using `antsApplyTransforms` (ANTs), configured with Lanczos interpolation to minimize the smoothing effects of other kernels (Lanczos 1964).

Many internal operations of *aslprep* use *Nilearn* 0.7.0 (Abraham et al. 2014, RRID:SCR_001362), mostly within the functional processing workflow. For more details of the pipeline, see the section corresponding to workflows in *aslprep*'s documentation.

Copyright Waiver

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Errors

No errors to report!