


Assessing the quality of ongoing acquisitions

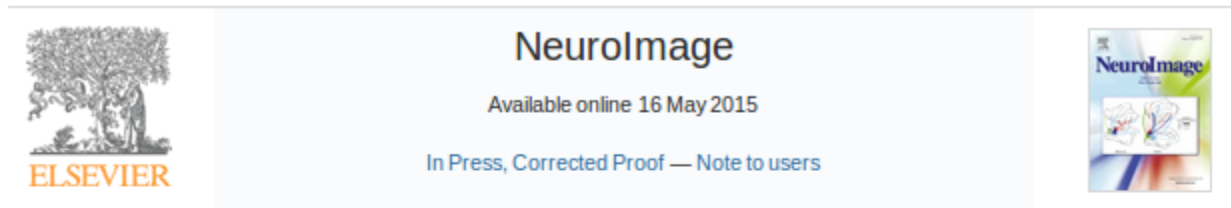
**Joseph D Viviano, Sofia Chavez,
Jon Pipitone, & Aristotle N Voineskos**

'Big' Data & Neuroimaging

- Need for **curation before sharing**.
 - Neural Network: 10,000's - 1,000,000's of images.
 - Big imaging study: 100's.

 - MRI artefacts
 - Participant performance
 - Data labeling / format
- 
- Study-specific!
- Data organization **automatic** and both **human/machine readable**.
 - QC of human and phantom data at the databasing stage with **audit trail**.

Other (Excellent) Work



Vanderbilt University Institute of Imaging Science Center for Computational Imaging XNAT: A multimodal data archive and processing environment ☆

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<https://github.com/VUIIS>

Other (Excellent) Work

SCIENTIFIC DATA

OPEN

SUBJECT CATEGORIES

- » Neuroinformatics
- » Brain imaging
- » Functional magnetic resonance imaging
- » Cognitive neuroscience

An open science resource for establishing reliability and reproducibility in functional connectomics

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Naming: Subjects

[study]_[site]_[ID]_[timepoint]_[repeat]

eg.

DTI_CMH_H001_01_01

SPN01_ZHH_00009_01_01

Naming: Acquisition

exportinfo.csv

DICOM header



[exam name]_[tag]_[series #]_[description].[extension]

eg.

DTI_CMH_H001_01_01_T1_08_Sag-T1-BRAVO.nii.gz

DTI_CMH_H001_01_01_FLAIR_11_Obl-Ax-T2-Flair.nii.gz

Naming: Tags

pattern	tag	export_mnc	export_nii
T1	T1	yes	yes
DTI-60	DTI60-1000	no	yes
Rest	RST	no	yes
TE6.5	FMAP-6.5	no	yes
FLAIR	FLAIR	no	yes
Loc	?	no	no

TAG used to guide all future pipelines

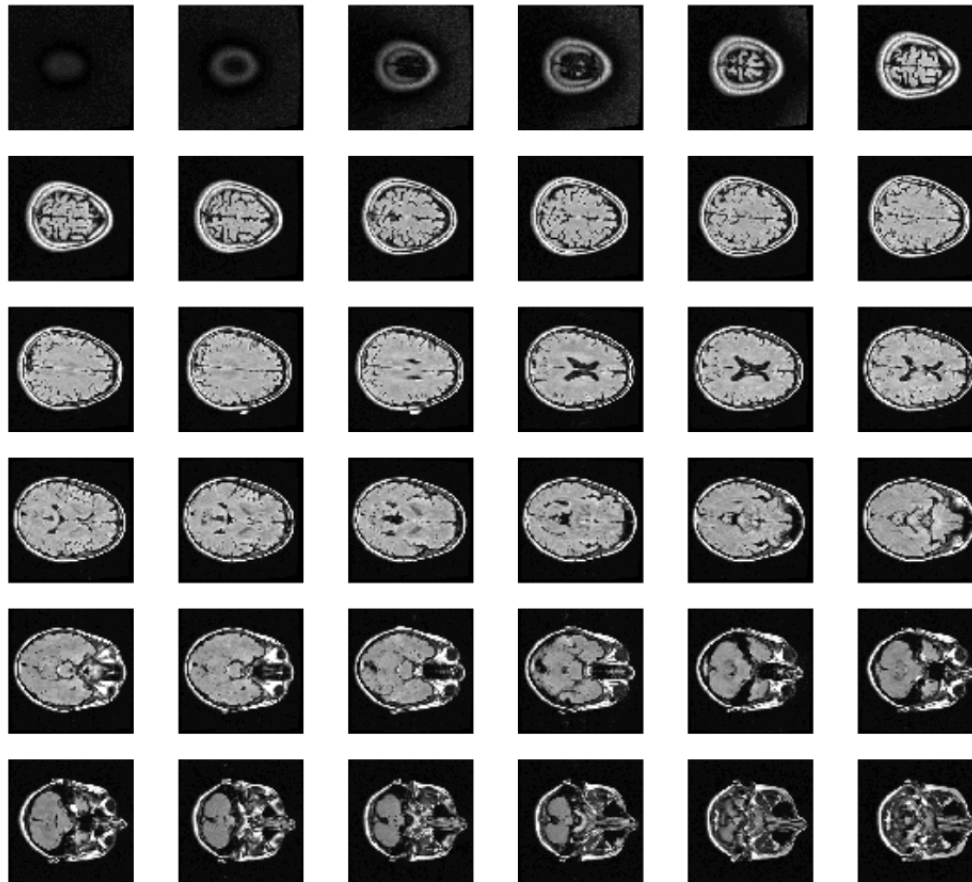
REGEX in DICOM description field

Automatic Reports

- Completely manual QC does not scale.
 - Replace with visual aids.
- Single-subject PDF reports.
 - Host on github.
- Longitudinal subject/phantom metrics.
 - Online dashboard.

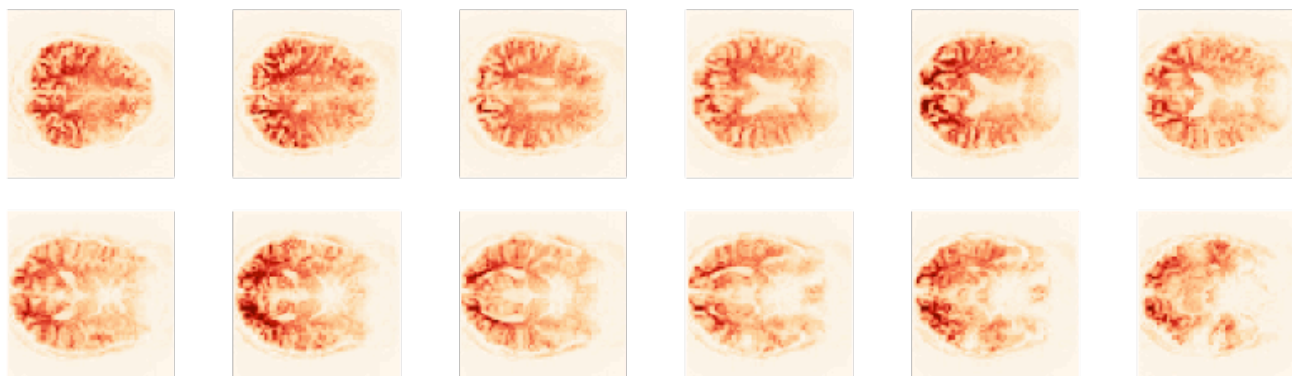
Human: Geometry

SPN01_XXX_XXXX_01_01_FLAIR_22_T2-FLAIR-AX-OBL.nii.gz
FLAIR-contrast

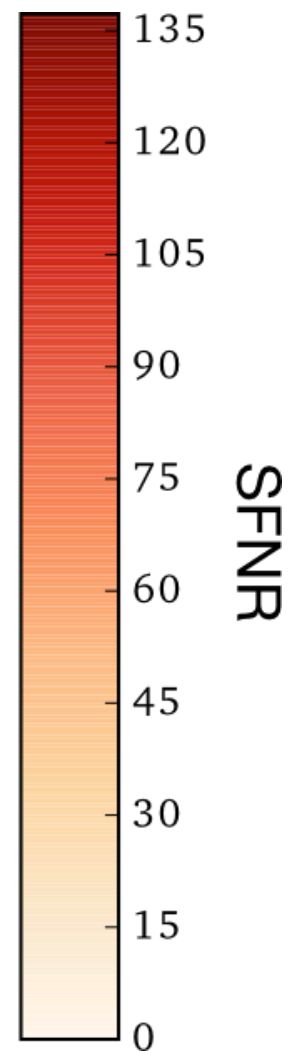
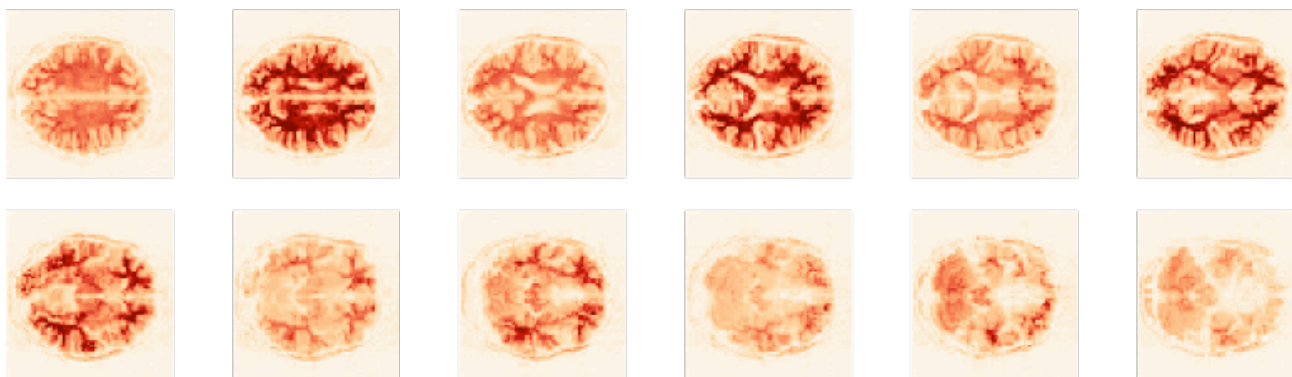


Human: SFNR

SPN01_ABC_XXXX_01_01_IMI_11_fMRI-Imitation-110.nii.gz



SPN01_DEF_XXXX_01_01_RST_07_Ax-RestingState.nii.gz



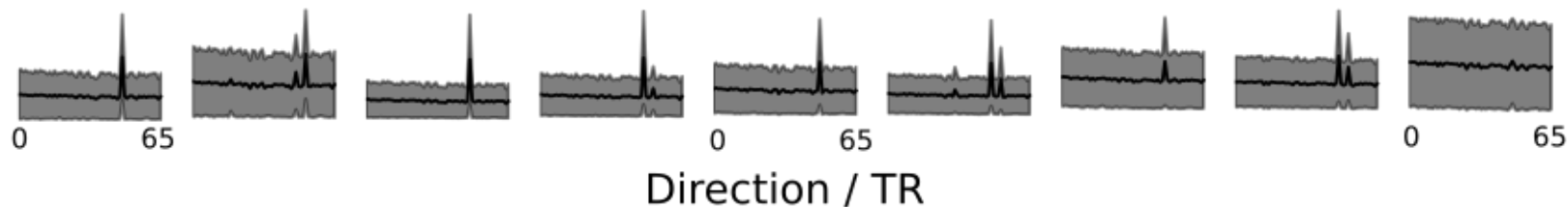
Human: EPI Outliers

SPN01_XXX_XXXX_01_01_DTI60-1000_20_DTI-B-1000-60+5.nii.gz
DTI Slice/TR Wise Abnormalities

Slice 10

Slice 14

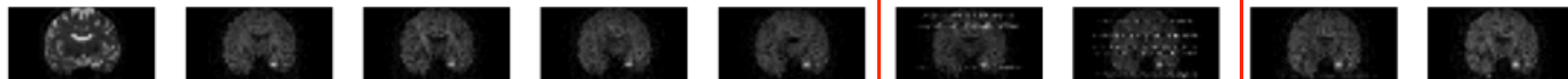
Slice 18



Dir 0

Dir 30

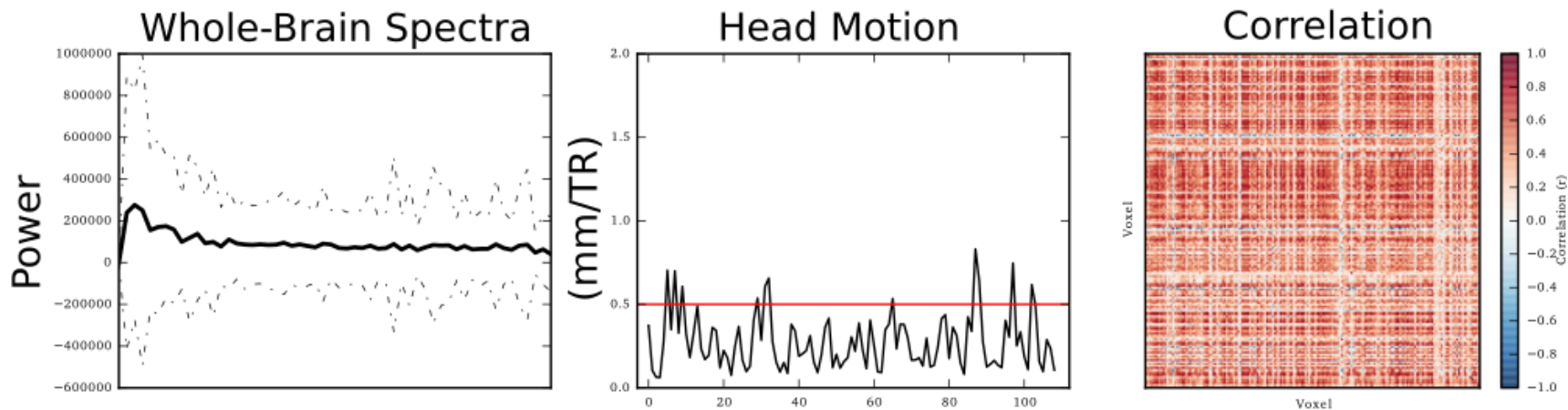
Dir 60



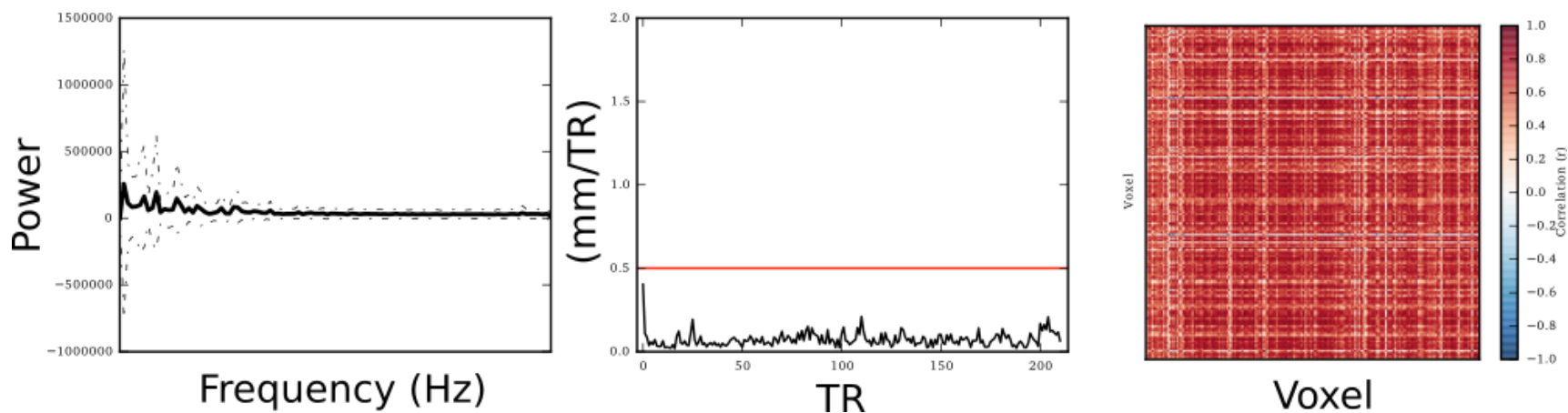
Slices

Human: fMRI

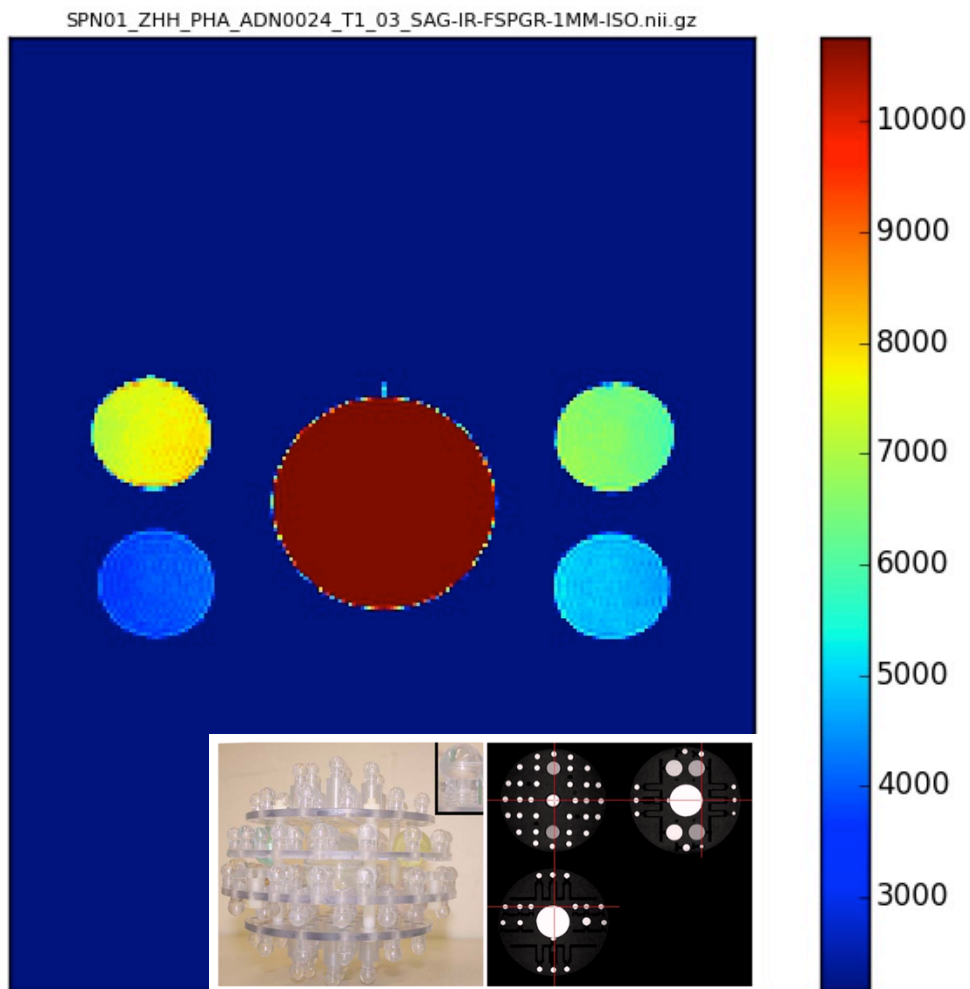
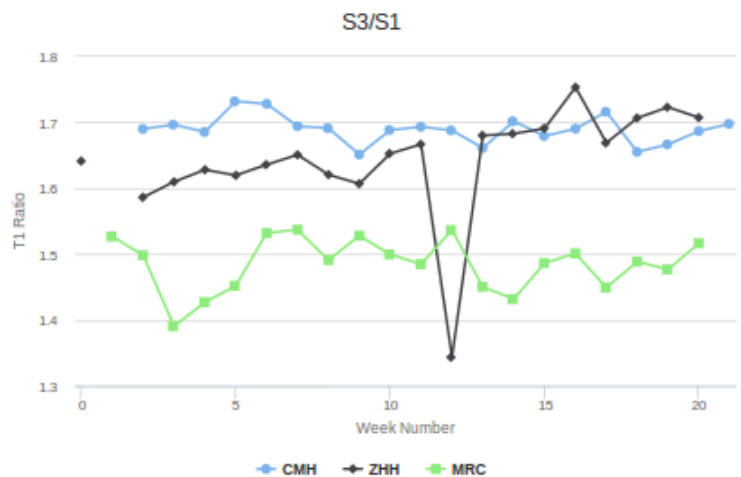
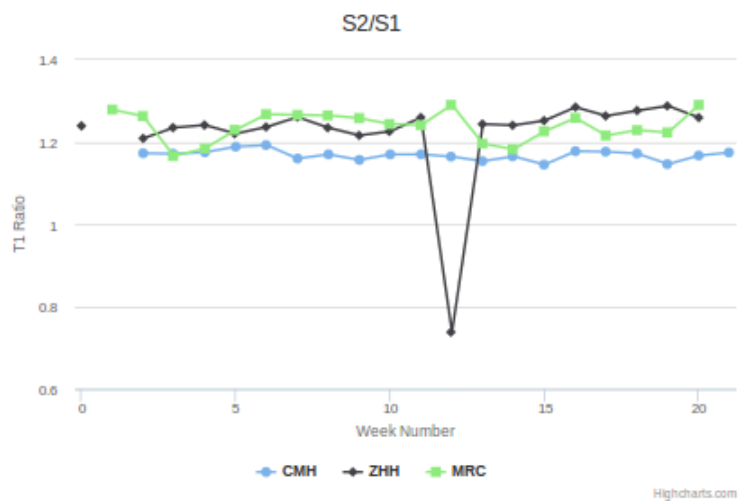
SPN01_CMH_0005_01_01_IMI_10_Ax-Imitate-Task.nii.gz



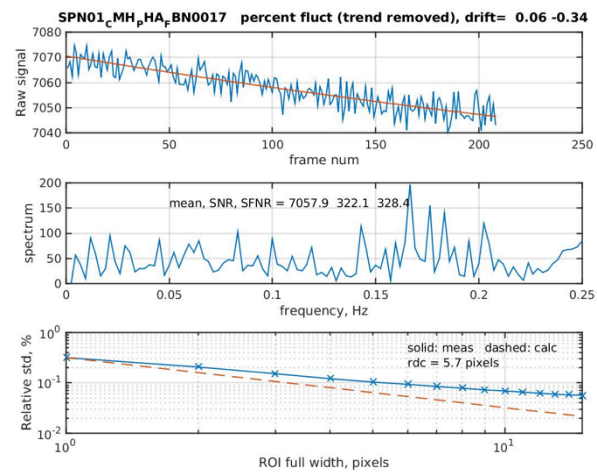
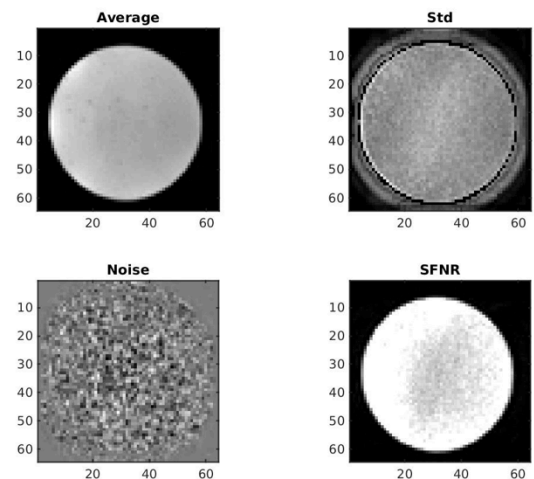
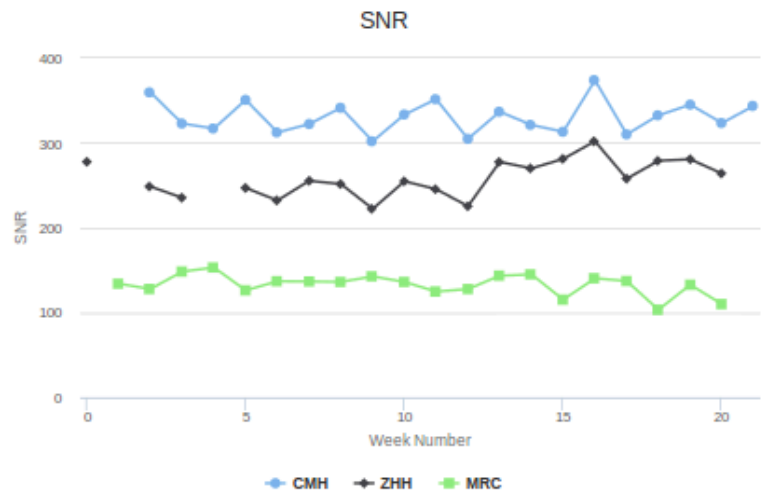
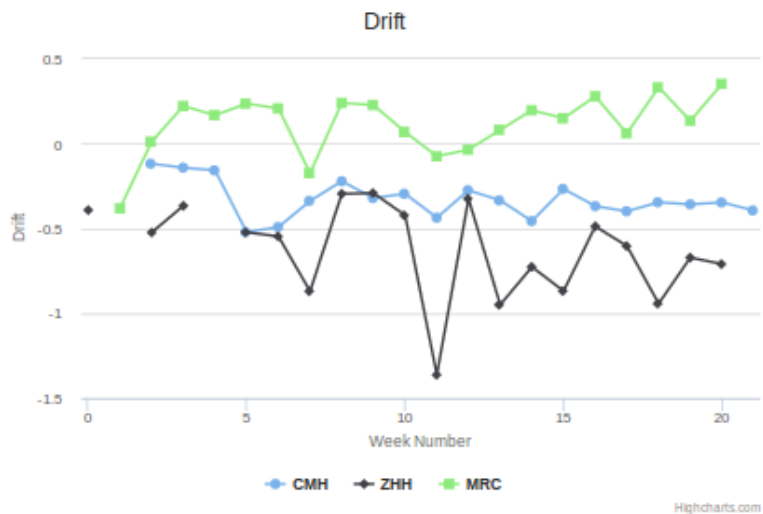
SPN01_CMH_0005_01_01_RST_07_Ax-RestingState.nii.gz



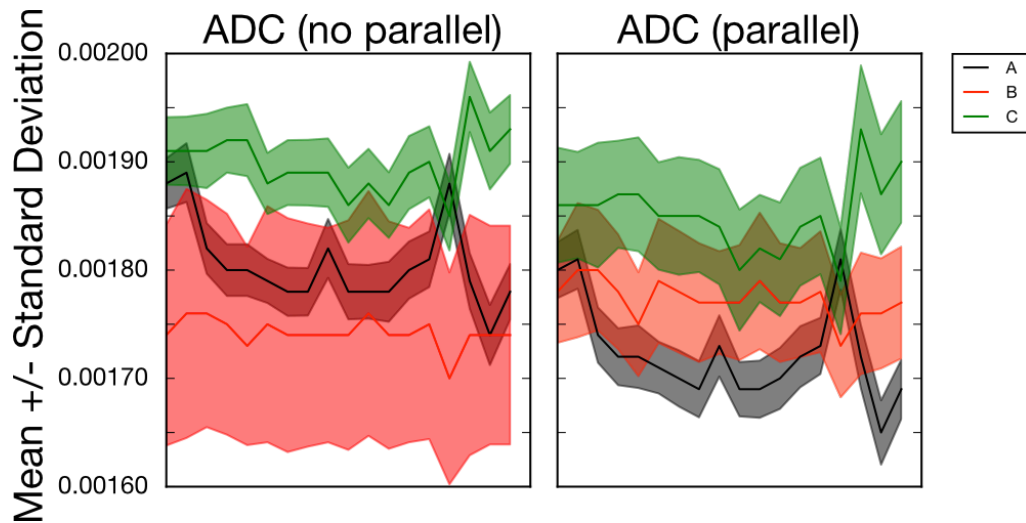
Phantom: ADNI



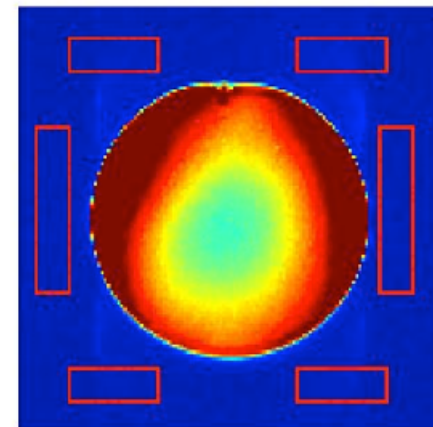
Phantom: fMRI (fBIRN)



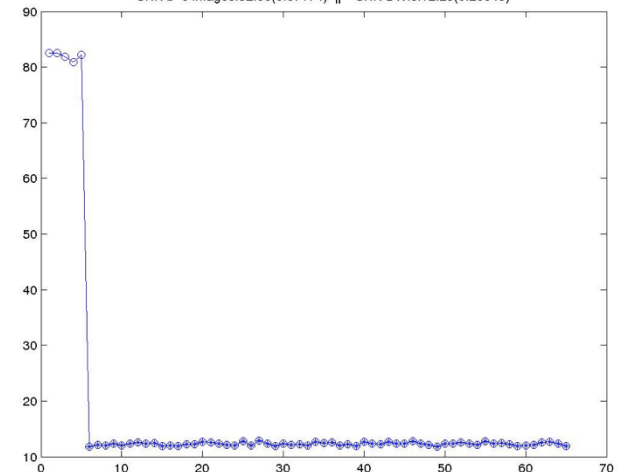
Phantom: DTI



b=0 Img#6 ROI regions for Nyquist ratio



SNR b=0 Images:82.00(0.67174) || SNR DWIs:12.29(0.26649)



- Eddy current distortion.
- SNR, ADC, FA, with & without parallel reconstruction.
- Nyquist ghost (calc on B0).

Thank You

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Mind Research Network

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www.github.com/tigrlab

www.github.com/VUIIS