



Resting state fMRI and ICA

- Introduction to resting state
- Independent Component Analysis
- **Single-subject ICA**
- Multi-subject ICA
- Dual regression

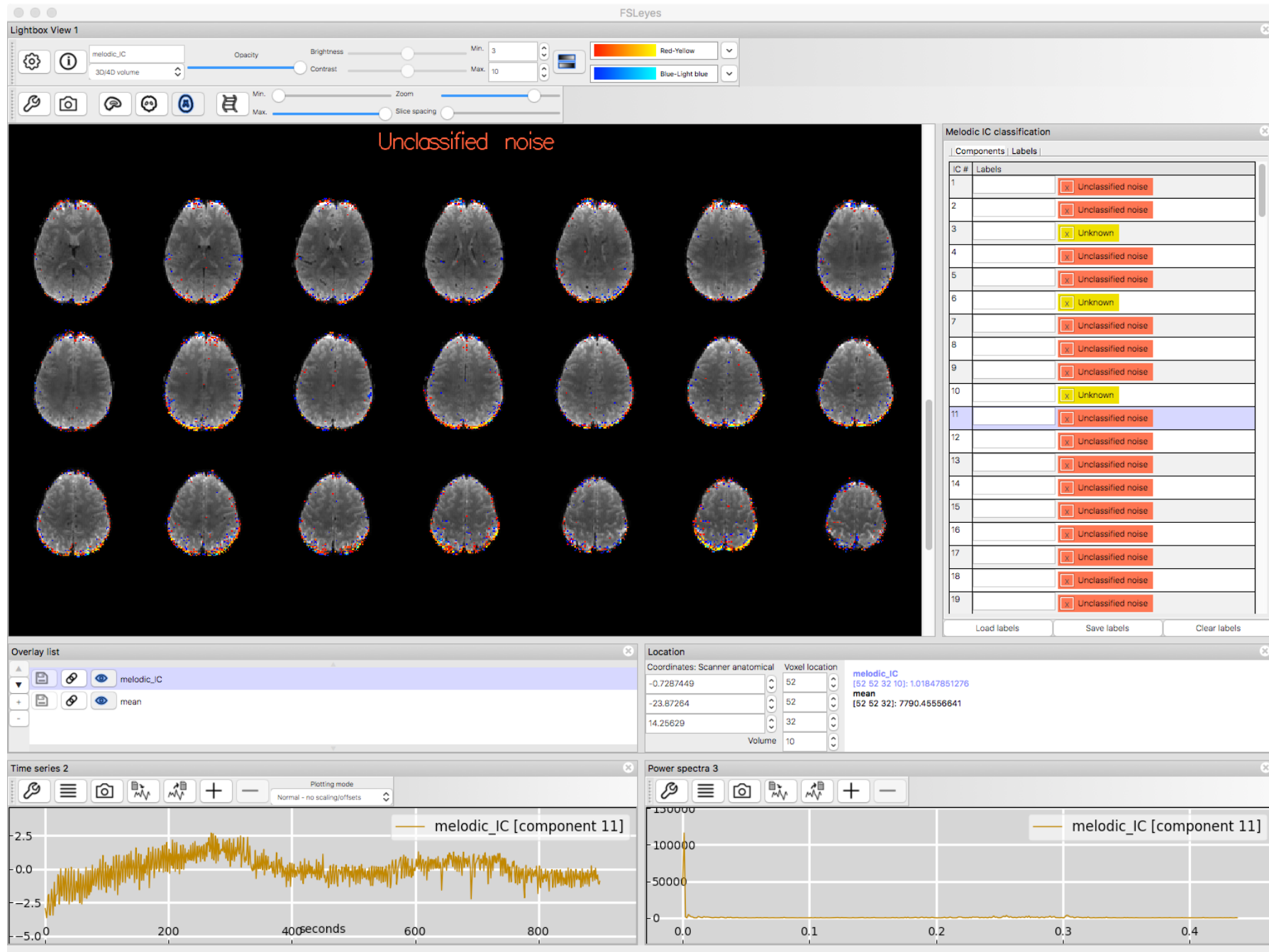


Artefact detection

- FMRI data contain a variety of source processes
- Artifactual sources typically have unknown spatial and temporal extent and cannot easily be modelled accurately
- Exploratory techniques do not require a priori knowledge of time-courses and spatial maps

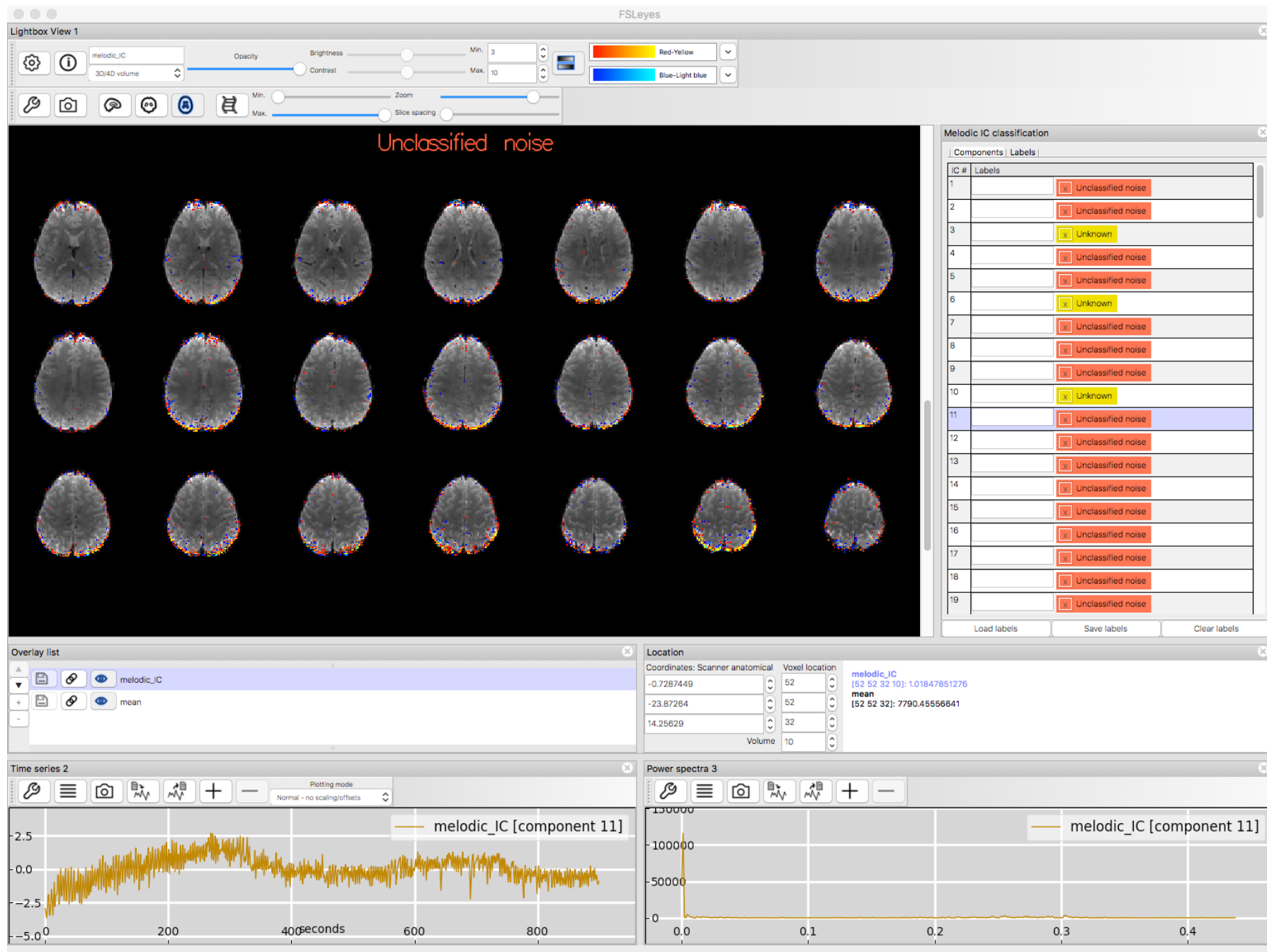


FSLeyes Melodic Mode



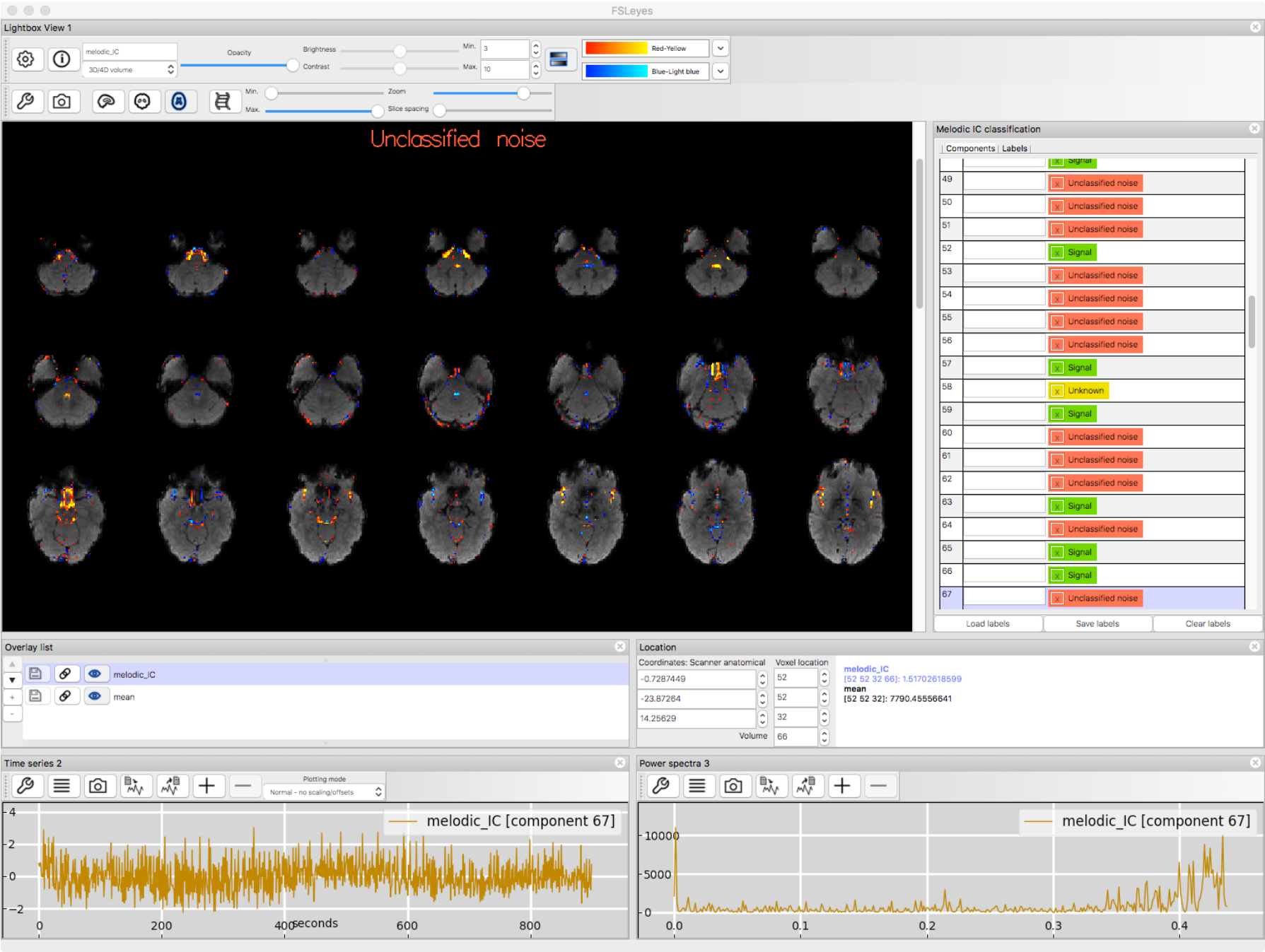


motion



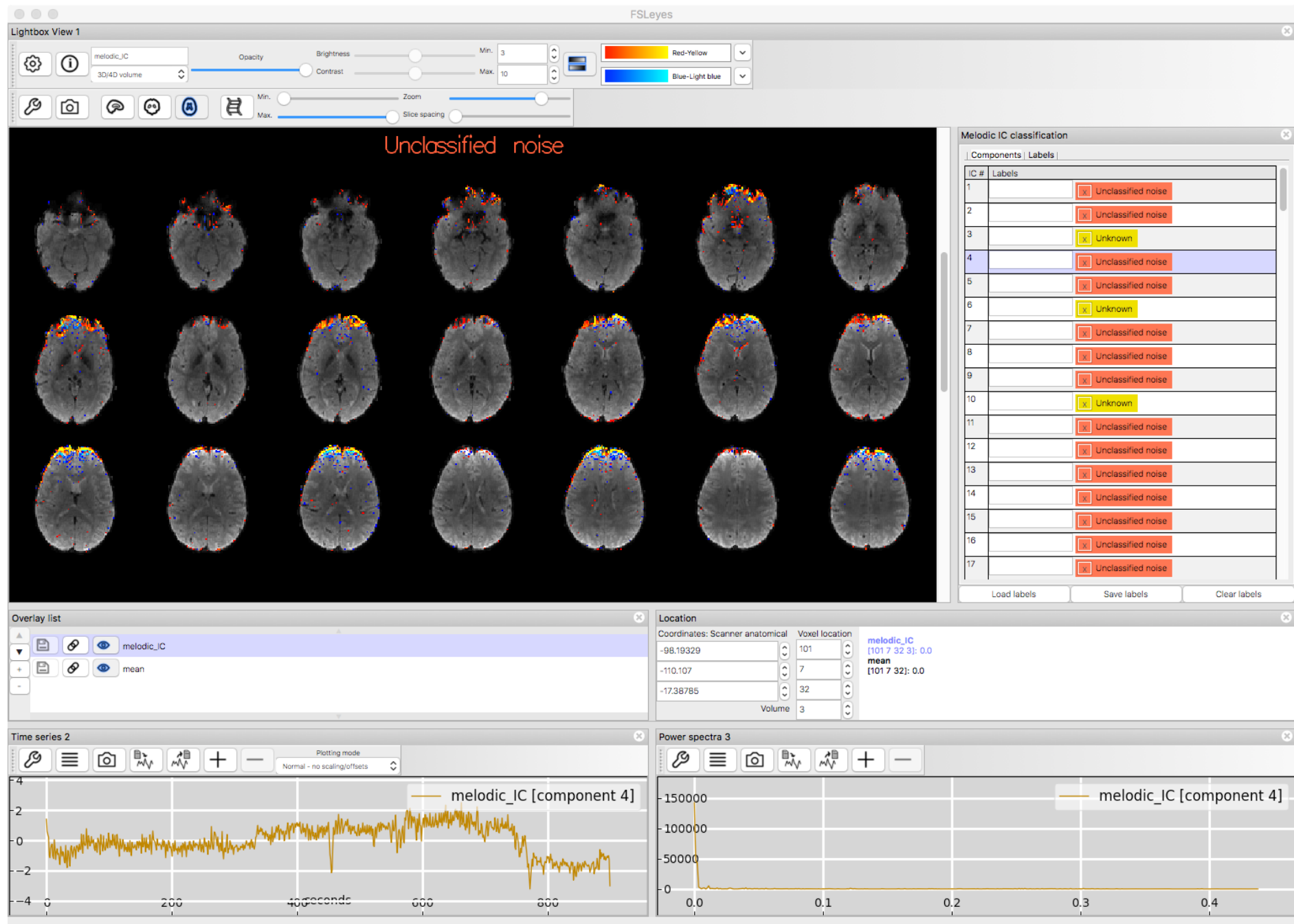


cardiac



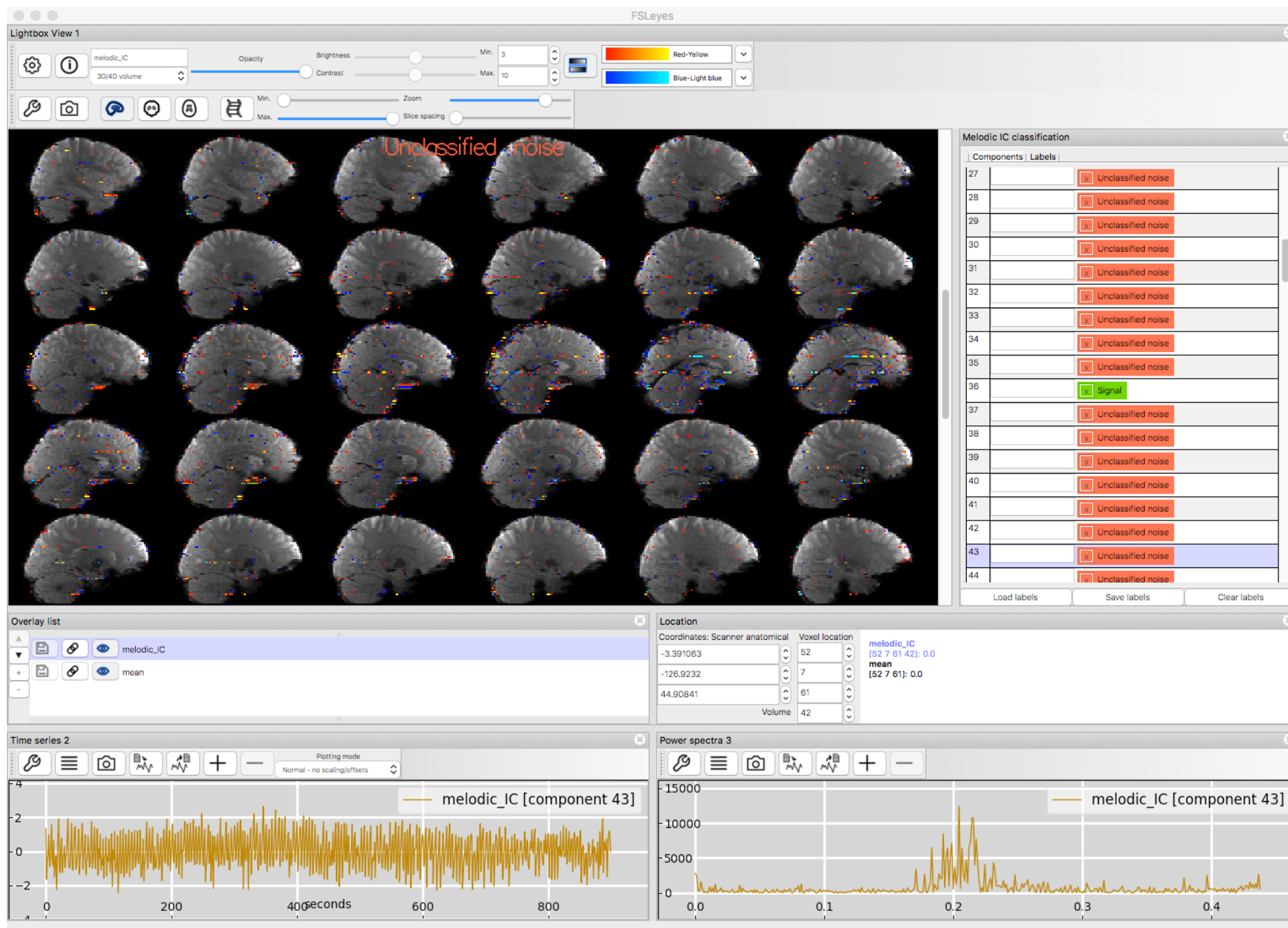


susceptibility motion



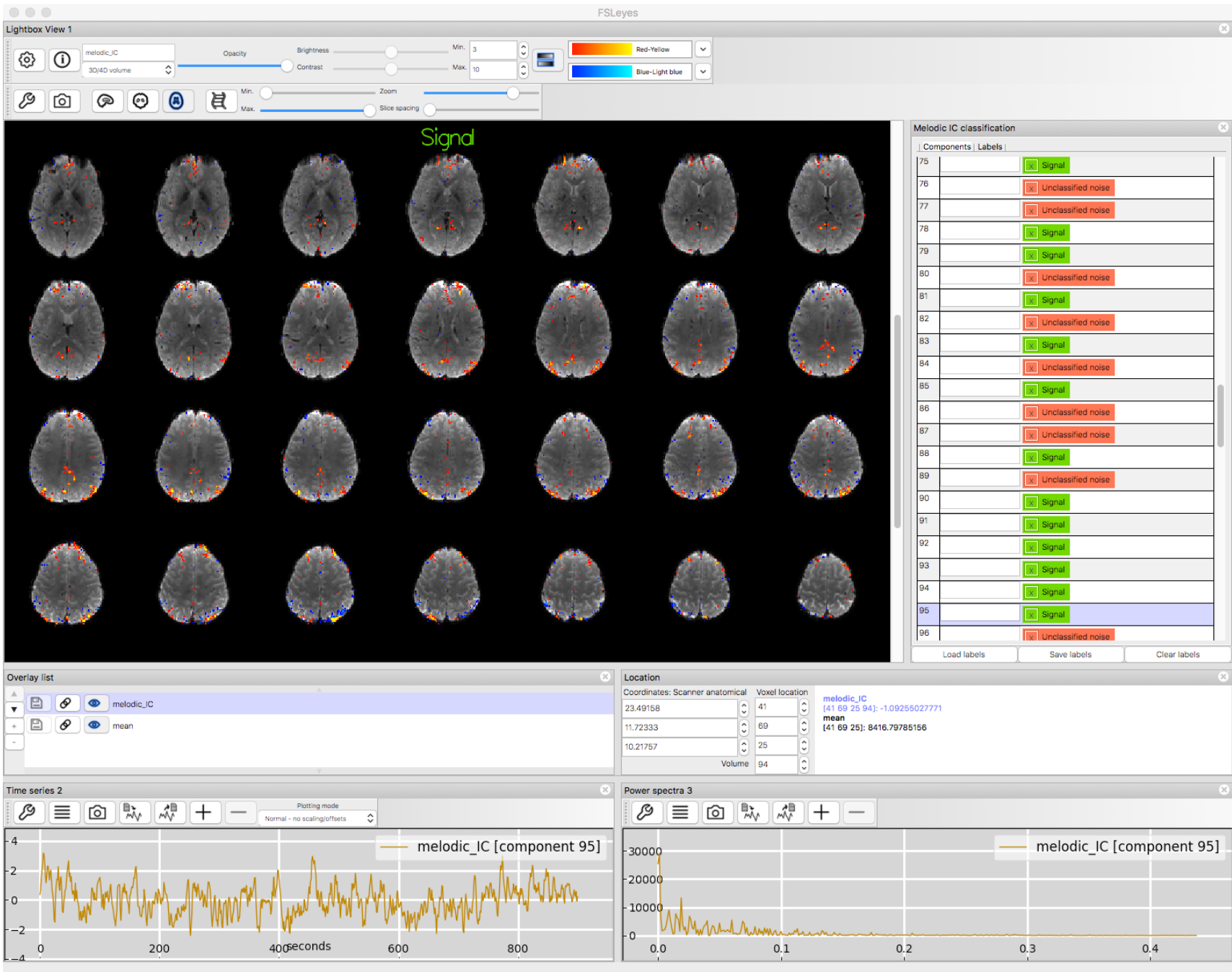


multiband



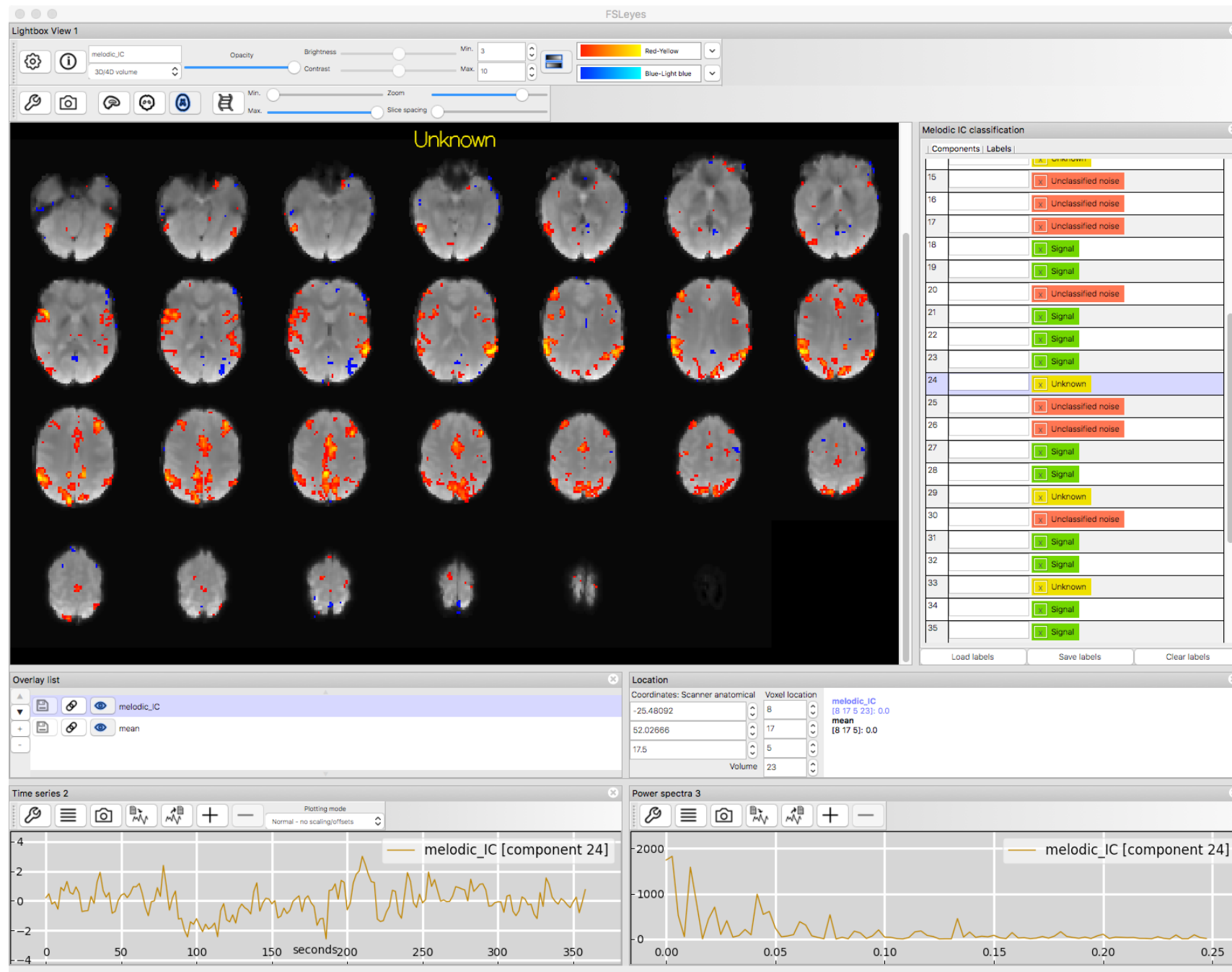


signal



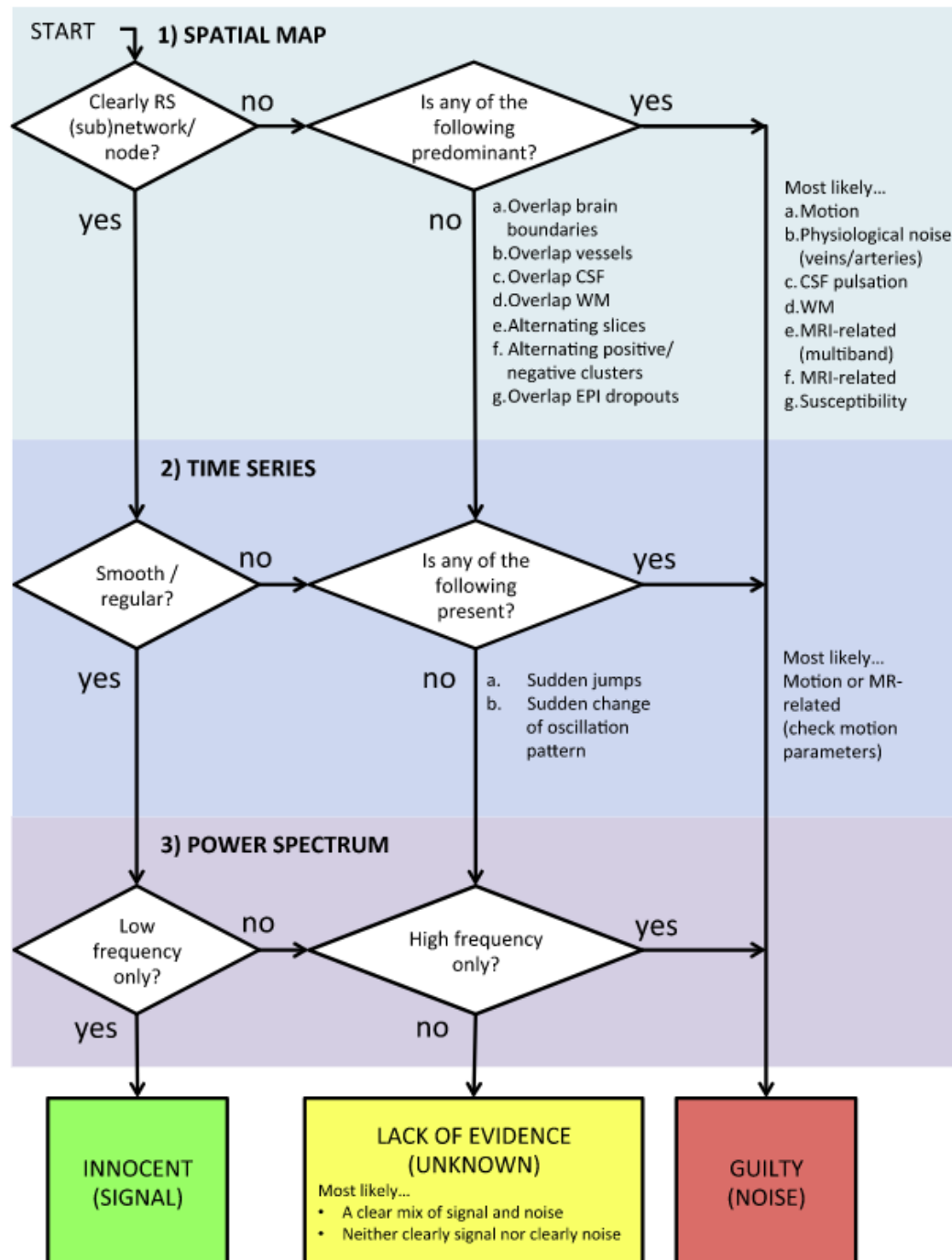


effects of scan parameters





manual classification



Griffanti et al (2016).

<https://doi.org/10.1016/j.neuroimage.2016.12.036>



semi-automatic classification



semi-automatic classification

- FIX (fsl.fmrib.ox.ac.uk/fsl/fslwiki/FIX)
 - Classifier with many features
 - Requires manually labelled training data
 - 99% accuracy on high-quality data

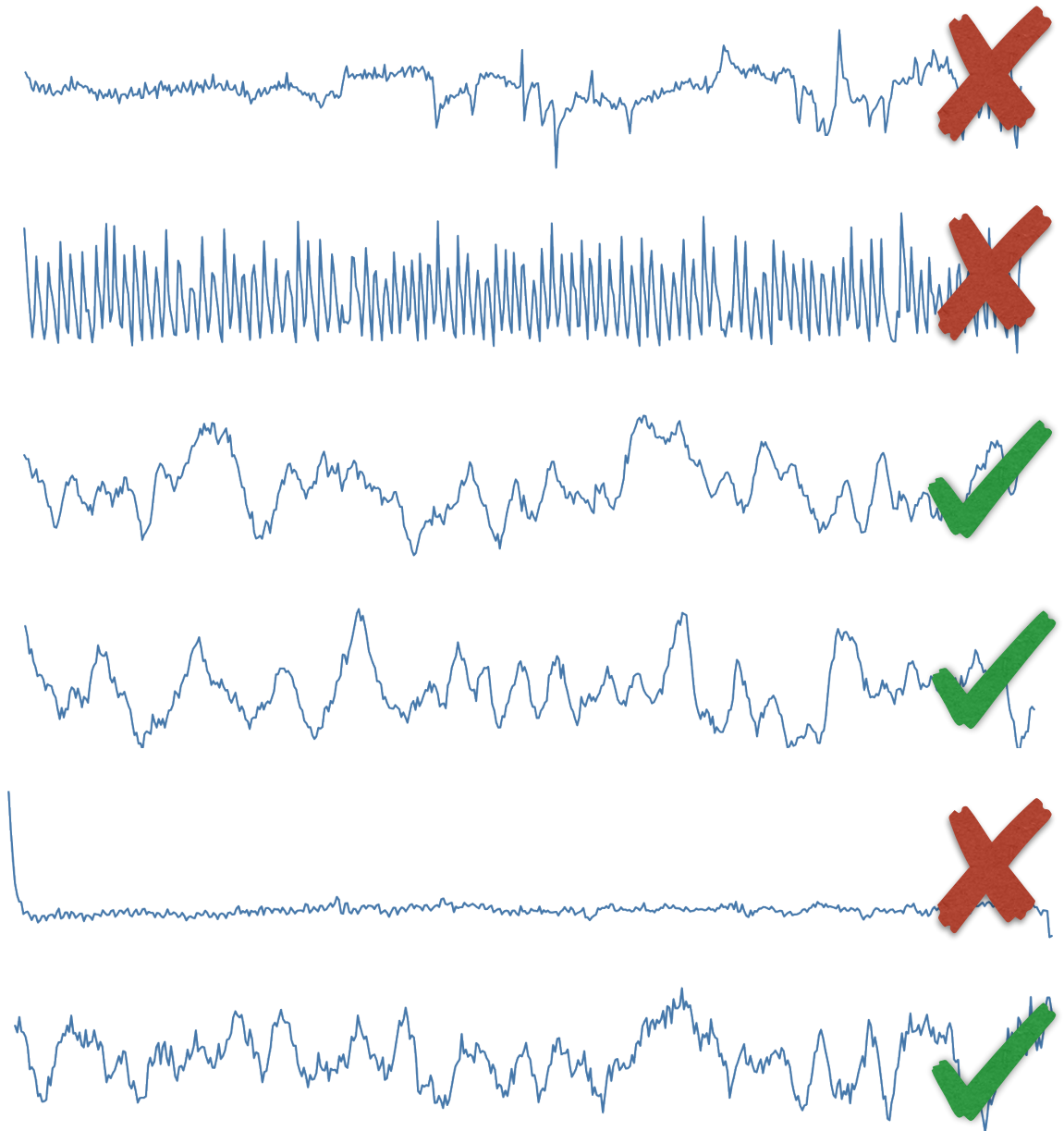
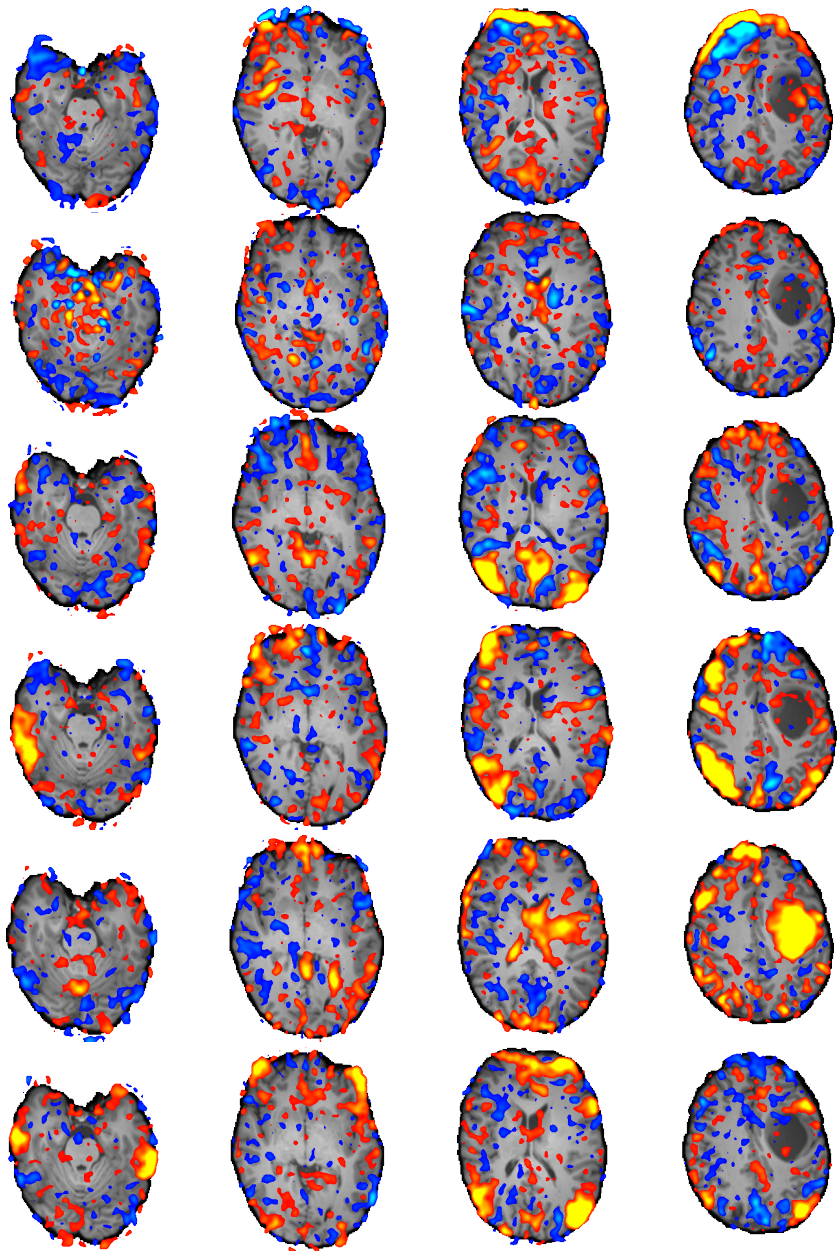


semi-automatic classification

- FIX (fsl.fmrib.ox.ac.uk/fsl/fslwiki/FIX)
 - Classifier with many features
 - Requires manually labelled training data
 - 99% accuracy on high-quality data
- ICA-AROMA (github.com/rhr-pruim/ICA-AROMA)
 - Simple classifier with only 4 features
 - No training data required
 - Mainly designed for motion artefacts

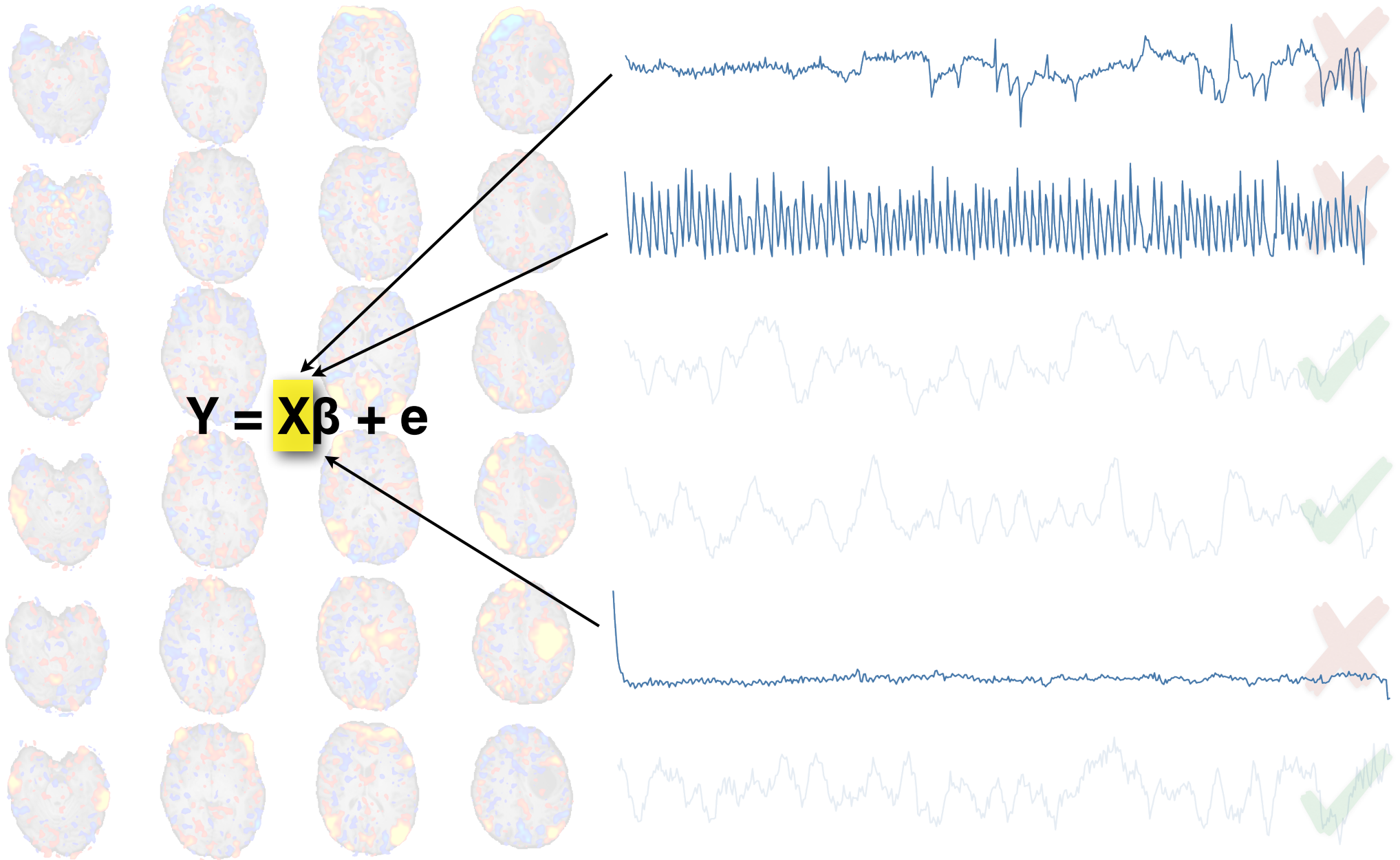


ICA-based denoising





ICA-based denoising





ICA-based denoising

