Multi-echo fMRI

| Echo 1 |
| Echo 2 |
| ... |
| Echo N |

Calculate mean fit decays across time
tedana.py 419: decay.fit_decay called

T_2* Map
tedana.py 419: decay.fit_decay called

S_0 Map
tedana.py 419: decay.fit_decay called

Calculate weights for each echo to "Optimize" T_2*
tedana.py 442: combine.make_optcom

Optimal Combination
(Weighted Average)
of the echoes

PCA
with dimensionality reduction
tedana.py 463: decomposition.tedpca called

Unmodeled signal to
remain in the denoised
time series

ICA
tedana.py 506: decomposition.tedica called

ICAbeta: ICA "beta" magnitude
maps for each component
kundufit.py dependence_metrics tsoc_b 104
PSC and WTS are variants

ICAts: ICA time series
for each component
mmix_orig tedana.py 506
Then scaled in kundufit.py
dependence_metrics to mmix

Fit T2 Model for each component

Fit S0 Model for each component

Z_clMap: Binary map of spatial clusters
for above thresh component beta values
dependence_metrics 267

T2Fmap: Voxelwise F stats of
goodness of fit to T2* model
F_R2_maps in dependence_metrics 170

S0Fmap: Voxelwise F stats of
goodness of fit to S0 model
F_S0_maps in dependence_metrics 161

Model parameters used in the decision process **Each parameter has a single value per component**			
Param Name	**Param Description**	**Inputs for calculations**	**Location in code**
kappa	Weighted sum of T2* F stats and component betas for each component	T2Fmap ICAbeta	dependence_metrics 182
rho	Weighted sum of S0 F stats and component betas for each component	S0Fmap ICAbeta	dependence_metrics 183
varexp	Variance Explained	ICAbeta	dependence_metrics 150
normvarexp	Normalized Variance Explained	ICAbeta	dependence_metrics 151
countsigFR2	Number of signif voxels in spatially contiguous clusters in fit to T2* Model	T2Fmap	dependence_metrics 253 Recalculated in kundu_metrics 340?
countsigFS0	Number of signif voxels in spatially contiguous clusters in fit to S0 Model	S0Fmap	dependence_metrics 261 Recalculated in kundu_metrics 341?
DICE_FR2	DICE overlap of T2* model significant fits and the same number of voxels with the highest beta weights for the ICA component	T2Fmap ICAbeta	kundu_metrics 350
DICE_FS0	DICE overlap of S0 model significant fits and the same number of voxels with the highest beta weights for the ICA component	S0Fmap ICAbeta	kundu_metrics 350
countnoise	Count of high value betas outside of clusters of the same img How many of the biggest mag values in a component are not part of clusters?	ICAbeta Z_clMap	kundu_metrics 377
signalnoise (t and p)	t and p values for a paired t-test of the log F values of T2* model fit for voxel inside-outside of high mag clusters of the component beta map	T2Fmap,ICAbeta,Z_clMap	kundu_metrics 387
d_table_score	The mean of the component rankings for 5 separate metrics. Rankings go from 1 to num compnents where closer to 1 means more likely to be BOLD-weighted Ranks are for the parameters that are inputs	kappa DICE_FR2 signalnoise countnoise countsigFR2	kundu_metrics 403
kapparatio	For provisionally accept components the ratio of the range of kappa values over the range of variance explained Used to find components with an unusually high variance compared to their kappa value so that components with relatively low kappas are more likely to be removed if they have relatively high variances	kappa varexp *Caculated only on provisionally accepted components	tedica.py kundu_selection_v2 245
Decision criteria used for setting thresholds for accepting components			
kappa elbow	Minimum of Kappa elbow of all components and elbow of remaining components excluding components with the highest kappa vals that are greater than a strict F threshold	kappa # of echos	tedica.py kundu_selection_v2 216
rho elbow	Mean of Rho elbows all components, after components with obvious artifacts are removed and a liberal F threshold	rho # of echoes *Components not removed in I002-5 criteria	tedica.py kundu_selection_v2 217
* NOTE: These inputs include information that is calculated as part ofthe component acceptance/rejection decision tree, which are not shown in this flow chart			