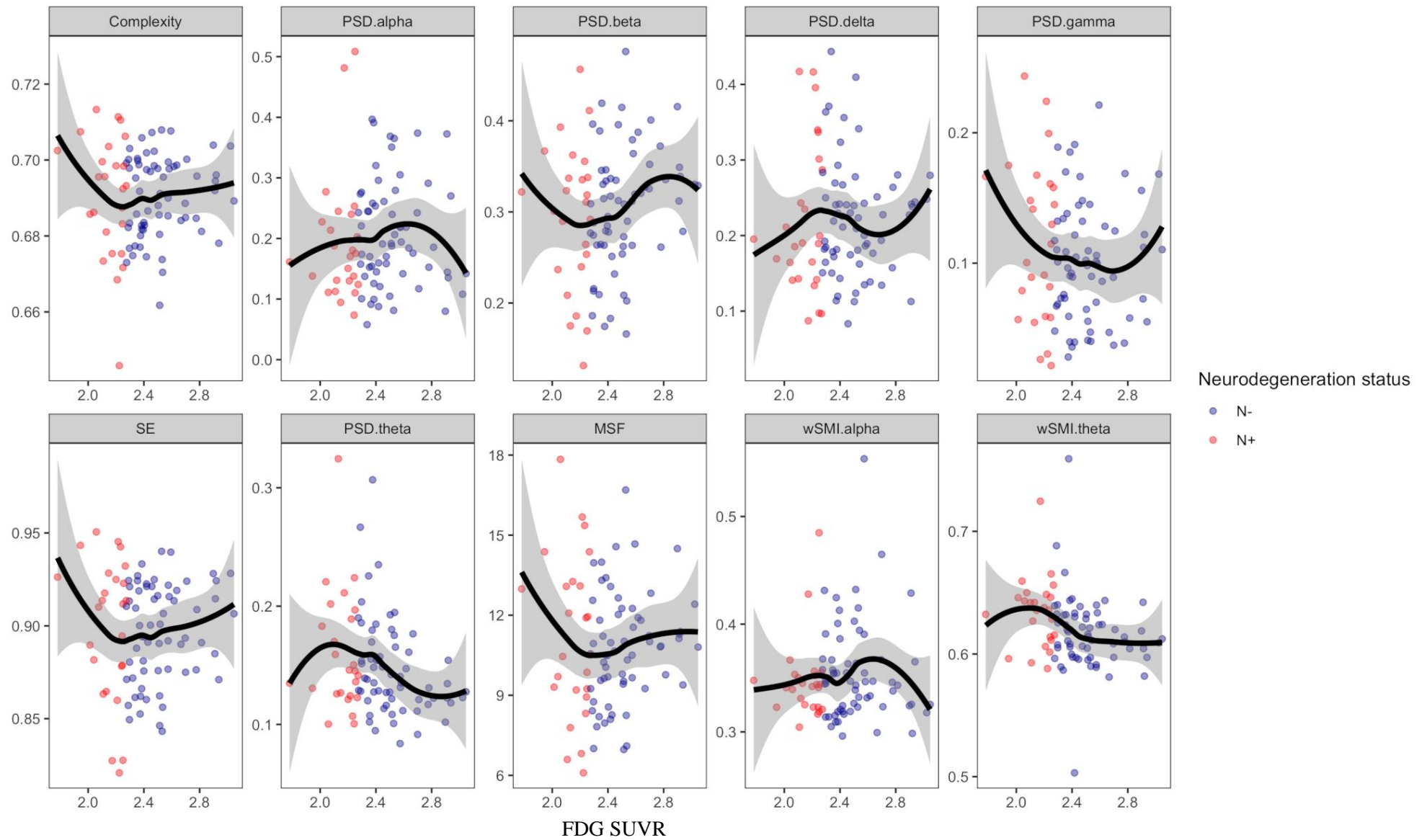


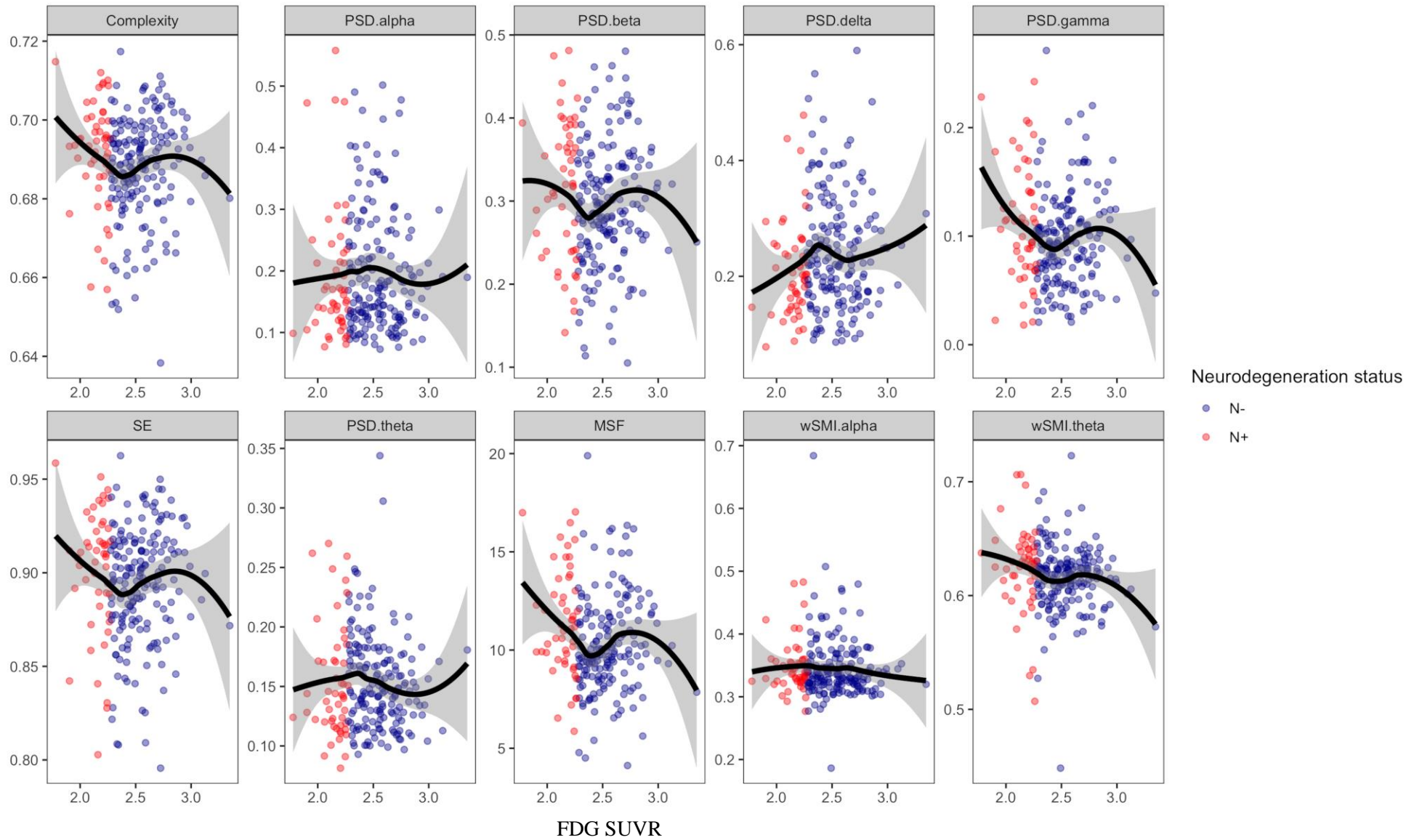
Supplementary Figure 1 : Local regression of average EEG metrics on all scalp electrodes in function of amyloid SUVR for neurodegeneration negative subjects only.

A+ = Amyloid positive; A- = Amyloid negative; MSF = median spectral frequency; PSD = power spectral density; SE = spectral entropy; wSMI = weighted symbolic mutual information.



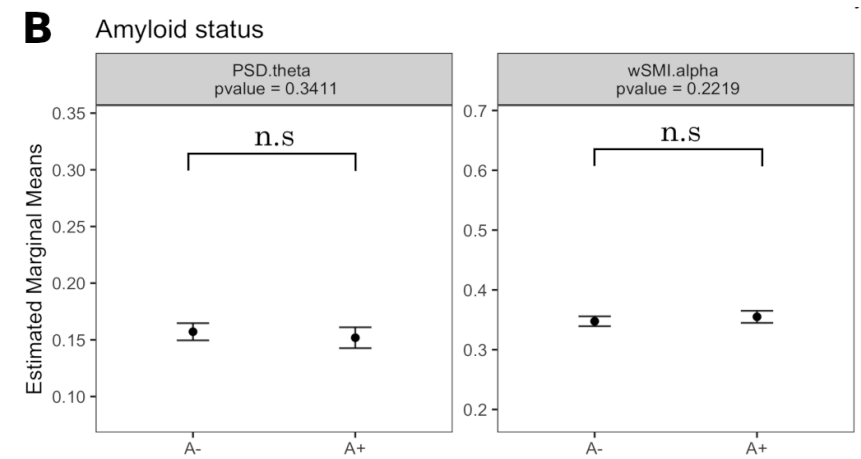
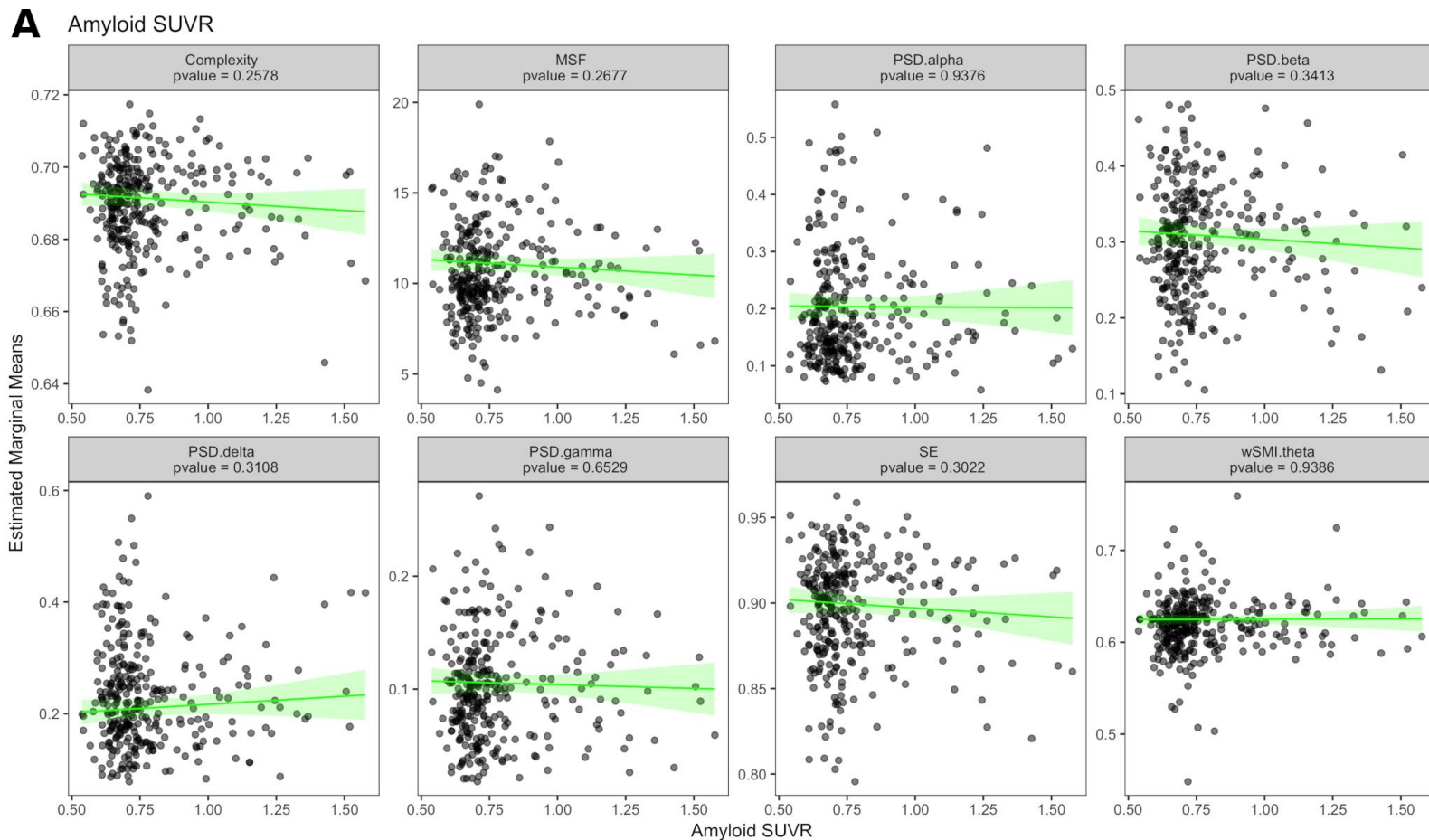
Supplementary Figure 2 : Local regression of average EEG metrics across all scalp electrodes as a function of mean FDG SUVR for amyloid positive subjects only.

FDG = fluorodeoxyglucose; N- = neurodegeneration negative; N+ = neurodegeneration positive MSF = median spectral frequency; PSD = power spectral density; SE = spectral entropy; wSMI = weighted symbolic mutual information.



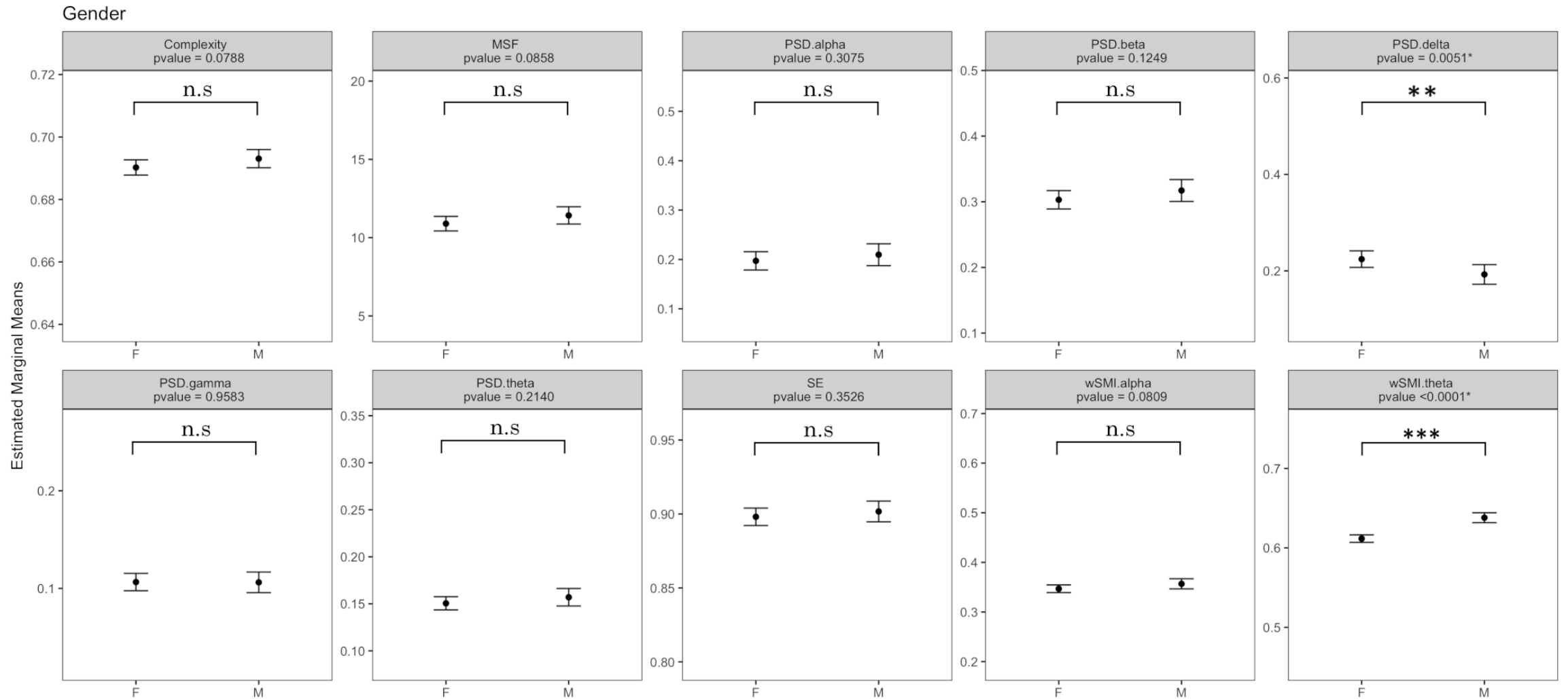
Supplementary Figure 3 : Local regression of average EEG metrics on all scalp electrodes in function of mean FDG SUVR for amyloid negative subjects only.

FDG = fluorodeoxyglucose; MSF = median spectral frequency; PSD = power spectral density; SE = spectral entropy; wSMI = weighted symbolic mutual information.

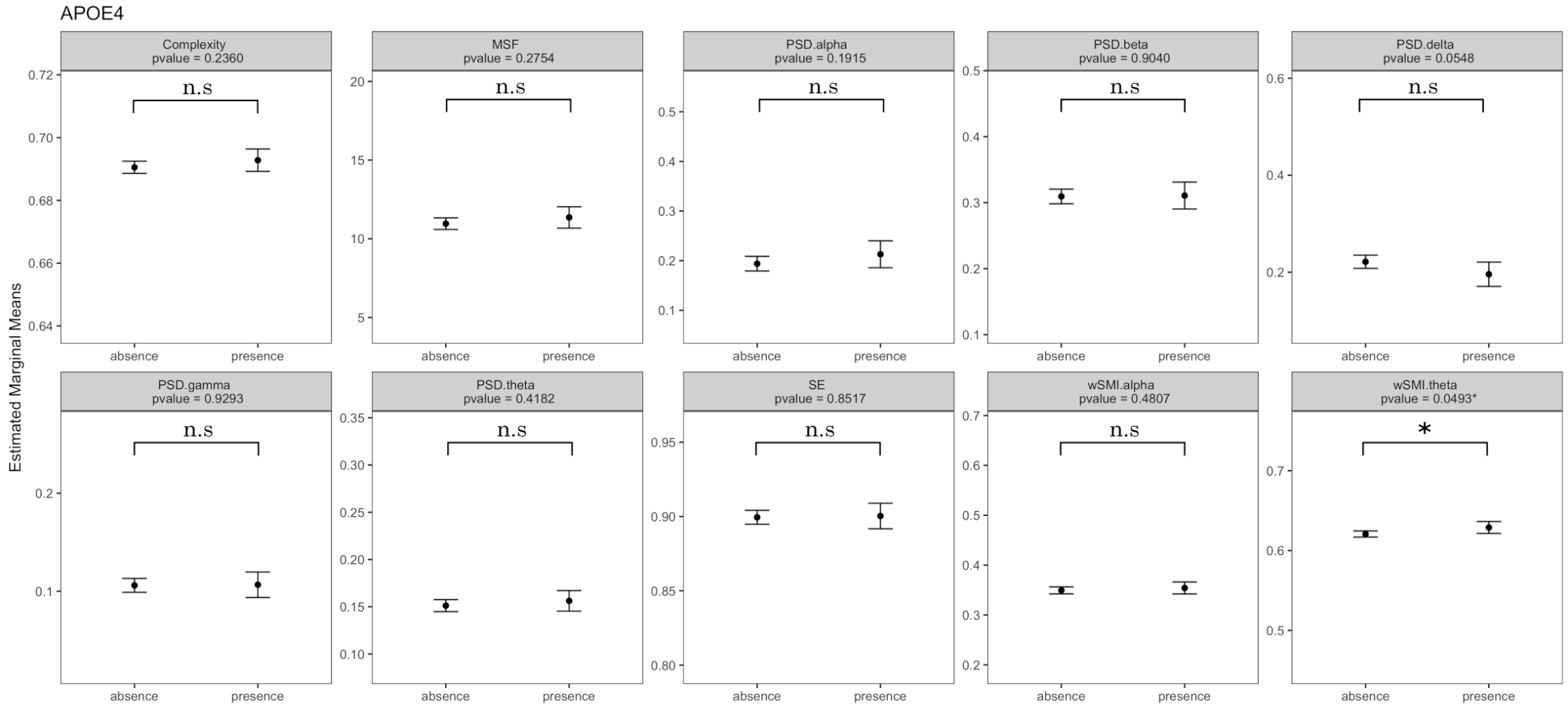


Supplementary Figure 4 : Estimated marginal means from multiple linear regressions of average EEG metrics according to amyloid SUVR.

Amyloid load and brain metabolism are used either as continuous or binary measures, depending on each EEG metric to maximize R-squared values. **(A)** Amyloid load as continuous measure (mean amyloid SUVR). **(B)** Amyloid load as binary measure (A+ vs A-). Estimated marginal means and standard deviation are depicted; covariables in the models were: age, education level, gender, ApoE4 status, hippocampal volume and FDG (either binary or continuous); p-values are indicated with *P < 0.05. **P < 0.01. n.s.: not significant. SE = spectral entropy.

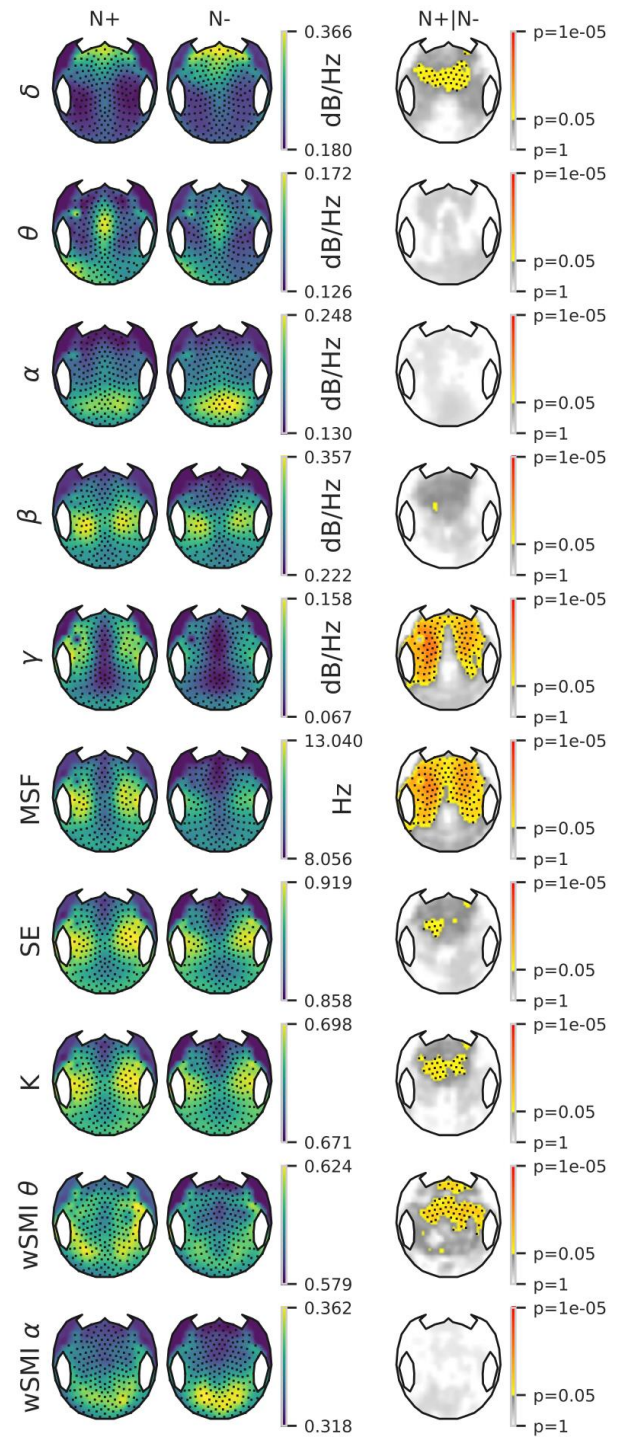


Supplementary Figure 5 : Estimated marginal means from multiple linear regression of average EEG metrics on gender. Significant adjusted p-values on age, education level, ApoE4 status, hippocampal volume, FDG and Florbetapir are indicated with * $P < 0.05$, ** $P < 0.01$, P*** < 0.001 , n.s.: not significant. ApoE = Apolipoprotein E; F = female; M = male; MSF = median spectral frequency; PSD = power spectral density; SE = spectral entropy; wSMI = weighted symbolic mutual information.



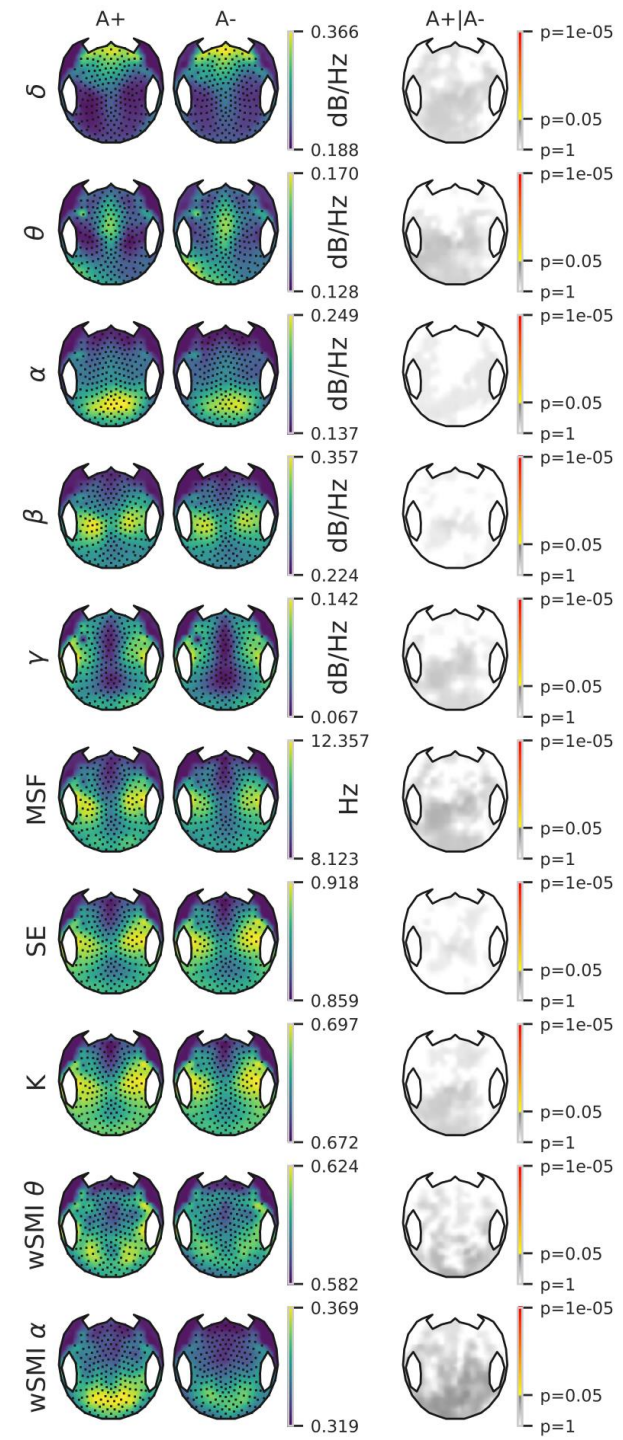
Supplementary Figure 6 : Estimated marginal means from multiple linear regression of average EEG metrics on ApoE4 status (presence or absence). Significant adjusted p-values on age, education level, gender, hippocampal volume, FDG and Florbetapir are indicated with * $P < 0.05$, n.s.: not significant. ApoE = Apolipoprotein E; MSF = median spectral frequency; PSD = power spectral density; SE = spectral entropy; wSMI = weighted symbolic mutual information

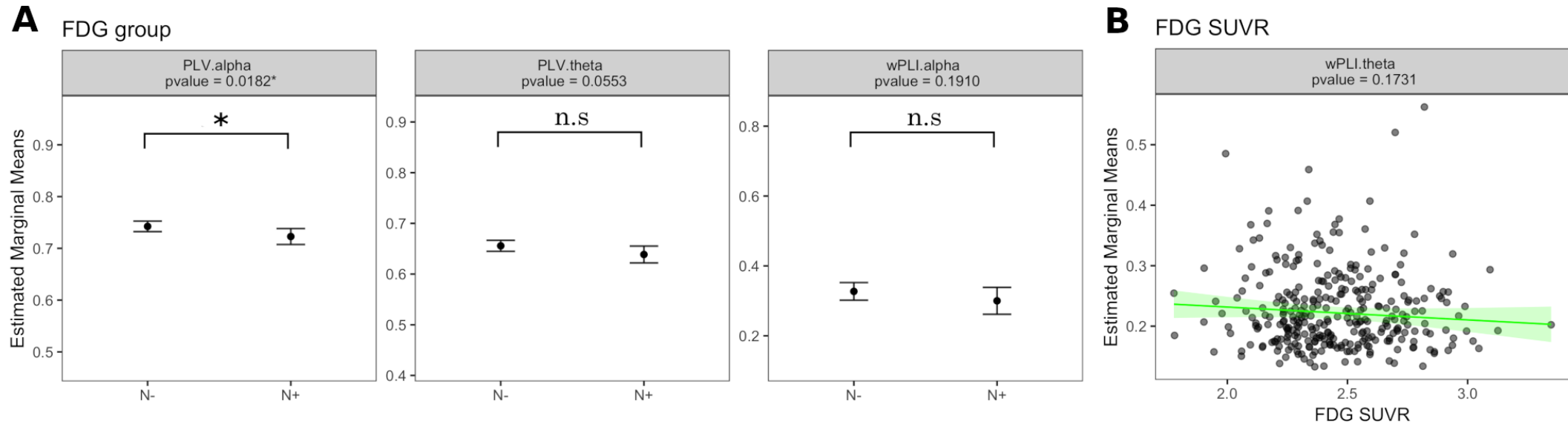
Supplementary Figure 7 : 224 electrodes topographical maps of EEG metrics for neurodegeneration positive (N+) and neurodegeneration negative (N-) groups. The topographical 2D projection (top = front) of each measure [normalized power spectral density in delta (δ), theta (θ), alpha (α), beta (β), gamma (γ), median spectral frequency (MSF), spectral entropy (SE), algorithmic complexity (K) and weighted symbolic mutual information in theta band and alpha band (wSMI θ and wSMI α)] is plotted for N+ group and N- group (columns). Statistics were done on 224 electrodes by non-parametric cluster permutation test. The three last columns indicate non-parametric cluster-based permutation test results for the pairwise comparison : N+ vs N- group, for each EEG metric. The topographical maps in the last column are color-coded according to the cluster permutation tests p-values (color = $P < 0.05$, grayscale= $P > 0.05$). Clusters of electrodes whose EEG metrics' values are significantly different between groups are depicted.



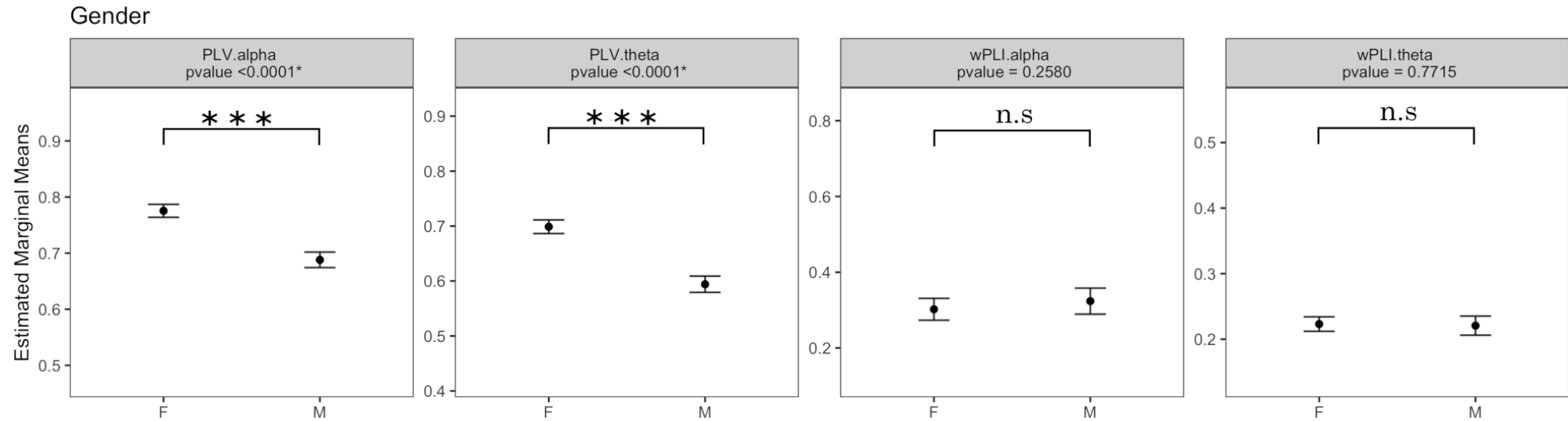
Supplementary Figure 8 : 224 electrodes topographical maps of EEG metrics for amyloid positive (A+) and amyloid negative (A-) groups.

The topographical 2D projection (top = front) of each measure [normalized power spectral density in delta (δ), theta (θ), alpha (α), beta (β), gamma (γ), median spectral frequency (MSF), spectral entropy (SE), algorithmic complexity (K) and weighted symbolic mutual information in theta band and alpha band (wSMI θ and wSMI α)] is plotted for A+ group and A- group (columns). Statistics were done on 224 electrodes by non-parametric cluster permutation test. The three last columns indicate non-parametric cluster-based permutation test results for the pairwise comparison : A+ vs A- group, for each EEG metric. The topographical maps in the three last columns are color-coded according to the cluster permutation tests p-values (color = $P < 0.05$, grayscale= $P > 0.05$). Clusters of electrodes whose EEG metrics' values are significantly different between groups are depicted.





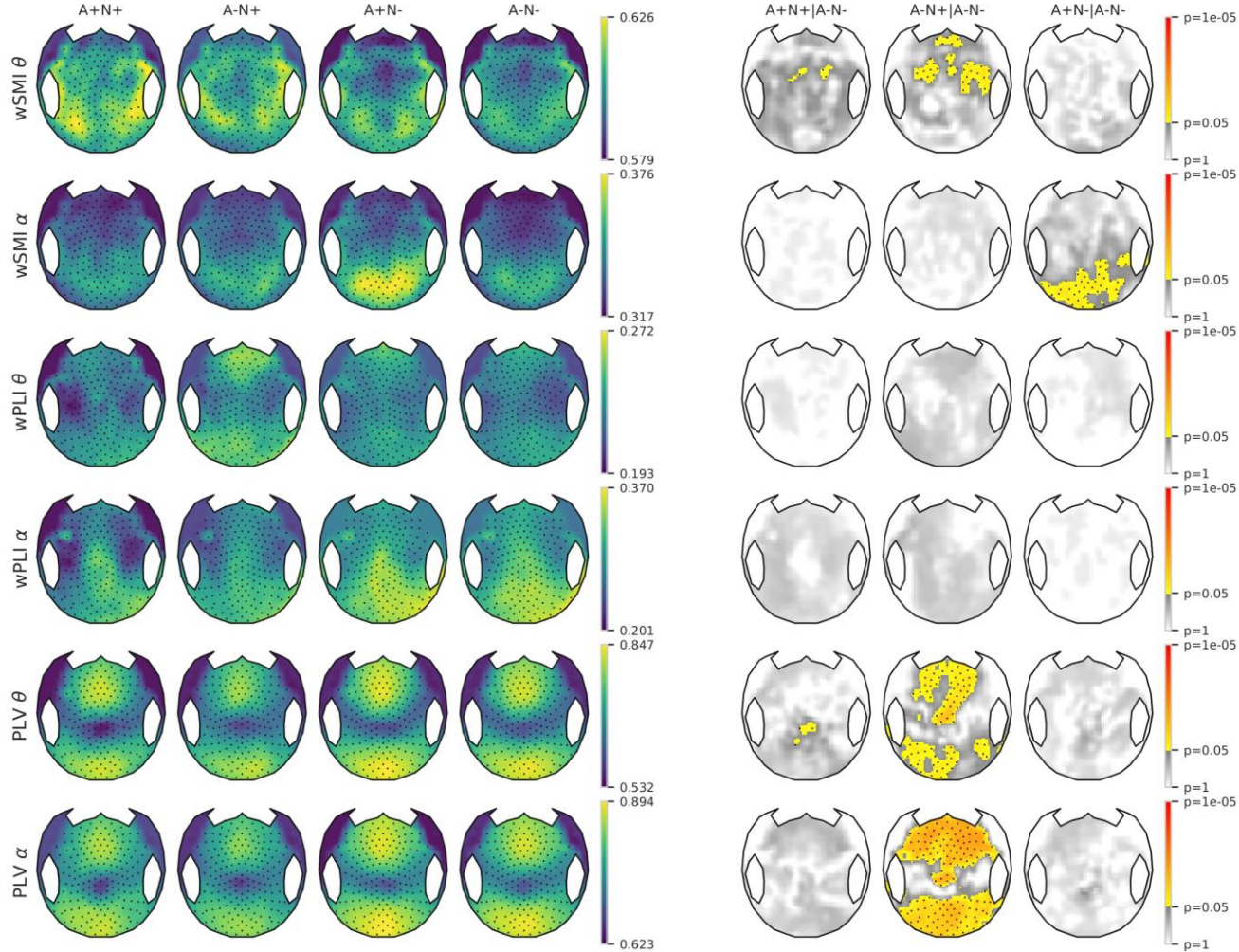
Supplementary Figure 9 : Multiple linear regression of average EEG metrics (PLV and wPLI) on brain metabolism. Amyloid load and brain metabolism are used either as continuous or binary measures, depending on each EEG metric to maximize R-squared values. **(A)** Brain metabolism as binary measure (N+ vs N-) **(B)** Brain metabolism as continuous measure (mean FDG SUVR). Estimated marginal means and standard deviation are depicted; significant adjusted p-values on age, education level, gender, ApoE4 status, hippocampal volume and Florbetapir are indicated with *P < 0.05. **P < 0.01. n.s.: not significant. FDG = fluorodeoxyglucose; N+=neurodegeneration positive; N-=neurodegeneration negative; PLV = Phase Locking Value; wPLI = weighted Phase Lag Index

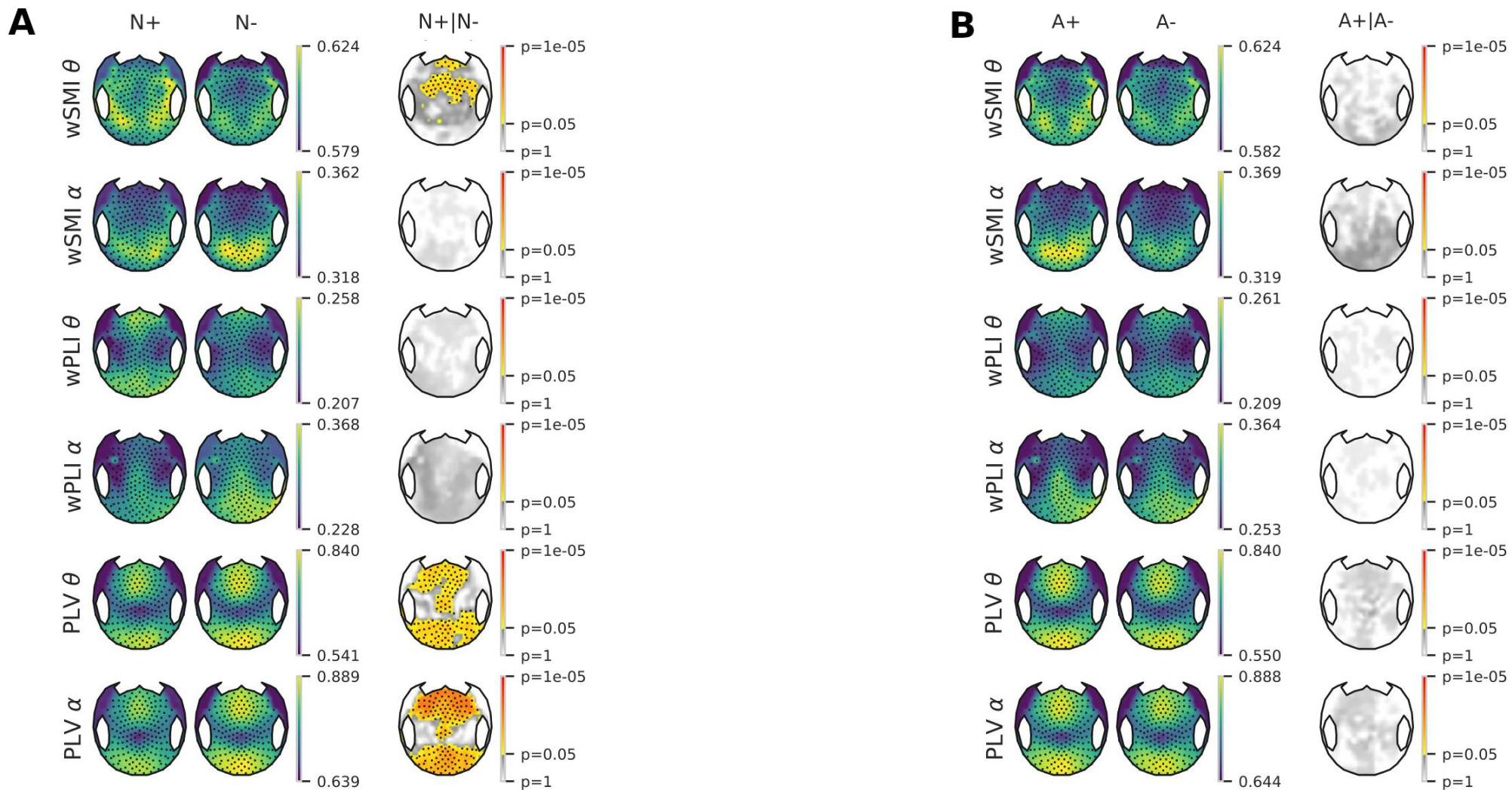


Supplementary Figure 10 : Estimated marginal means from multiple linear regression of average EEG metrics (PLV and wPLI) on gender. Significant adjusted p-values on age, education level, ApoE4 status, hippocampal volume, FDG and Florbetapir are indicated with *P < 0.05, **P < 0.01, P***<0.001, n.s.: not significant. F=female; M=male; PLV = Phase Locking Value; wPLI = weighted Phase Lag Index

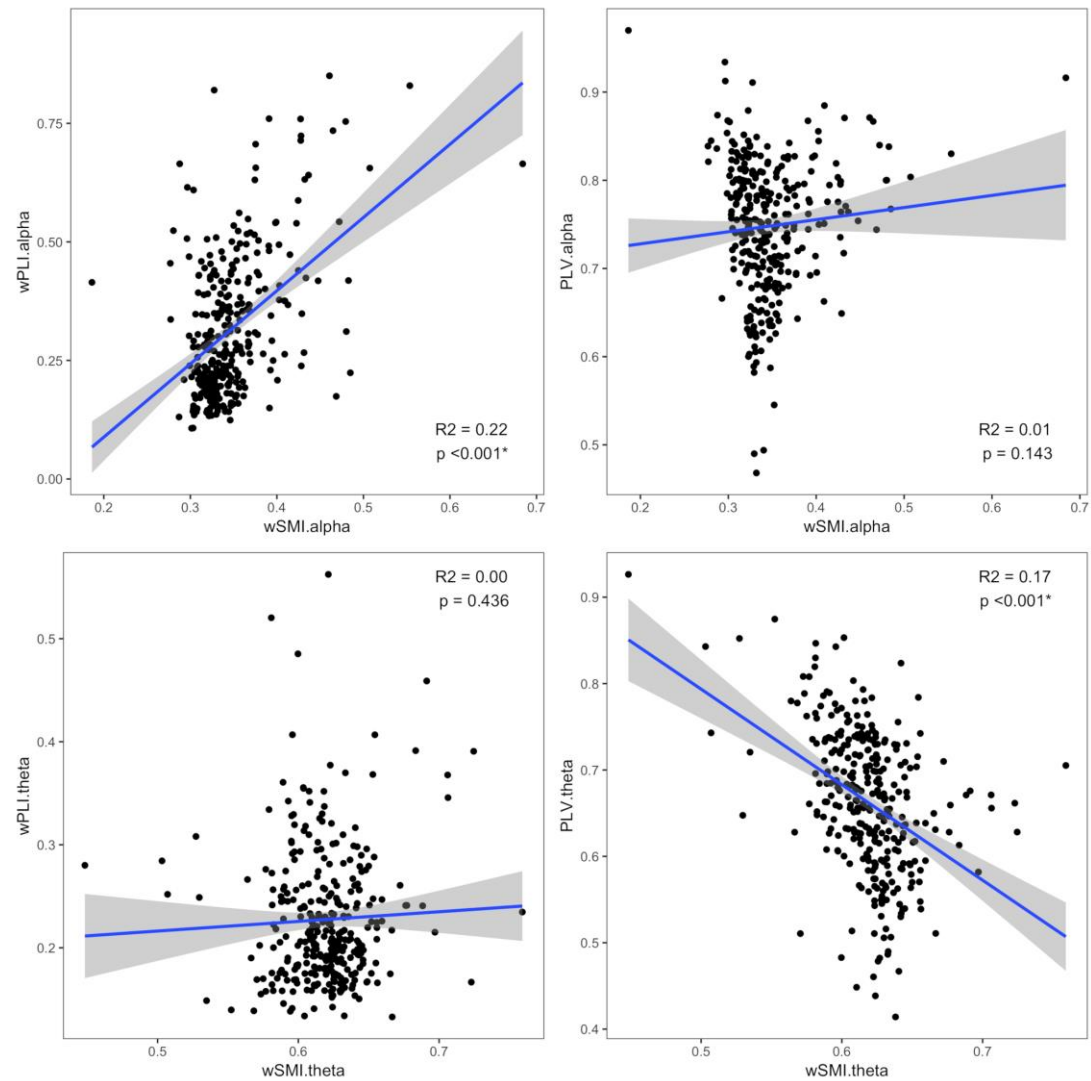
Supplementary Figure 11: 224 electrodes topographical maps of functional connectivity EEG metrics.

The topographical 2D projection (top = front) of each measure [weighted symbolic mutual information in theta band and alpha band (wSMI θ and wSMI α), weighted phase lag index in theta and alpha band (wPLI θ and wPLI α), Phase Locking Value in theta and alpha band (PLV θ and PLV α)] is plotted for A+N+ group, A-N+ group, A+N- group and control group A-N- (columns). Statistics were done on 224 electrodes by non-parametric cluster permutation test. The three last columns indicate non-parametric cluster-based permutation test results for the following pairwise comparisons: A+N+ vs A-N- ; A-N+ vs A-N- and A+N- vs A-N-, for each EEG metric. The topographical maps in the three last columns are color-coded according to the cluster permutation tests p-values (color = $P < 0.05$, grayscale = $P > 0.05$). Clusters of electrodes whose EEG metrics' values are significantly different from the control group (A-N-) are depicted.

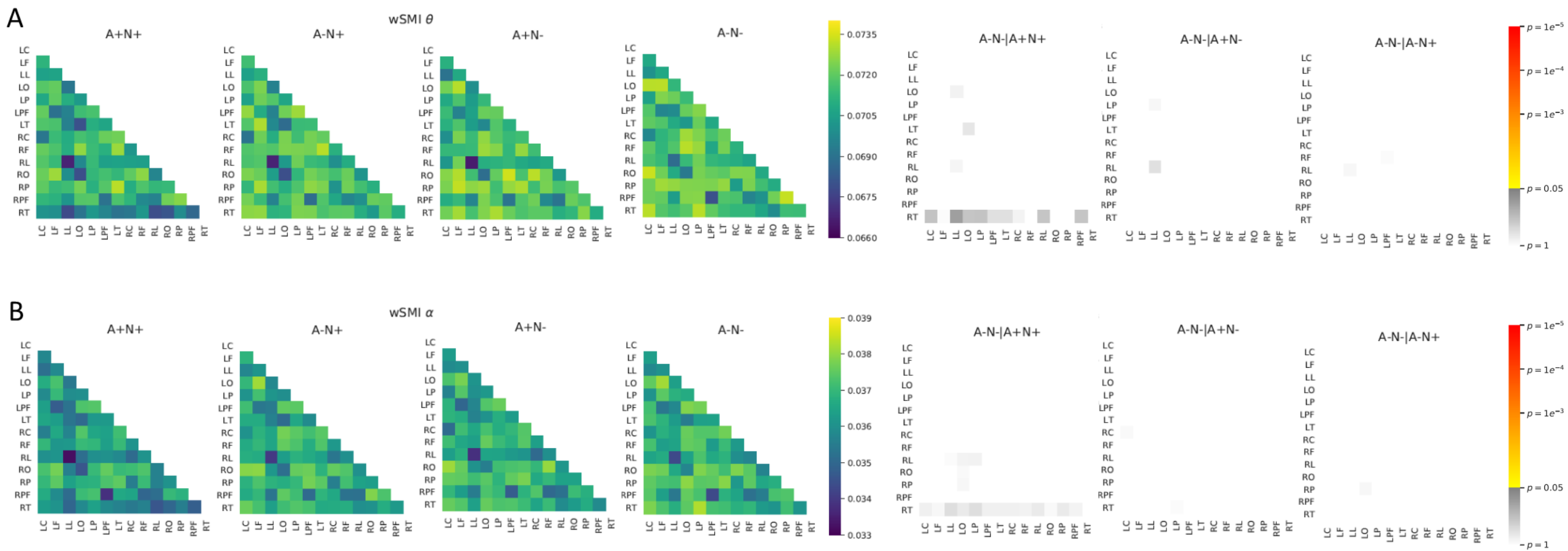




Supplementary Figure 12 : 224 electrodes topographical maps of functional connectivity EEG metrics. (A) For N+ vs N- groups (B) For A+ vs A- groups. The topographical 2D projection (top = front) of each measure [weighted symbolic mutual information in theta band and alpha band (wSMI θ and wSMI α), weighted phase lag index in theta and alpha band (wPLI θ and wPLI α), Phase Locking Value in theta and alpha band (PLV θ and PLV α)] is plotted for N+|N- groups and A+|A- group (columns). Statistics were done on 224 electrodes by non-parametric cluster permutation test. In (A) and (B) the last column indicates non-parametric cluster-based permutation test results for the pairwise comparisons : N+ vs N- group, A+ vs A- group, for each EEG metric. The topographical maps in the last column are color-coded according to the cluster permutation tests p-values (color = $P < 0.05$, grayscale = $P > 0.05$). Clusters of electrodes whose EEG metrics' values are significantly different between groups are depicted. N+/- = Neurodegeneration positive/negative; A+/- = Amyloid positive/negative



Supplementary Figure 13 : Analysis of correlation between wSMI, wPLI and PLV, in theta and alpha band. wSMI alpha is correlated with wPLI alpha ($R^2=0.22$, $p<0.001$). Absence of correlation between wSMI alpha and PLV alpha ($R^2=0.01$, $p=0.143$). Absence of correlation between wSMI theta and wPLI theta ($R^2=0.00$, $p=0.436$). Anti-correlation between wSMI theta and PLV theta ($R^2=0.17$, $p<0.001$). PLV = Phase Locking Value; wPLI = weighted Phase Lag Index; wSMI = weighted Symbolic Mutual Information



Supplementary Figure 14 : Inter-ROI FC matrices are depicted for wSMI on a sample of 100 subjects : 25 A+N+ subjects, 25 A-N+ subjects, 25 A+N- subjects and 25 A-N-control subjects. Mean inter-ROI FC is depicted for the four groups. The three last columns show the results of the following pairwise comparisons : A+N+ vs A-N- ; A+N- vs A-N- and A-N+ vs A-N- , using a linear mixed model (color = $P < 0.05$, grayscale = $P > 0.05$; all p-values are adjusted on age, education level, gender, ApoE4 status and hippocampal volume and are corrected for multiplicity on 91 inter-ROI connections by FDR method. **(A)** Results for wSMI theta. **(B)** Results for wSMI alpha. FC = functional connectivity; LC = left central; LF = left frontal; LL = left cingulate; LO = left occipital; LP = left parietal; LPF = left prefrontal; LT = left temporal; RC = right central; RF = right frontal; RL = right cingulate; RO = right occipital; RP = right parietal; RPF = right prefrontal; RT = right temporal; wSMI = weighted symbolic mutual information.

