



Figure S12: Reconstructed wavelets from regression coefficients ( $\beta$ s) when differentiating among adaptive introgression, sweeps, and neutrality scenarios for summary statistics mean, variance, skewness, and kurtosis of pairwise  $r^2$  for *SURFDAWave* when  $\gamma = 1$ , when trained with statistics  $\hat{\pi}$ ,  $H_1$ ,  $H_{12}$ ,  $H_2/H_1$ , and frequencies of first to fifth most common haplotypes (Figure S14). *SURFDAWave* was trained on simulations of scenarios simulated under demographic specifications for European CEU demographic history. Note that the wavelet reconstructions for all summary statistics are plotted on the same scale, thereby making the distributions of some summaries difficult to decipher as their magnitudes are relatively small. *SURFDAWave* results shown are using Daubechies' least-asymmetric wavelets to estimate spatial distributions of summary statistics. Level 1 chosen through cross validation.