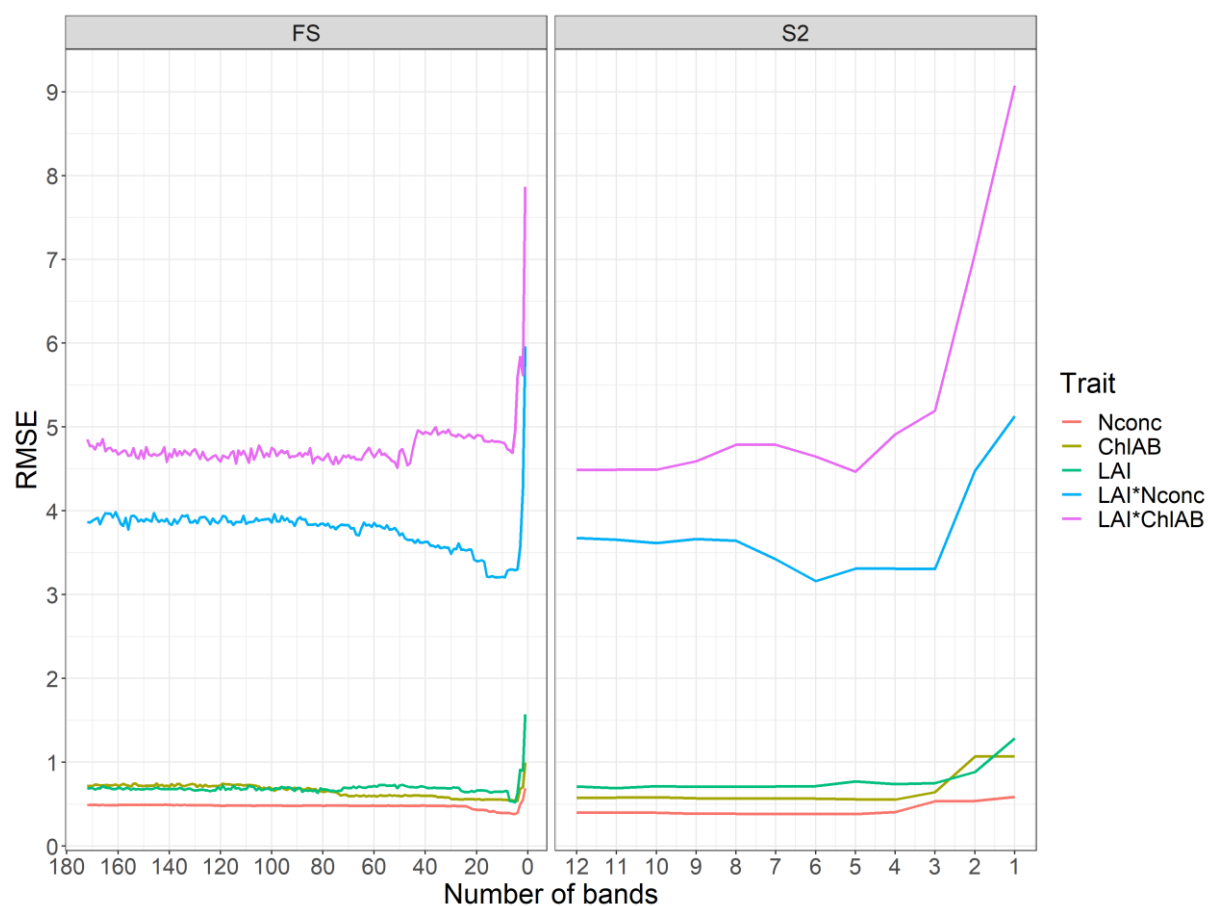


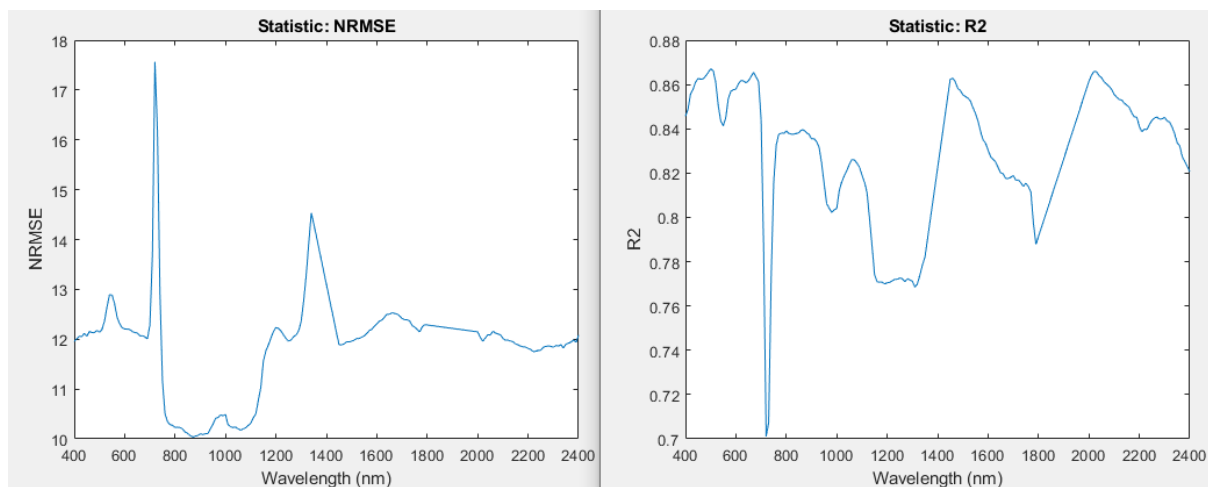
# Supplementary Materials

## 1.1. GPR-BAT

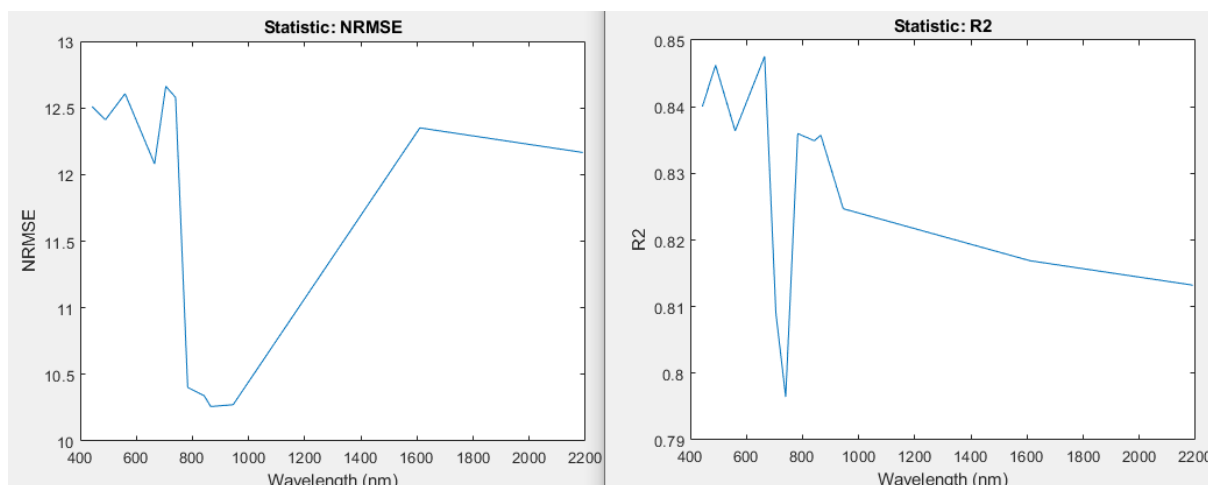


**Figure S4.** RMSE values of the traits as a function of the number of spectral bands obtained using the Gaussian processes regression - band analysis tool (GPR-BAT) with the sequential backward band removal (SBBR) algorithm applied.

## 1.2. GSA emulator performance for ASD and S2

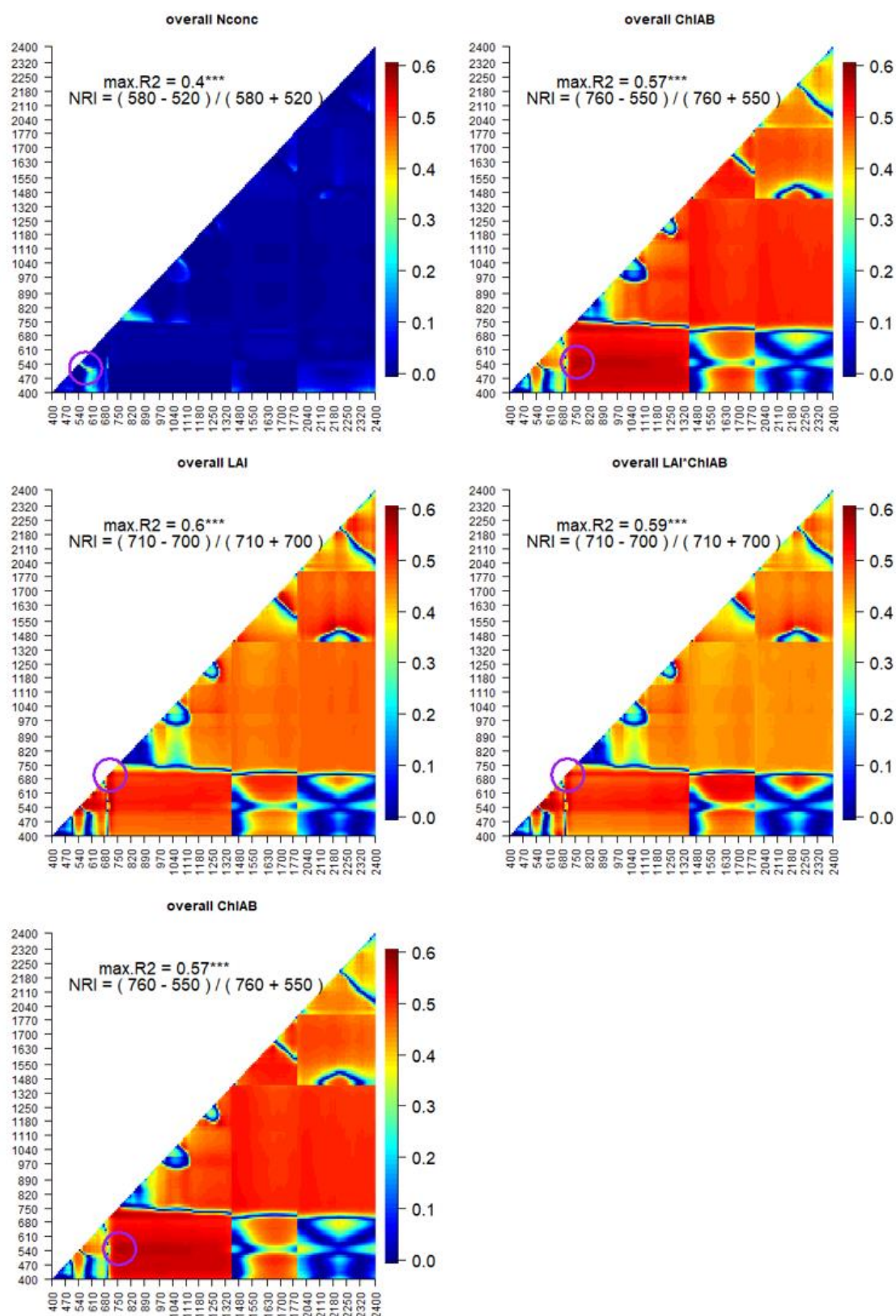


**Figure S5.** Performance of the emulator (Canonical Correlation Forest) on the full FS dataset with 20 PCA and 80/20% train/test set split.

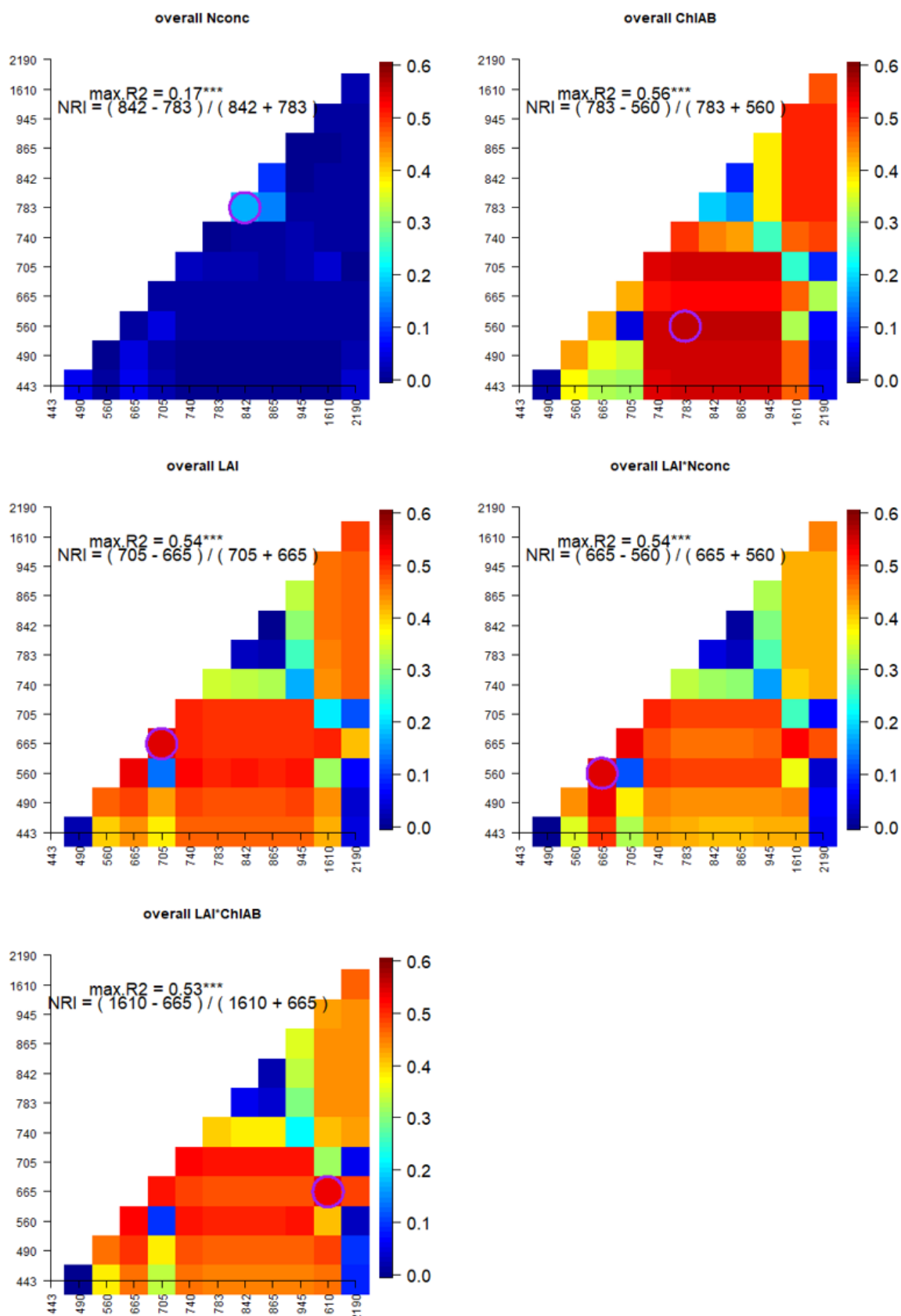


**Figure S6.** Performance of the emulator (Canonical Correlation Forest) on the S2 resampled full dataset with 20 PCA and 80/20% train/test set split.

### 1.3. NRI heatmaps

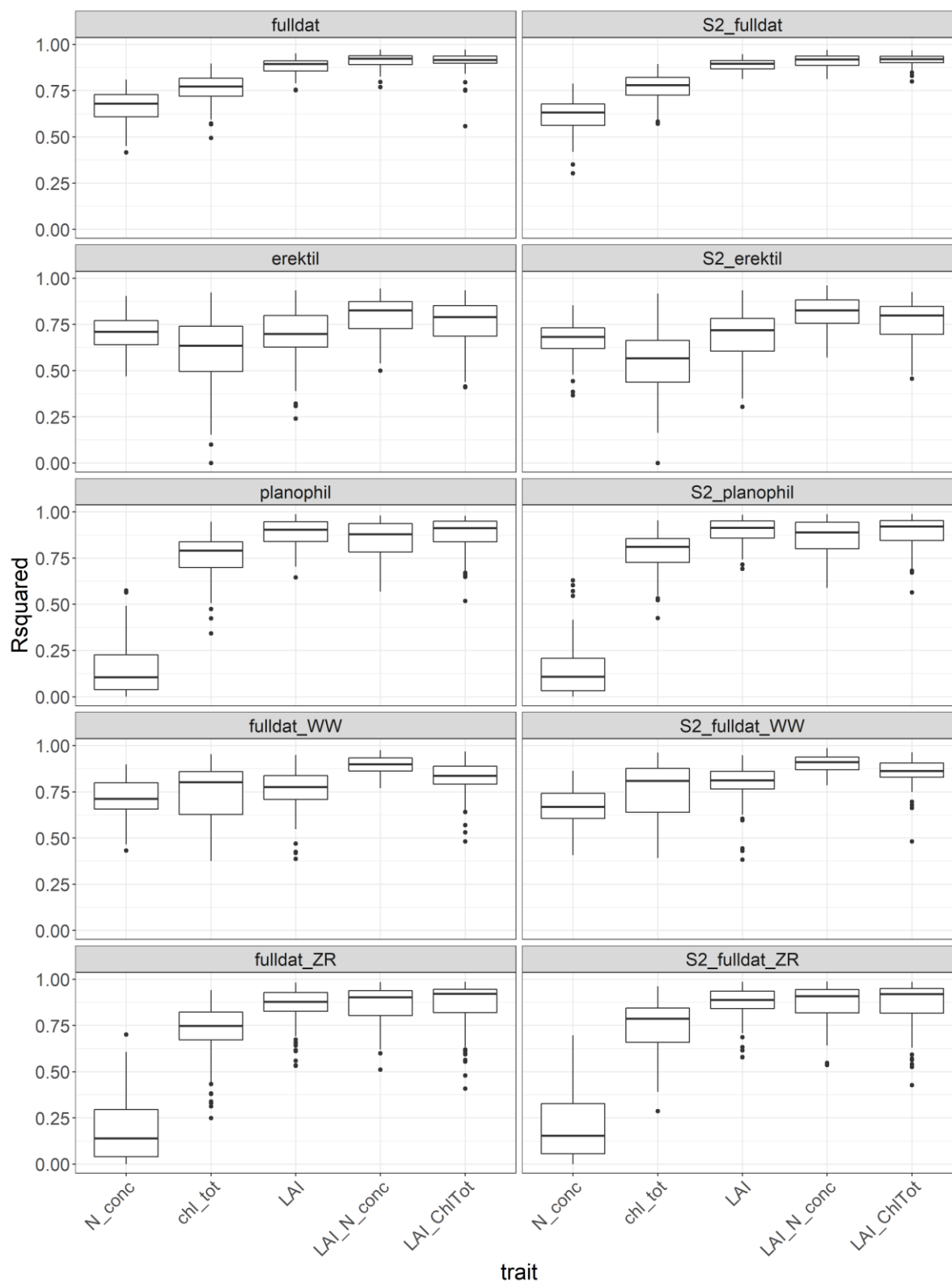


**Figure S7.** R<sup>2</sup> values between the trait of interest and the normalized ratio indices (NRI's) using all possible band combinations of the full field spectrometer dataset.

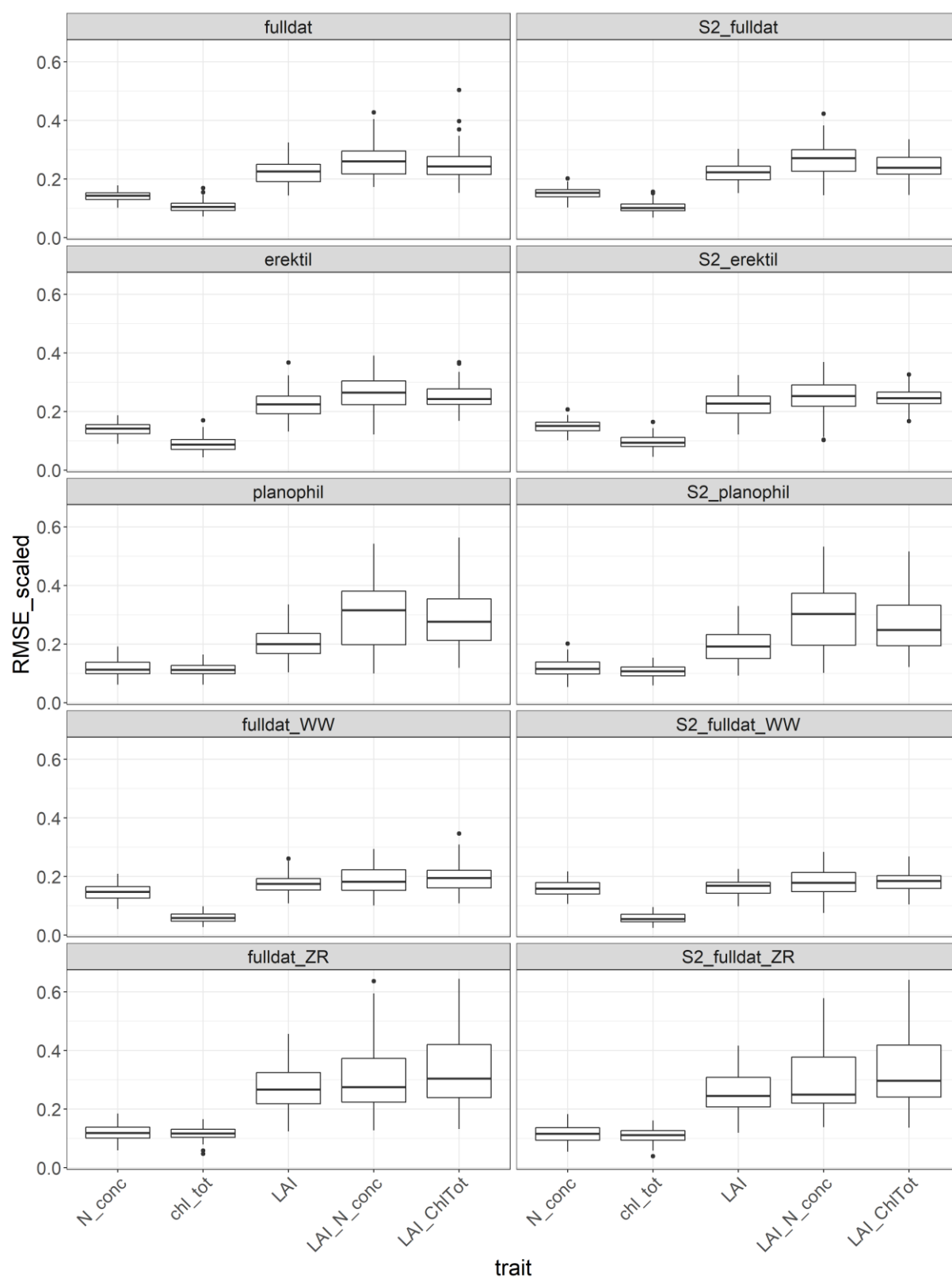


**Figure S8.** R<sup>2</sup> values between the trait of interest and the normalized ratio indices (NRI's) using all possible band combinations of the full Sentinel-2 resampled dataset.

## 1.4. Effect of train/test set split on RFR



**Figure S9.**  $R^2$  values for prediction on the test set for 100 iterations of random train/test set splits. Train/test set splits were performed by stratification by crop and date combinations.



**Figure S10.** Median centred RMSE values for each trait & dataset combination for the same 100 iterations of random train/test set splits as found in Figure S9.