

Sentinel-2 based mapping of SOC content in Wallonia

Dries De Bièvre, Bas van Wesemael, Pierre Defourny
 Université Catholique de Louvain, 1348 Louvain-la-Neuve, Belgium



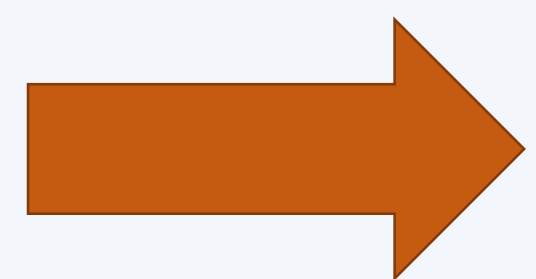
UCLouvain



Wallonie Relance

Hypothesis

IF Environmental covariates Explain spatial trends AND Sentinel-2 bare soil composites Explains local variation



Can these sources complement each other?

Methods

Comparison of predictors

1. Sentinel-2 bands
2. S-2 spectral indices
3. Environmental covariates
4. Combination: spectral + covariates

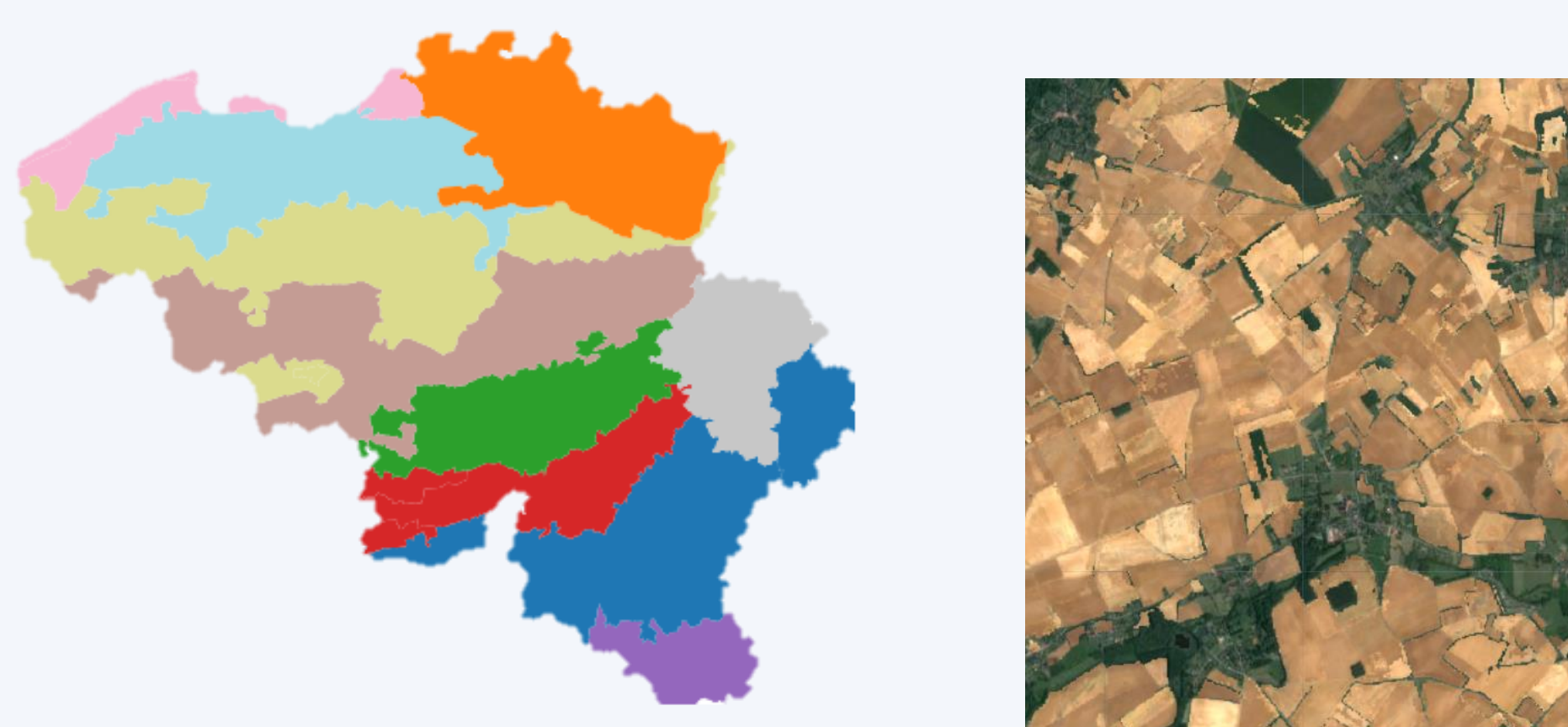
Training data

≈ 11 000 fields with SOC analysis



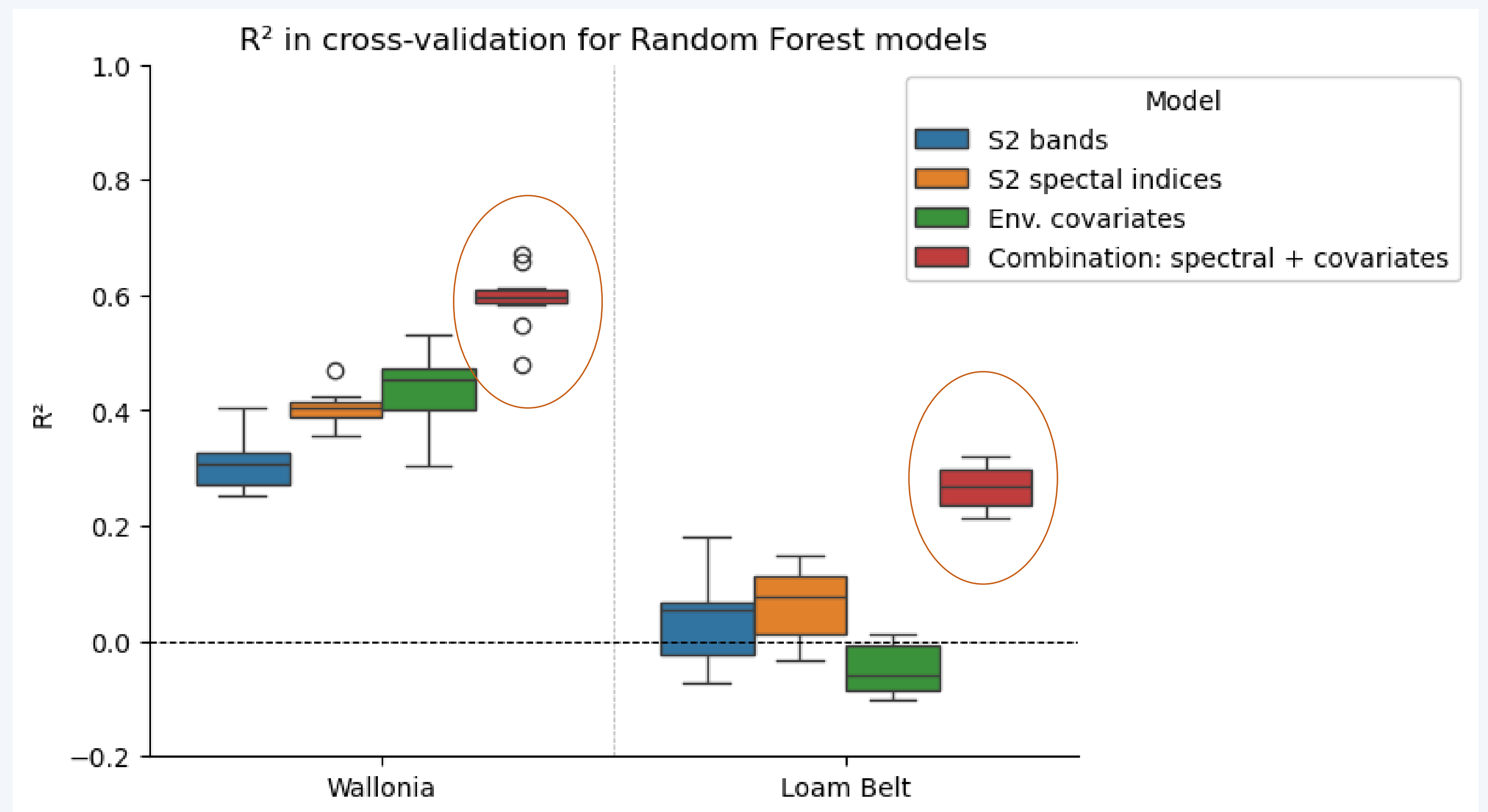
Covariates

- Agricultural region
- Textural class
- Altitude

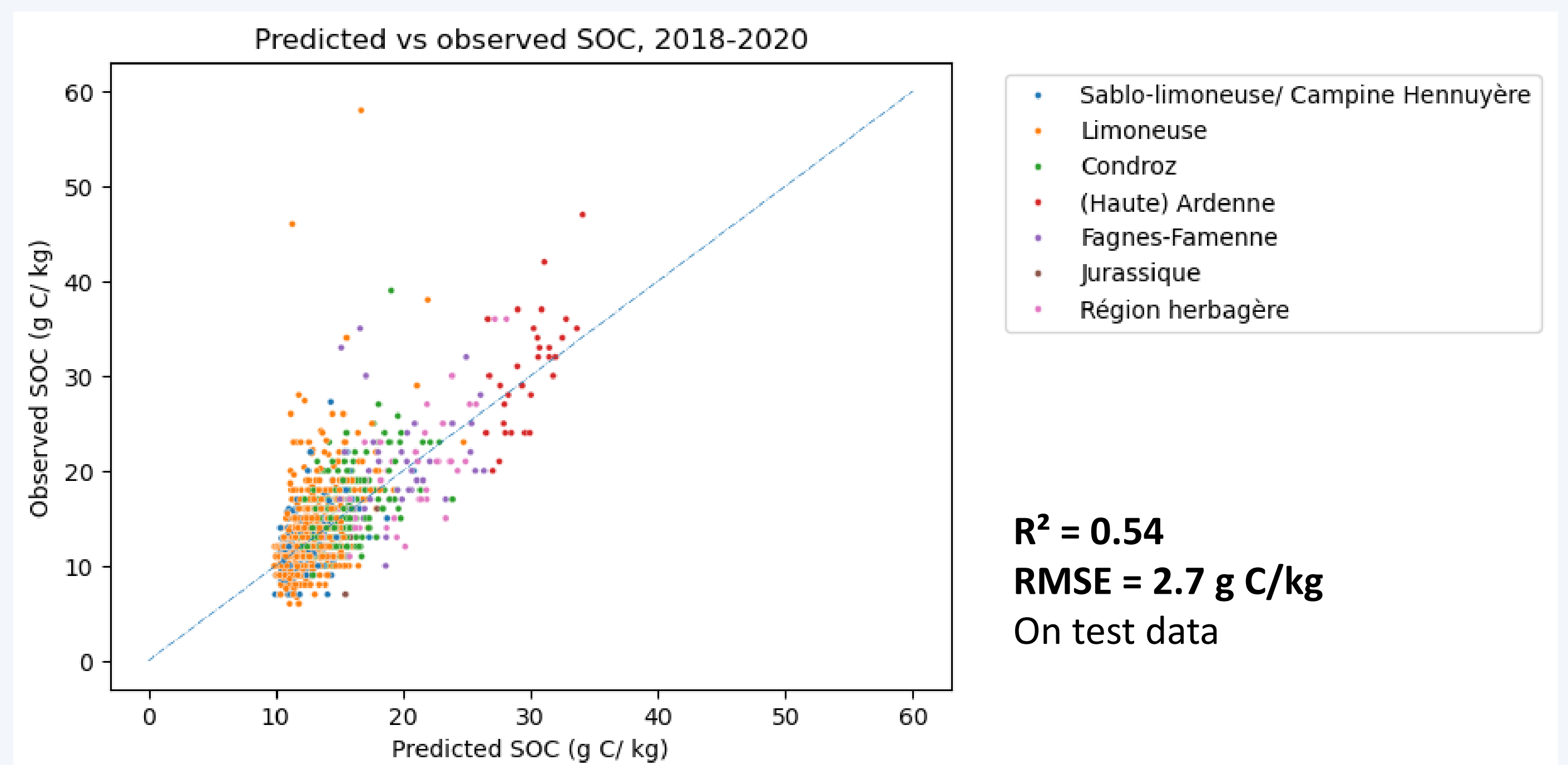


Random Forest model

Results



Validation on held-out test set



Conclusions

- 1) Covariates + S2 indices = complementary
- 2) Spectral indices > reflectance values as predictors
- 3) Absorption in band 3, 5, 12 + albedo-effect
- 4) Wallonia: $R^2 = 0.54$, $RMSE = 2.7g C/kg$

Indices selected by feature elimination

$$\begin{matrix} \blacktriangleright & \frac{B2 - B3}{B2 + B3} \end{matrix}$$

$$\blacktriangleright \frac{B5 - B11}{B5 + B11}$$

$$\blacktriangleright \frac{B11 - B12}{B11 + B12}$$

$$\blacktriangleright \frac{B4 + B5}{2}$$