PROSOIL:
Soil Organic Carbon prediction in croplands by airborne APEX images using LUCAS topsoil database

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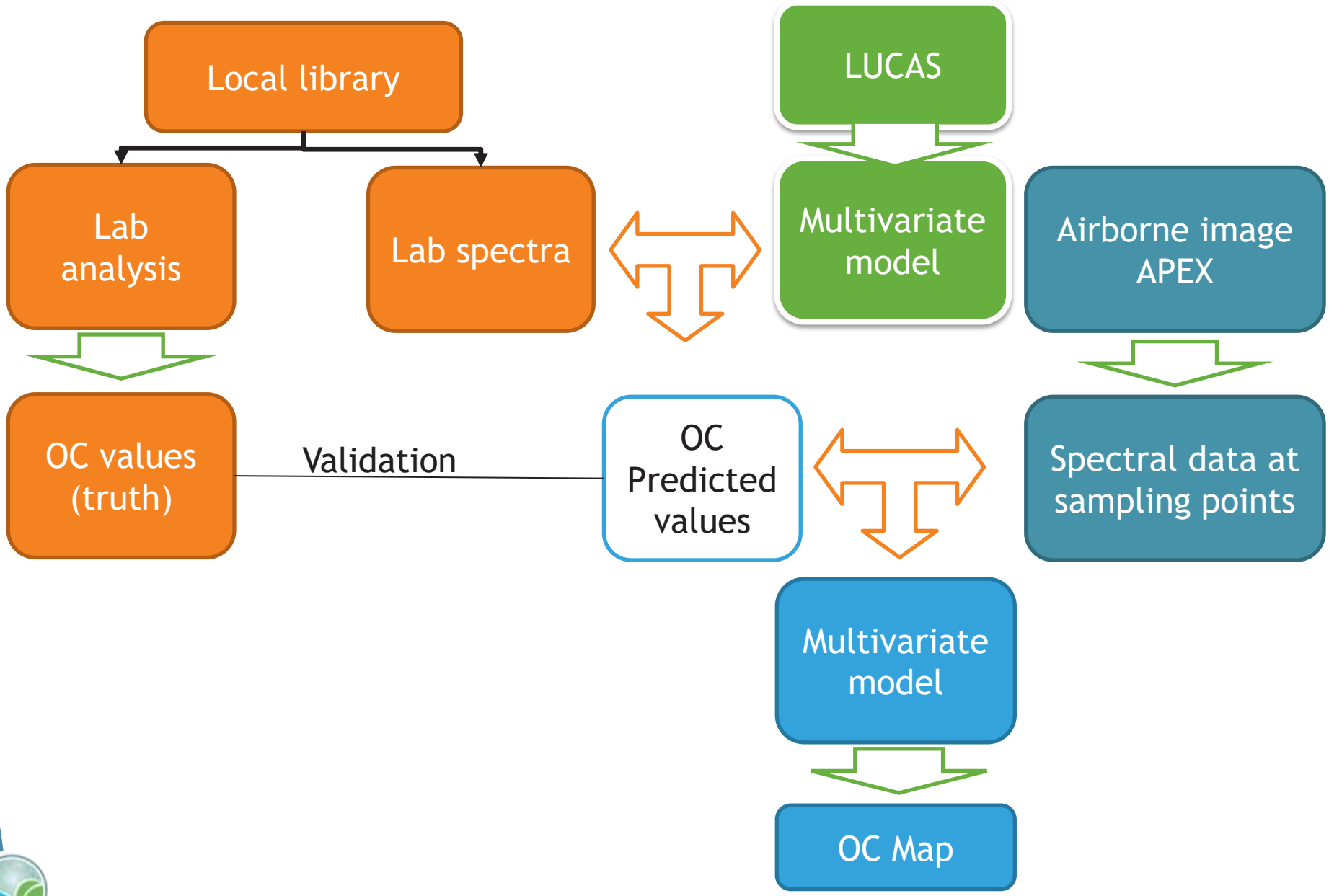
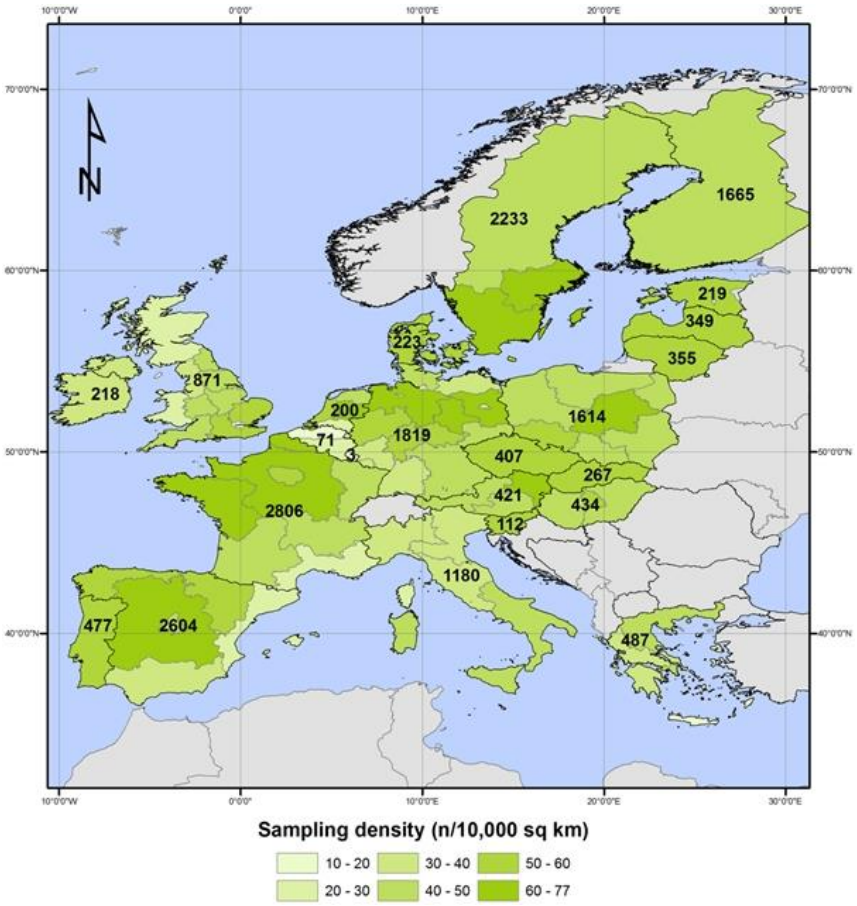

Local library
Lab analysis
Lab spectra
LUCAS
Multivariate model
Airborne image APEX
OC values (truth)
Validation
OC Predicted values
Spectral data at sampling points
Multivariate model
OC Map

A standardized multivariate calibration approach valid for large areas and that requires minimal user inputs.

LUCAS topsoil database



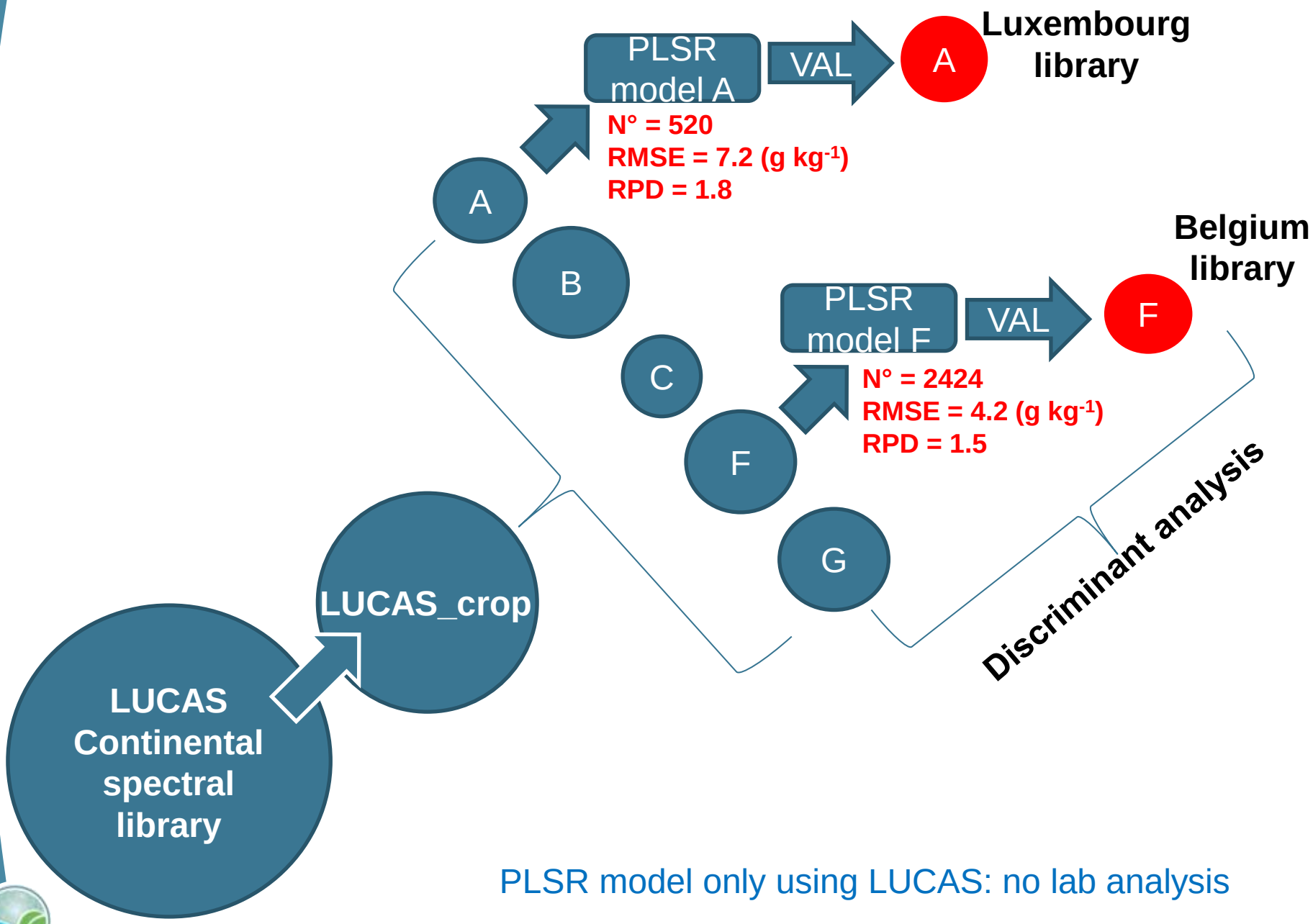
- ✓ ~ 20000 samples
- ✓ 25 Member States of the UE
- ✓ Chemical and physical measurements
- ✓ Lab spectra (400 – 2500 nm)
- ✓ 12128 on croplands (LUCAS_crop)

Local libraries

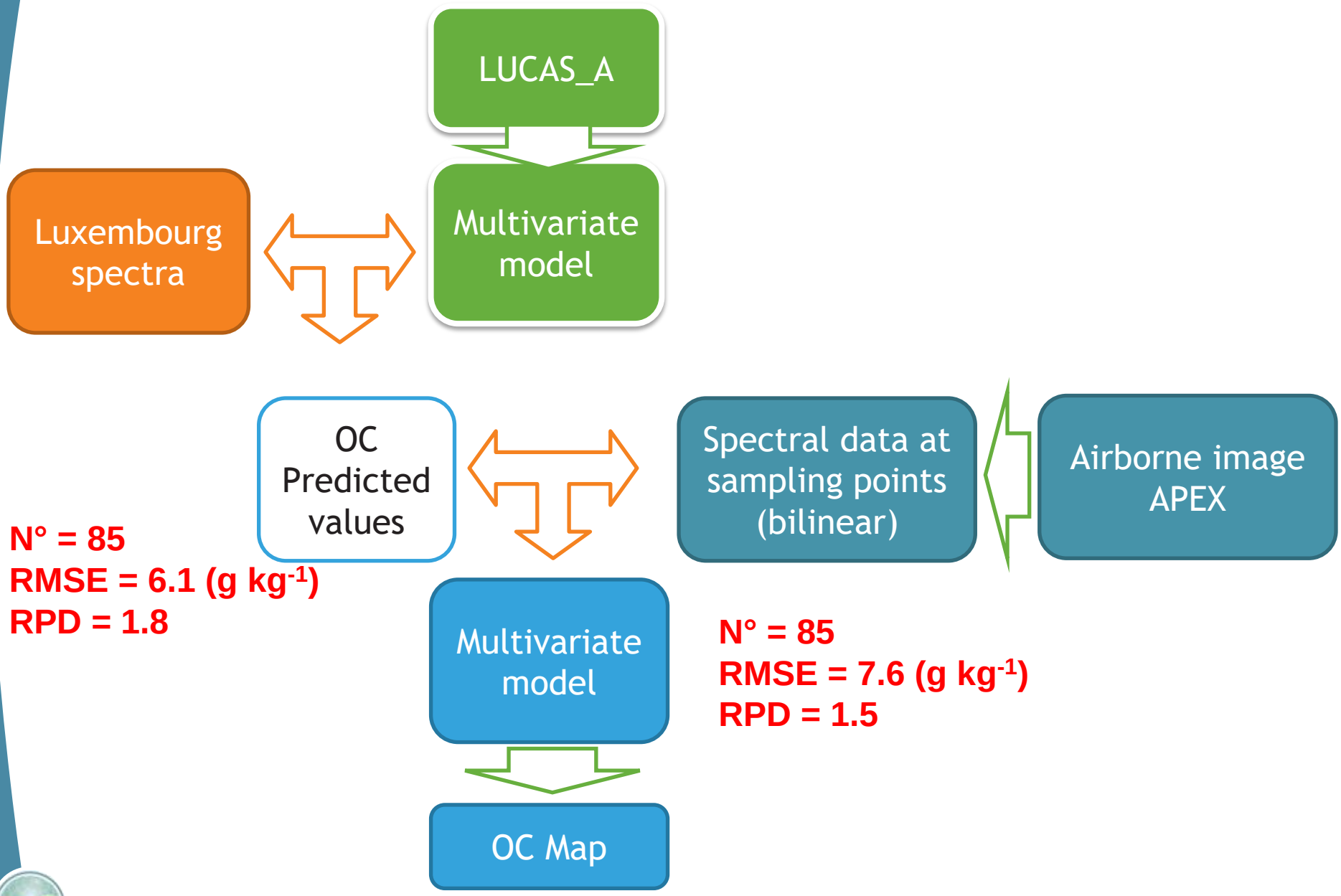
61 samples

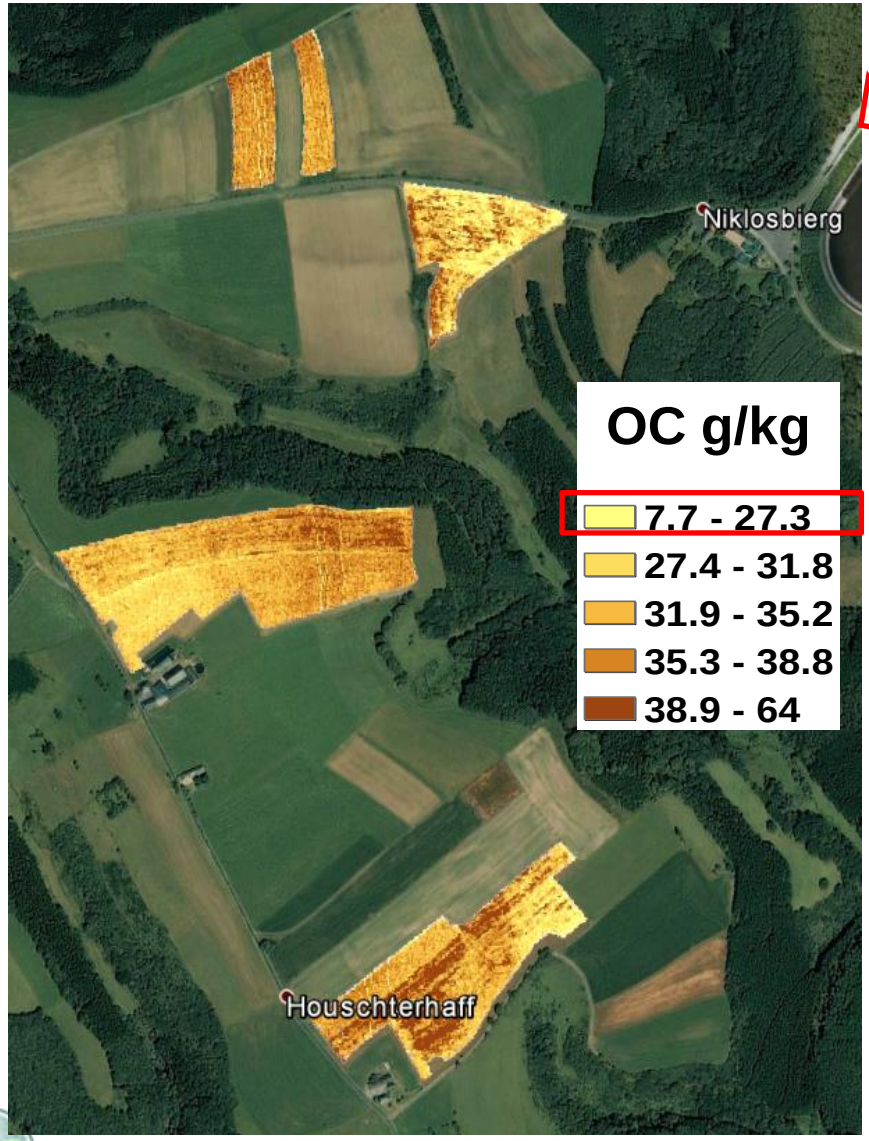
85 samples

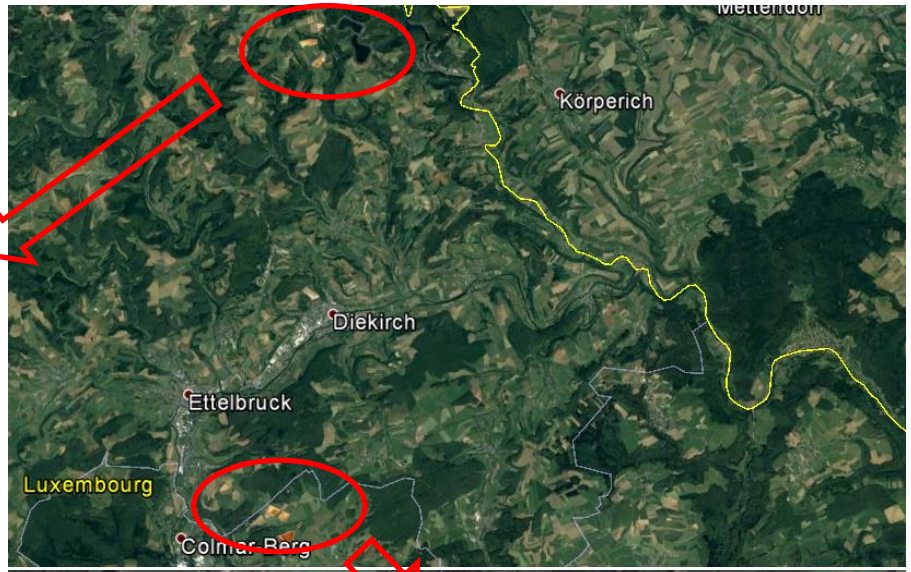
	Belgium OC (g kg^{-1})	Luxembourg OC (g kg^{-1})
Mean	10.5	23.2
Min	7.1	6.6
Max	19.4	49.8
SD	2.3	11.2

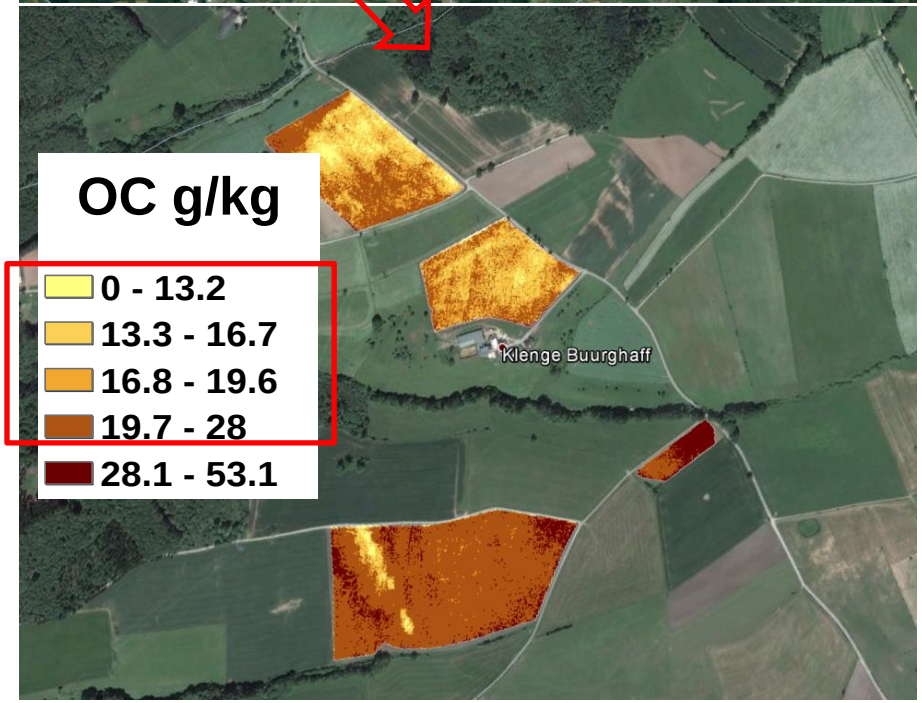


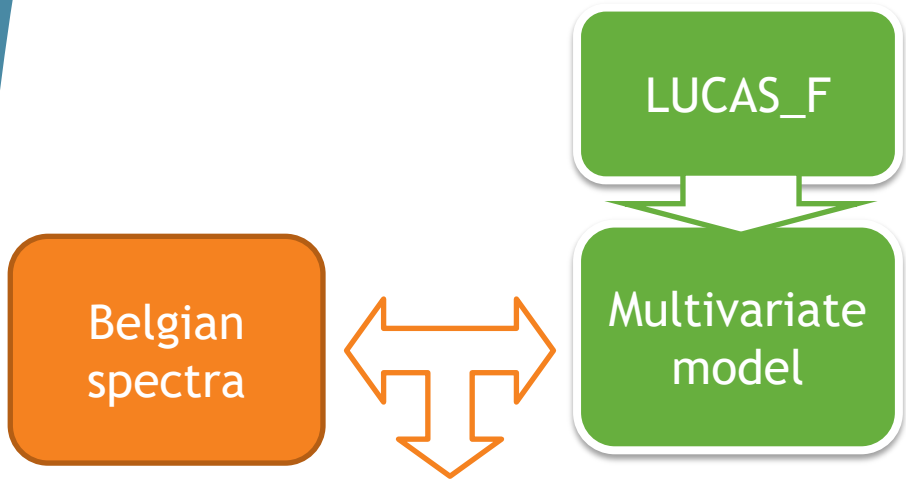
PLSR model only using LUCAS: no lab analysis

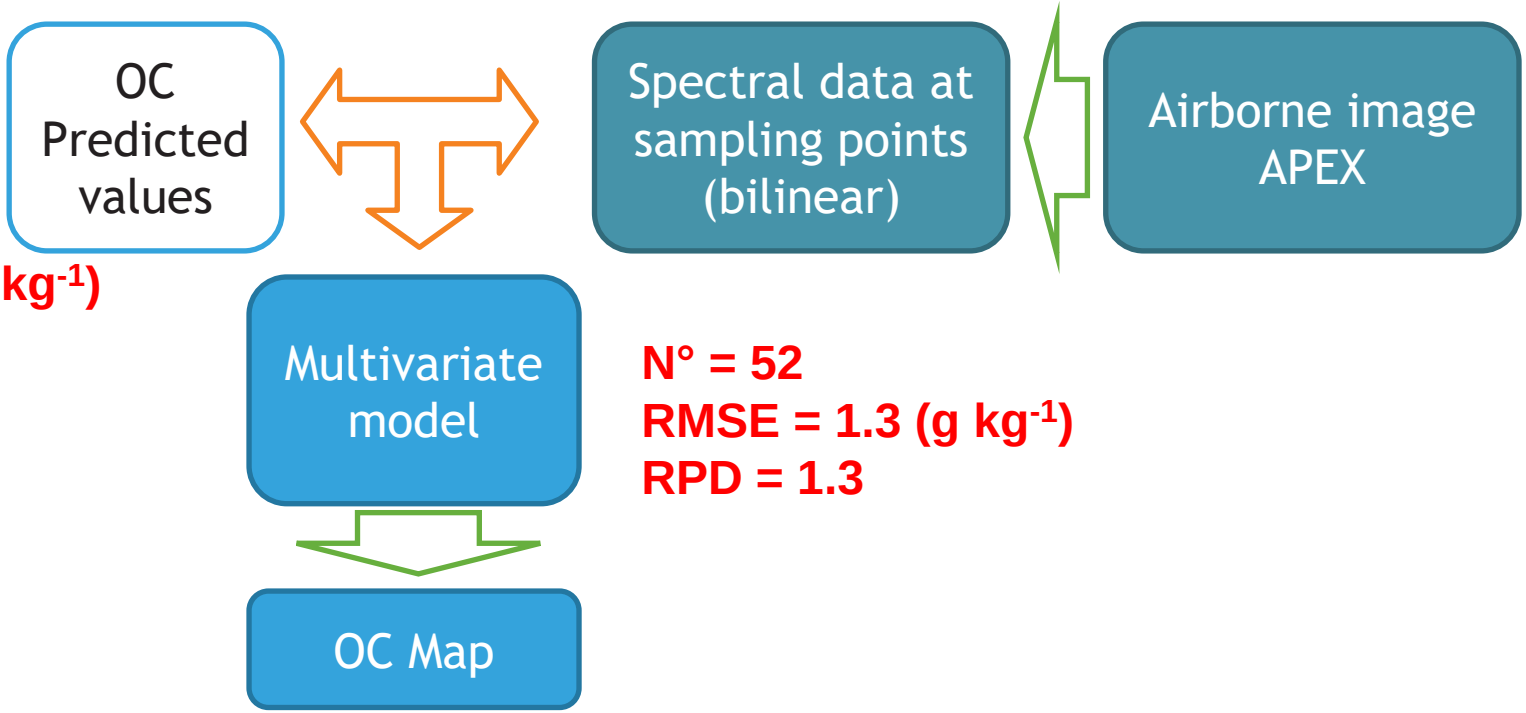

LUCAS_A
Luxembourg spectra
Multivariate model
OC Predicted values
Spectral data at sampling points (bilinear)
Airborne image APEX
N° = 85
RMSE = 6.1 (g kg-1)
RPD = 1.8
Multivariate model
N° = 85
RMSE = 7.6 (g kg-1)
RPD = 1.5
OC Map


Niklosbierg
Houschterhaff
OC g/kg
7.7 - 27.3
27.4 - 31.8
31.9 - 35.2
35.3 - 38.8
38.9 - 64


Körperich
Diekirch
Ettelbruck
Luxembourg
Colmar-Berg


Klenge Buurghaff
OC g/kg
0 - 13.2
13.3 - 16.7
16.8 - 19.6
19.7 - 28
28.1 - 53.1





N° = 52
RMSE = 1.2 (g kg^{-1})
RPD = 1.4

N° = 52
RMSE = 1.3 (g kg^{-1})
RPD = 1.3


Sauvenière
OC g/kg
6 - 10.8
10.9 - 12.3
12.4 - 13.5
13.6 - 14.8
14.9 - 18.7

- We exploited the **LUCAS** database to estimate **OC** of two **local** spectral libraries with a good accuracy (only using the lab spectra, without new chemical analyses)
- The **predicted values** + **APEX** spectra allowed to build a PLSR model for each area to obtain OC maps over large areas
- The maps showed both within and between fields variability
- The proposed methodology allows to transfer soil information from a continental library to remote sensing data obtaining relevant information at regional and local scale.

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