

Uncertainty propagation with RTM: Instrumental and spatial

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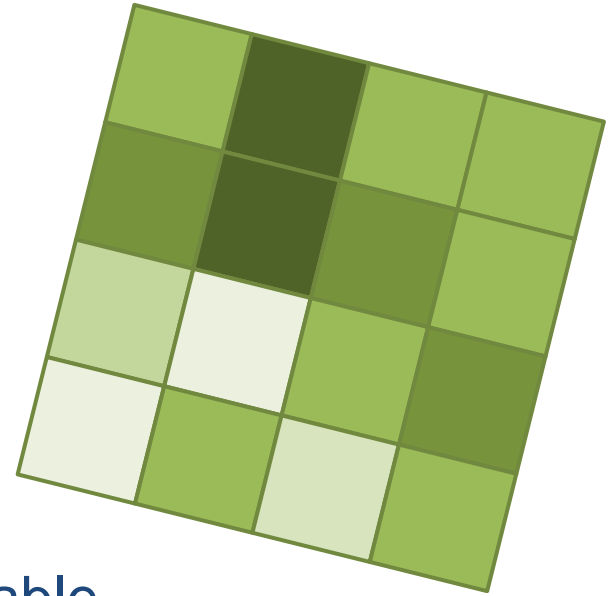
1. Exercise 2. PROSAIL

- Aim:
- 1) Repeat the propagation of uncertainty already learnt to a new and bigger dataset representing 15 samples taken in different spatial points of a study area.
- 2) Propagate uncertainties from measurements of incoming and transmitted radiation in the canopy to aPAR
- 3) Combine aPAR and a model predicting LAI
- 4) Propagate all the uncertainties to the reflectance factors predicted by PROSAIL

1. Exercise 2. PROSAIL

- Spatial sampling

- 16 subplots in a Landsat pixel.
- In each point, vegetation is assumed homogeneous and variables to estimate PROSPECT parameters are measured at each point.



You only get the averaged values (see table /Session2/Ex2_TableLeafParam.csv), but you are reported that there is a 5 % of (**spatial**) variability for each parameter measured in each subplot.

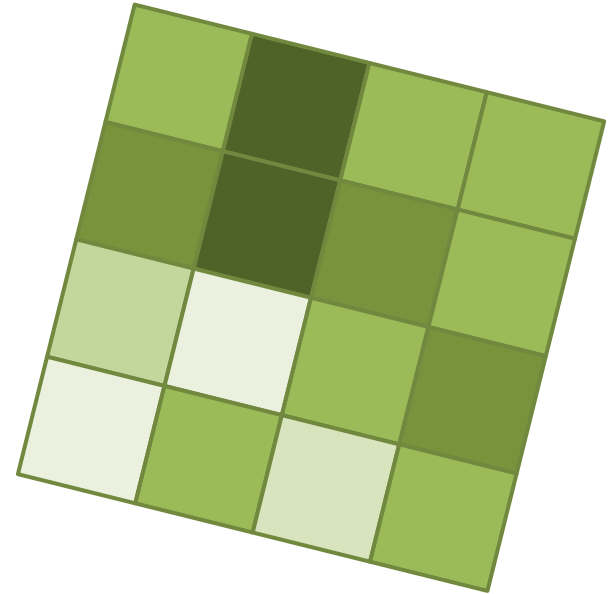
1. Exercise 2. PROSAIL

- Spatial sampling

- Also, in each point incoming irradiance and transmitted irradiance are computed to estimate aPAR and use it in a model calibrated in the site to predict LAI

- Irradiance measurements have an relative standard uncertainty of 5 % (see /Session2/Ex2_TableLAI.csv)

- $$aPAR = \frac{E_{PAR,transmitted}}{E_{PAR,incoming}}$$

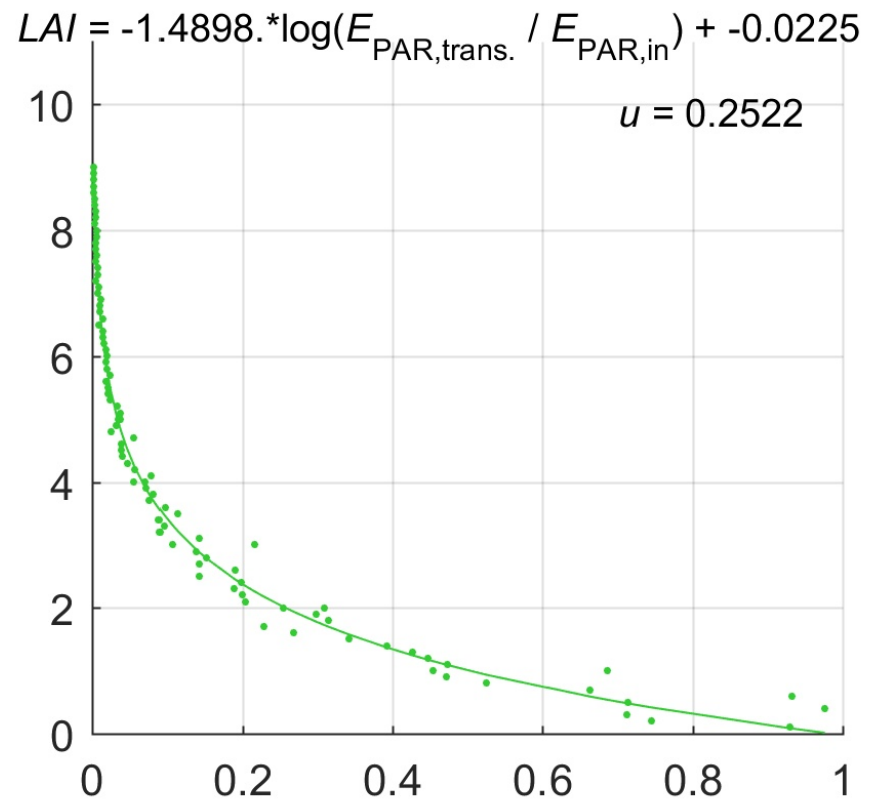


1. Exercise 2. PROSAIL

- For each subplot
 - Predict uncertainty of leaf reflectance and transmittance factors with PROSPECT
 - Predict distributions in LAI estimates
 - Assume $LIDFa = -0.35$ and $LIDFb = -0.15$
 - Use the soil spectra in /Session2/soil.csv for soil reflectance
 - Assume $\theta_{\text{sun}} = 30$ [deg]; $\theta_{\text{view}} = 0$ [deg]; $\varphi = 0$ [deg]
 - Assume hot spot = 0.001
- Predict uncertainty of top of the canopy reflectance factor

1. Exercise 2. PROSAIL

- LAI model
 - Use equation and standard uncertainty provided in this plot





THANKS!