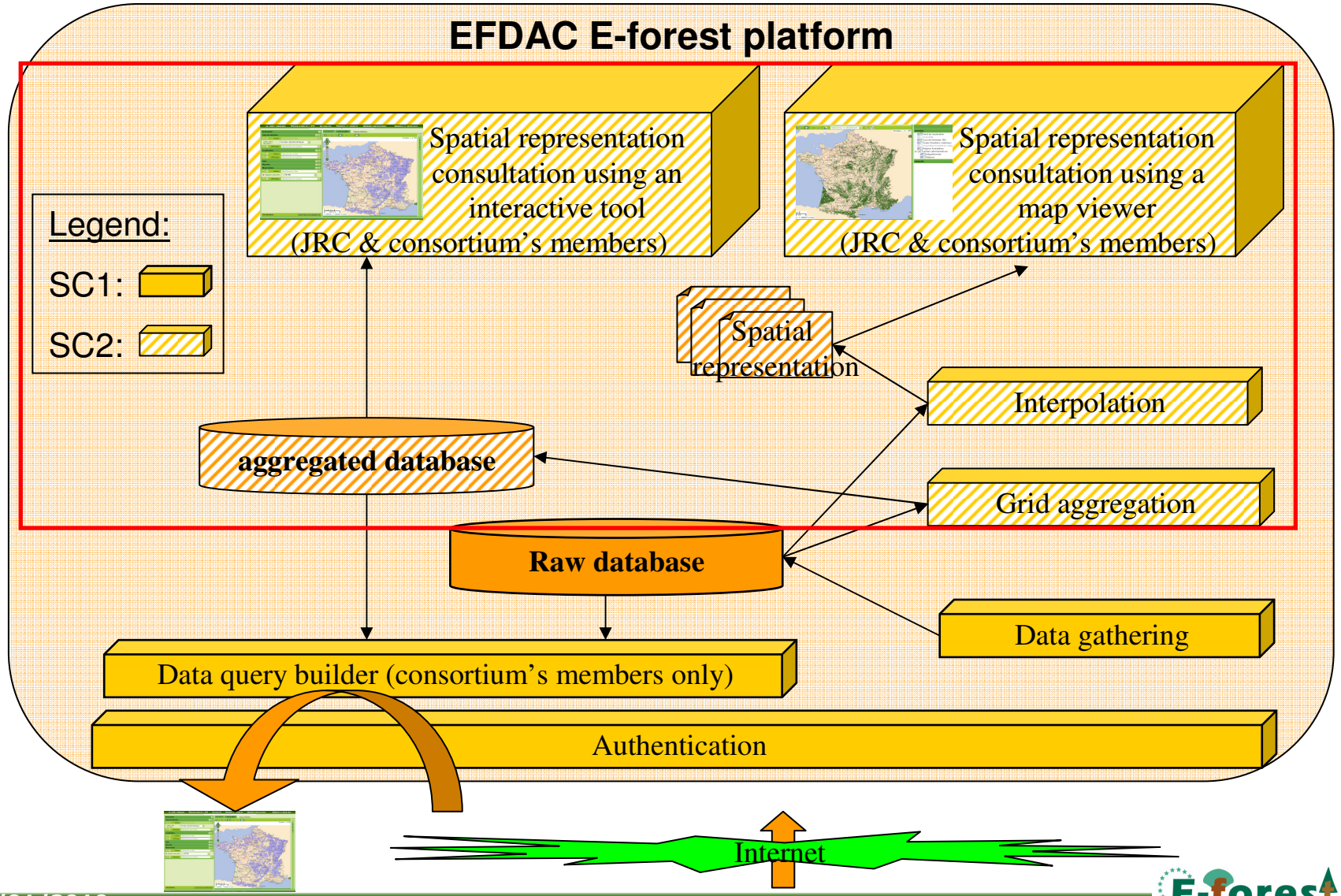
# Specific Contract 2

*Enrichment of the EFDAC E-forest Platform*




Jean-Luc Cousin

# The EFDAC E-forest platform

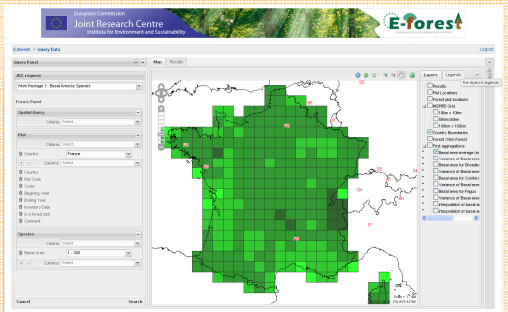


# Overview of the SC2

**POINT LEVEL**

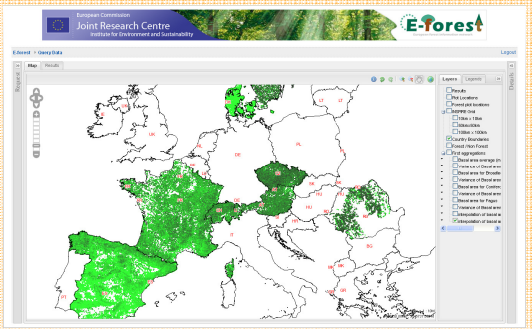
Data query builder (consortium's members only)

Grid aggregation

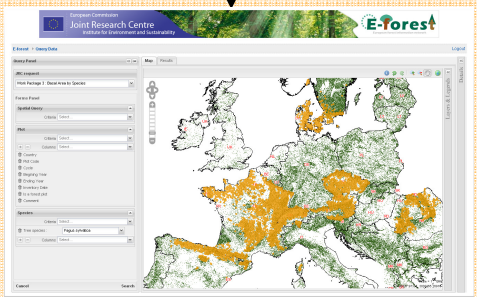


**Interactive tool**

Interpolation (smoothing)



**Map viewer**



**Interactive tool**

**EFDAC E-forest platform**

Legend:

SC1:

SC2:

# Aggregation module

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# Aggregation module

## Purposes:

**SC2 and SC3**

To avoid providing to the JRC quantitative variables at a plot level.

**In the future**

To produce statistical results on different territories such as NUTS, region, grid…

## Methodology:

- Based on **estimation** (design based estimation) or a **prediction** (geo statistic calculation).
- Provision of an estimation of the **variance** (not contractual in SC2 and SC3 but has to be considered as mandatory for next SC)

For the SC2 and SC3, the permanent members of consortium propose to use a design based estimation for the grid aggregation module.

# Aggregation module

## Constraints:

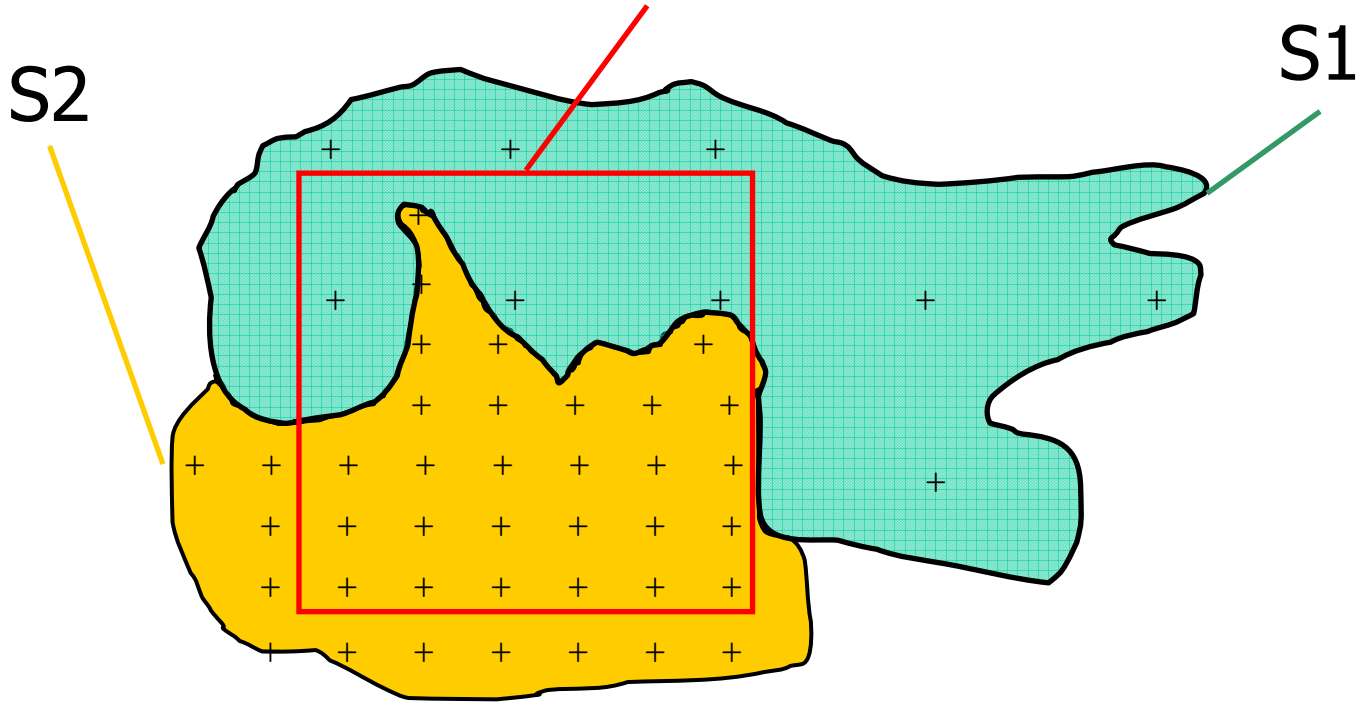
The aggregation **units size** (grid size or Territory area (NUTS, etc)) has to be compliant with the **standard error**

Depending on the result to obtain, we know that we need approximatively more than **30 plots** per line returned by the aggregation module.

To take into account the **inclusion probability** of the sampling unit at least for France and Italy, it will be necessary to provide the relative statistical weights of the sampling plots.

# Aggregation module

T: Territory where we want to calculate the basal area (can be a polygon or a grid)

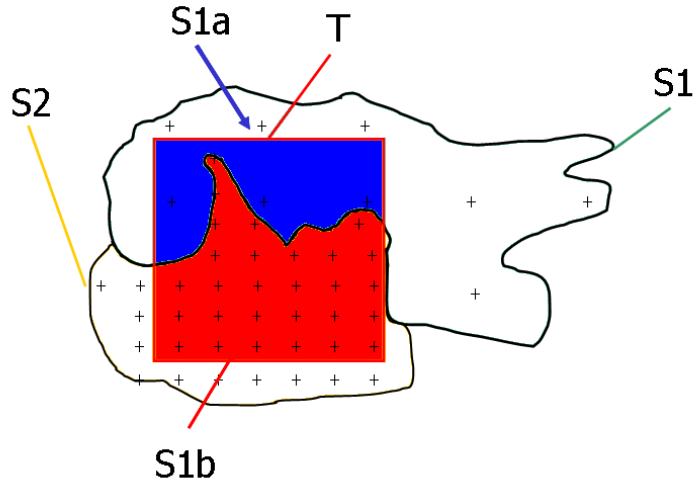



We know for each stratum (S1, S2): the total area, the relative statistical weights of sampling plots, the link between plot and strata.

We have also for territory (T) the GIS Layer

# Aggregation module

Strategy 1: overlaying GIS layer for T and strata (S1, S2)




➥ Creation of the new strata (S1a, S1b) with their area calculated by GIS software.

Unfortunately, it seems to be difficult to use it for SC2 and SC3 due to different constraints (harmonization of national boundaries, empty stratum, …).

→Thus a workaround is proposed (see strategy 2)…

# Aggregation module

**Strategy 2: Grid cell is only considered as a plot qualitative variable**

We keep the national stratification without over layering the Territory for which a calculation is necessary.

For the Inspire Grid:

1. The plot coordinates are overlaid with the Grid
2. The design based estimator is used to calculate the basal area per species and per grid cell identifier using the national stratification provided by the country.

It's a first step in order to wait a new SC to work on the first strategy.

# Estimation of the basal area per Grid

E-forest database

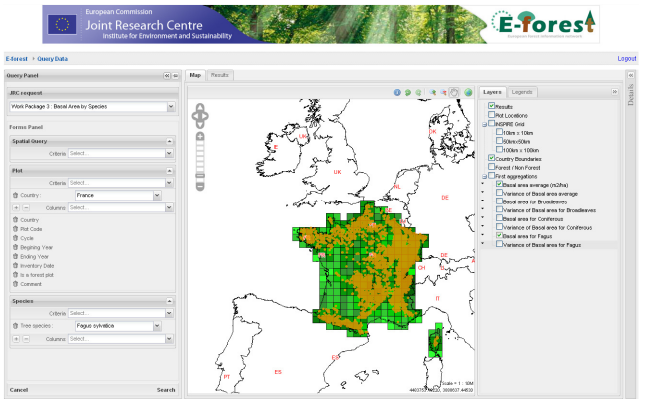
(1) Plot data extraction

Estimation module

(2) Importation of grid results + variance

Inspire Grids

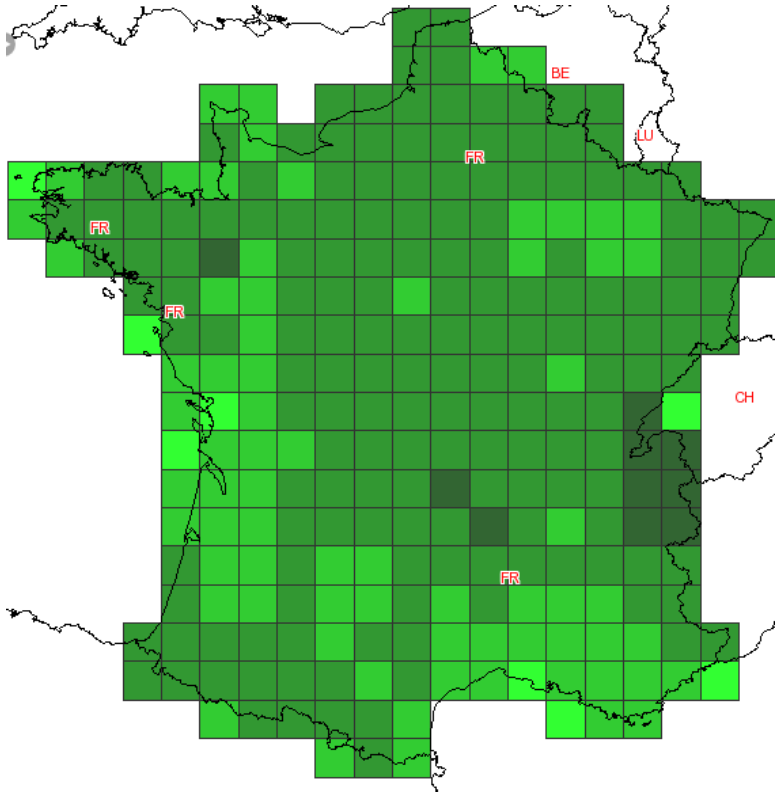
(3) Access to results (tables, maps) using E-forest platform

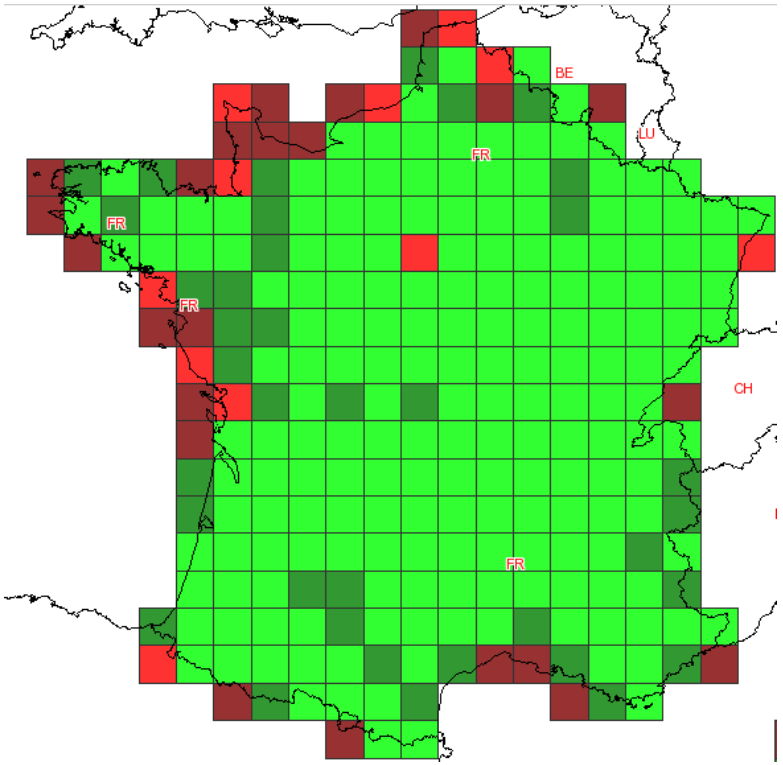


# Result obtained (grid 50kmx50km)
## Average of the total basal area (m2/ha)

| Basal area m2/ha | standard error (%) | Number of plots | Grird cell identifier |
|---|---|---|---|
| 24 | 29,4 | 51 | 50kmE325N285 |
| 19 | 30,5 | 40 | 50kmE325N290 |
| 25 | 23,1 | 56 | 50kmE330N280 |
| 26 | 36,4 | 78 | 50kmE330N285 |
| 23 | 22,4 | 63 | 50kmE330N290 |
| 21 | 91,9 | 10 | 50kmE335N225 |
| 8 | 178,7 | 3 | 50kmE335N270 |

# Result obtained (grid 50kmx50km)
## Average of the total basal area (m2/ha)




Basal area average (m2/ha)
- [0, 10[
- [10, 20[
- [20, 30[
- >30

Basal area

standard error

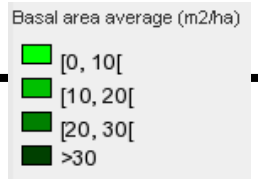
- [0%,30%[
- [30%,50%[
- [50%,100%[
- >100%

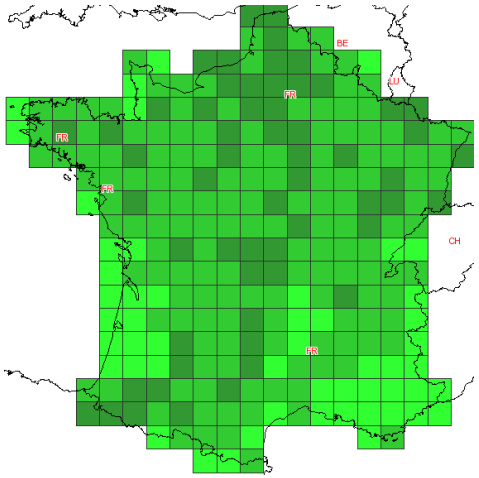
# Result obtained (grid 50kmx50km)

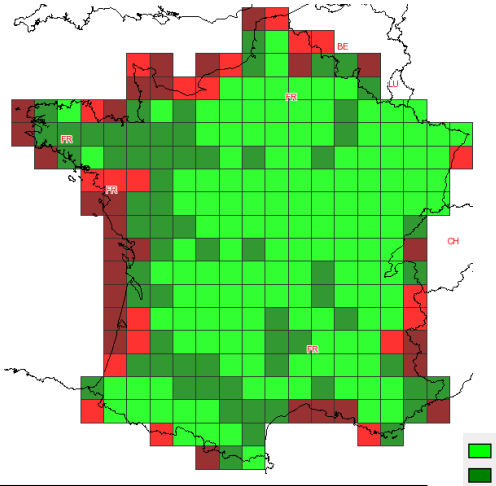
## Average of the total basal area (Broadleaved/coniferous)

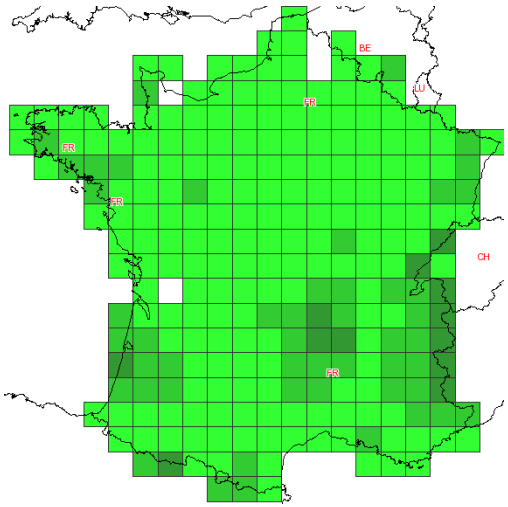
Broadleaved

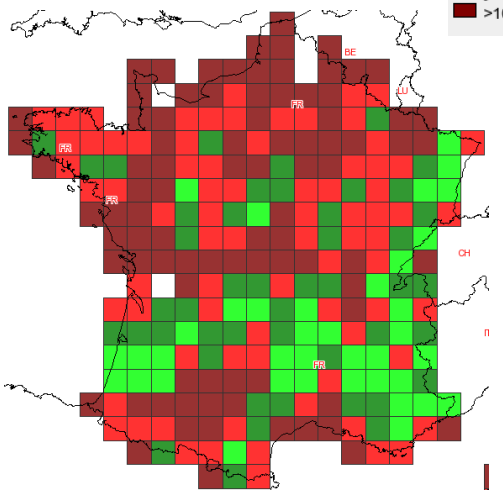
Coniferous

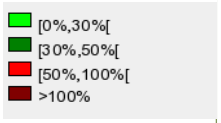








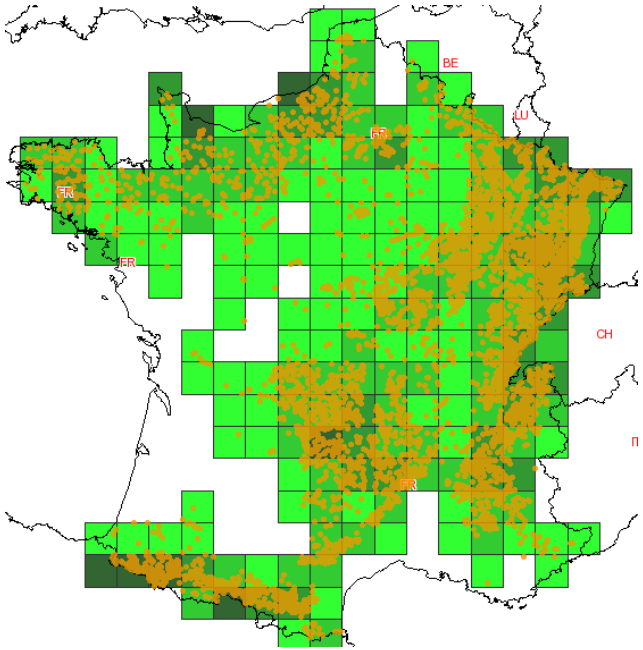


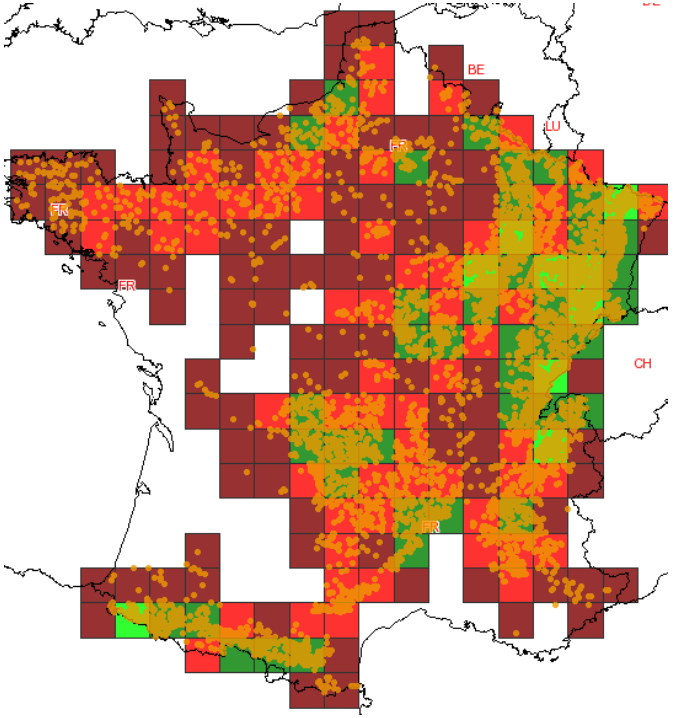

Basal area

standard error

# Result obtained (grid 50kmx50km)

## Average of the total basal area (Fagus sylvatica)




Basal area average (m2/ha)

- [0, 10[
- [10, 20[
- [20, 30[
- >30

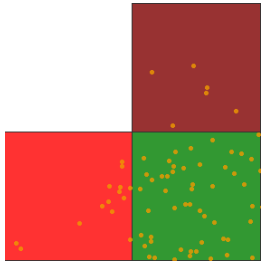
Basal area

Standard error

- [0%,30%[
- [30%,50%[
- [50%,100%[
- >100%

# Grid size constraints

The grid size has to be compliant with the plot density of each country



For France:

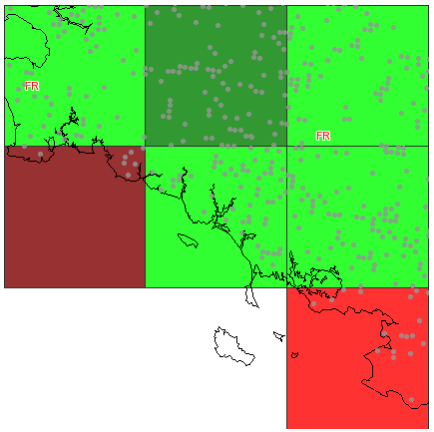
Number of Forest Plots: 29653

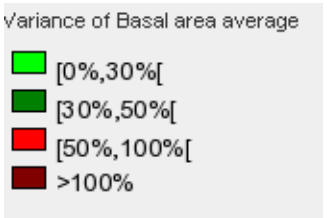
France area: 675.417 Km2

Grid size: 50kmx50km

>> average of plots per cell = 56,94

Limits with water area provoke the same phenomena depending on how the grid intersects the water boundary



# Aggregation module

**Conclusions:**

Even with the 50kmx50km grid, it seems to be difficult to provide the basal area per species.

-> A strategy has to be proposed to the JRC to fulfill their requirements: having access to aggregate quantitative variable

- We can provide results based on different INSPIRE grid size: 50Kmx50Km or higher (100Kmx100Km,…)
- We can aggregate the grid cell where the variance is too high and carry out a new estimation on this new "grid" (methodology to define)
- Other idea ?

# Interpolation module

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# Interpolation module

raw database

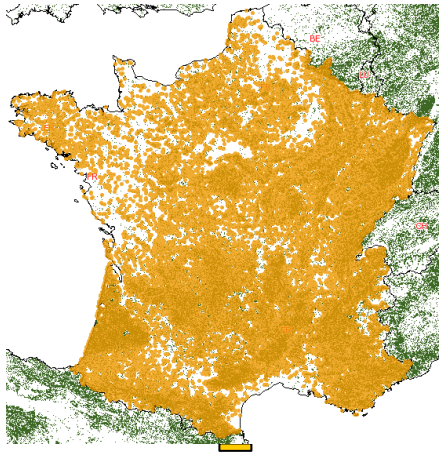
1. Variable to display
2. Methodology for interpolation

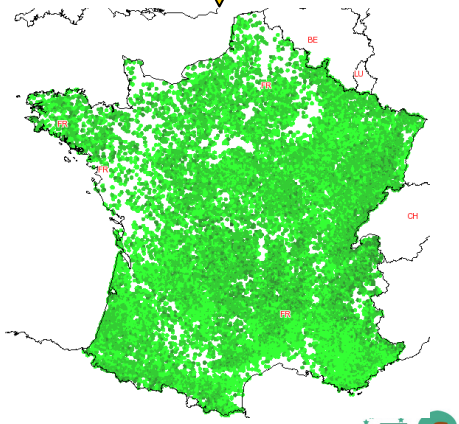
Based on INTAMAP

Java

R

Spatial representation





# Interpolation module

**Purposes:**

The purpose of the Interpolation module is to manage/"harmonize" **different plot densities** at a European level by producing maps which have to considered as **graphical representation** to illustrate a phenomena but not as layer to be overlaid with other GIS layers.

**Methodology:**

First step, we propose to use the a simple method with no modeling : IDW (Inverse distance weighting).

The value at the unknown point is a weighted sum of the values of N known points.

# Interpolation module

**Parameters:**

In this algorithm, we need to specify the grid size (level of restitution) and the strategy for interpolation:

- the number of nearest observations that should be used

or

- the maximum distance to find nearest observations

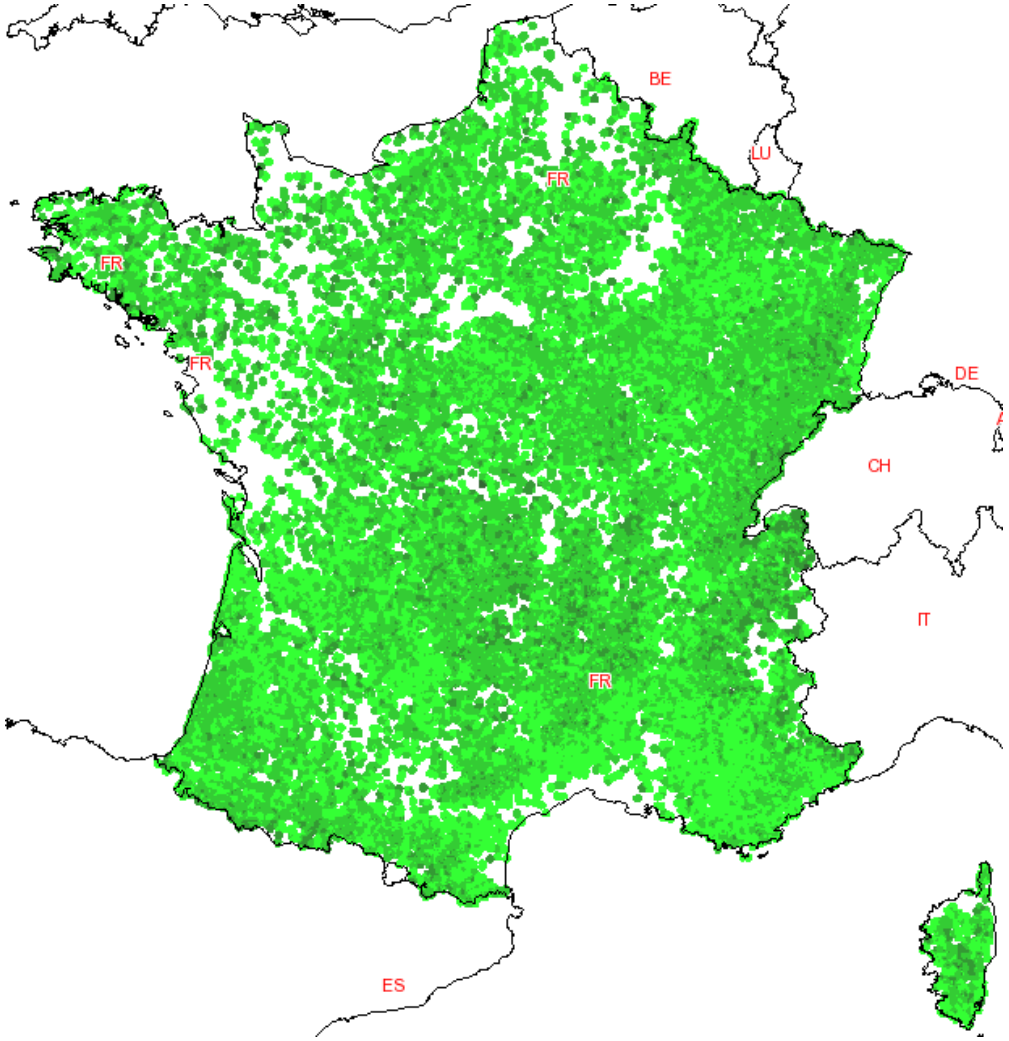
**Constraints:**

We need to take into account the cluster to avoid perturbation due to local high plot density

We need to take into account the difference of plot density to determine the interpolation parameters

We need to take into account water zone, etc

# Interpolation of the basal area for France




**Parameters:**

Level of restitution: 1 Km

Maximum distance: 5 km

interpolation of basal area for all countries

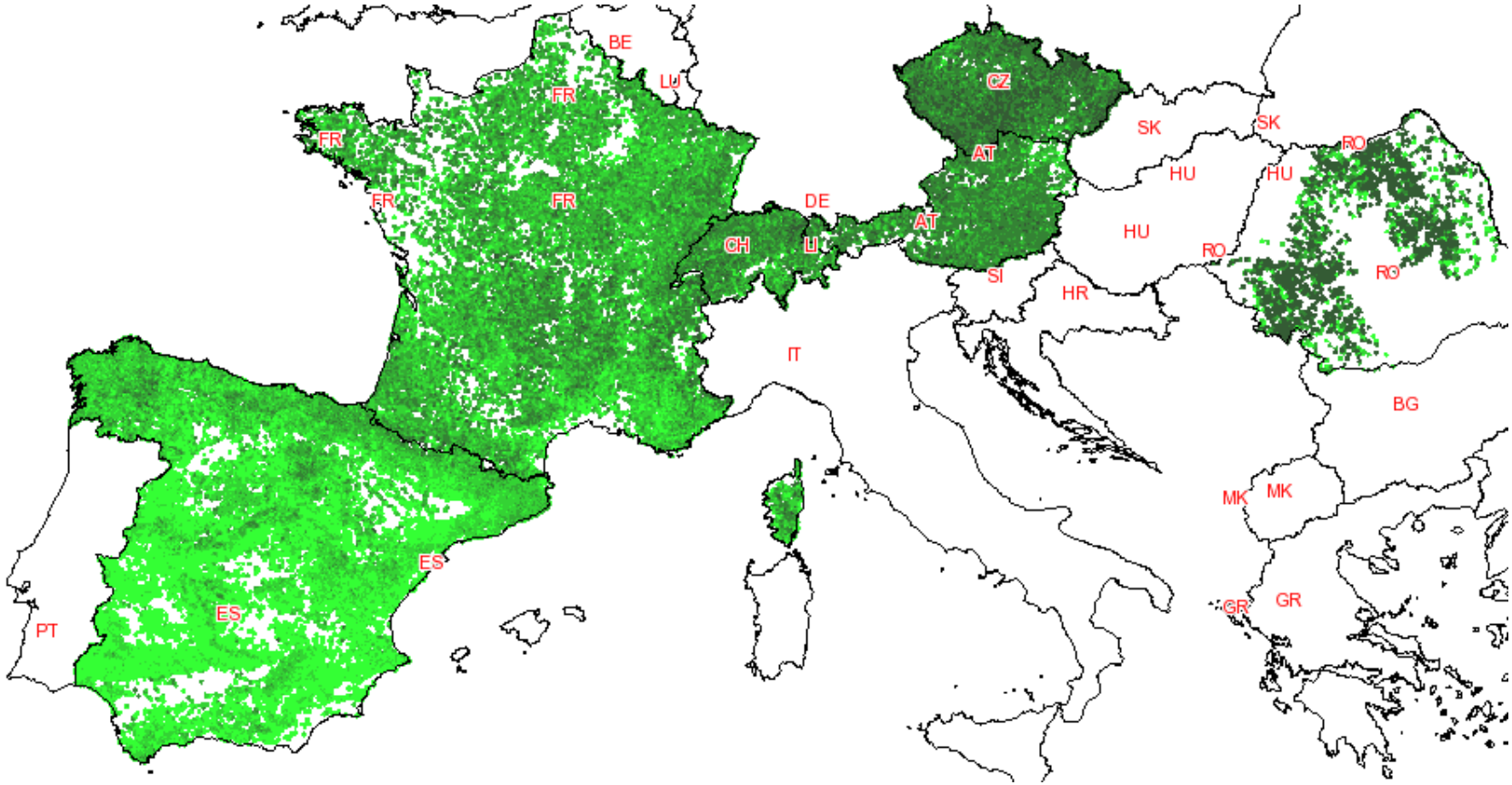
- 0
- ]0, 10[
- [10, 20[
- [20, 30[
- [30, 50[
- >50

# Interpolation of the basal area for south Europe

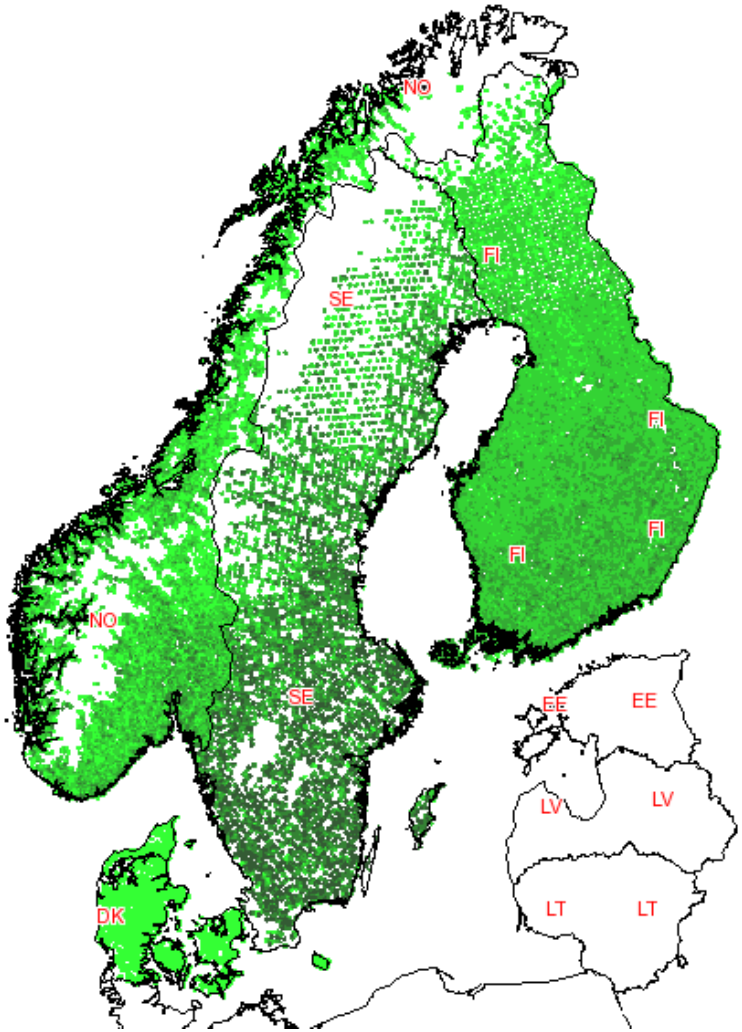
**Parameters:**

Level of restitution: 2 Km

Maximum distance: 10 km



# Interpolation of the basal area for north Europe




**Parameters:**

Level of restitution: 2 Km

Maximum distance: 10 km

# Interpolation module conclusions

**Conclusions:**

The parameters used for interpolation have to be improved (to take into account national plot density, water zone, etc) but this module will remained a simple process just to fulfill the JRC requirements (SC2).

The final aim of this module is to carry out a real prediction with a variance calculation but we need a new specific SC for that.