SIXTH FRAMEWORK PROGRAMME

FOOTPRINT

Identification of Agro-environmental scenarios characterizing European Agriculture

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Objective of the work

> Develop and apply a methodology for defining generic scenarios for characterising the complete spectrum of European agricultural environments (integrate crop, weather and soil characteristics).

- Scenarios must be capable of being applied anywhere in Europe at European/national/regional, catchment and farm/holding level.

- Each scenario will have a default set of
  - long-term weather data
  - soil property data
  - agronomic data.

Climatic scenarios

- Determine important climatic variables that affect pesticide transport: Tom Nolan's presentation.
- Use European Climate Assessment dataset and CRU TS 2.0 dataset, to derive spatial variability of these variables within Europe.
- Use principal components analysis (PCA) to define spatial groupings where the critical climatic variables are homogeneous: '**FOOTPRINT Climatic zones'**
- Produce consistent, representative daily weather time series for these climatic zones using the CRU TS 2.0 and MARS daily weather datasets for Europe.

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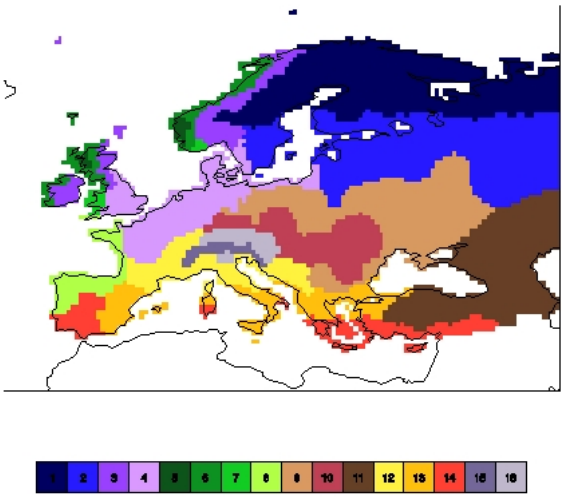
The 16 FOOTPRINT climatic zones



The 16 FOOTPRINT climatic zones

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FCZs in plain English

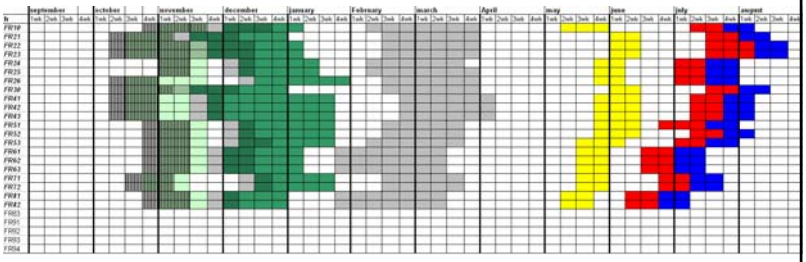
Climate Type	FCZ	Description
Northern	1	North European climate, cold and dry.
	2	North European climate, cool and dry.
Temperate	3	Modified temperate maritime climate, cool with moderate precipitation.
	4	Temperate maritime climate, warm with moderate precipitation.
Maritime	5	Very, wet, mountainous maritime climates, with more frequent extremes.
	6	Wet, maritime climates, on exposed western coasts, more frequent extremes.
	7	Modified upland maritime climate, more frequent extremes.
	8	Warmer maritime climate, wetter but fewer wet spring days.
Continental	9	Continental climate, warm and dry.
	10	Continental climate, warm and dry with moderate frequency of extremes.
	11	Continental climate, warm and dry.
Mediterranean	12	North Mediterranean climate, warm and moderate precipitation.
	13	Mediterranean climate with more frequent extreme rainfall.
	14	Mediterranean climate, warmer, lower rainfall with more dry days but higher winter rainfall.
Alpine	15	Alpine climate, cool and wet, relatively more extremes.
	16	Sub-Alpine continental climate, warm, moderate rainfall but low winter rainfall, moderate frequency of extremes.

Defining Agronomic scenarios

- 2 main objectives
- Produce templates of crop growth stages required by the models (MACRO & PRZM), 'application windows' and (where relevant) irrigation requirement.
- Identify specific crop coverage across EU at NUTS level 2 and their precise location using CORINE 2000.

Example crop growth stage template

Winter Soft Wheat



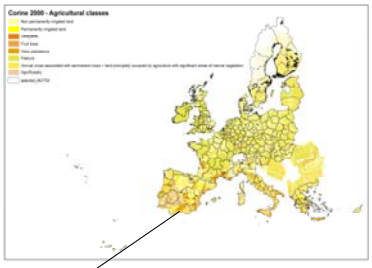
Crop growth stages harmonised across FOOTPRINT climate zones.

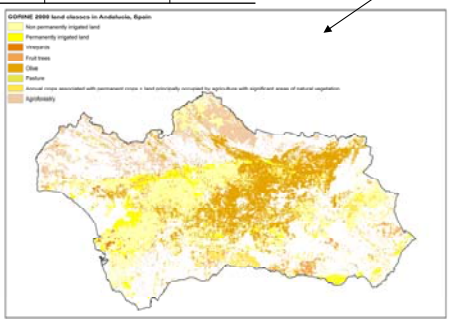
Collaborative effort
42 crops, 252 NUTS2 areas (23 countries)

FOOTPRINT Crop cover and location

Data for NUTS ES61: Andalucia, Spain

Crop Type	EUROSTAT Crop cover area % arable land area	Adjusted crop cover % using correction factor	Crop cover area (1000ha)
Durum wheat	24.86	28.48	475.94
Maize grain	2.45	2.83	47.06
Oil seed	15.47	17.79	296.32
Soft wheat	3.32	3.81	63.59
Sunflower	15.45	17.76	295.81
Olive	-	100	1494.01
Vineyards	-	100	44.31





FOOTPRINT soil scenarios (FSTs)

> Define FOOTPRINT soil scenarios based on:

- hydrological characteristics:
  HOST attributes; CORPEN soil attributes; Textures.
- sorption attributes:
  Texture; (from stu.dbf)
  Organic matter profiles; (identified by soil class from stu.dbf)

> Combine to define FOOTPRINT soil classes.

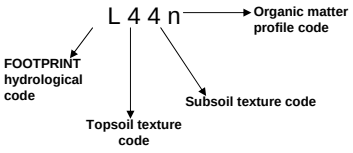
> Assign classes to each STU in SGDBE using stu,dbf attributes.

> Use SPADE-1 and SPADE-2 databases (Approximately 2000 profiles) to derive land use-specific profile parameters for each FOOTPRINT soil class.

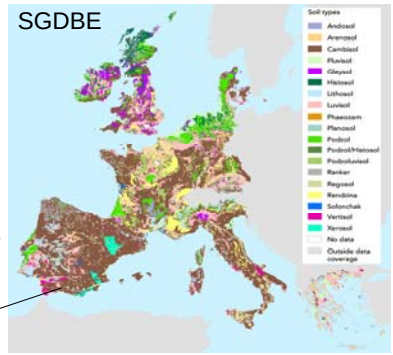
254 FSTs

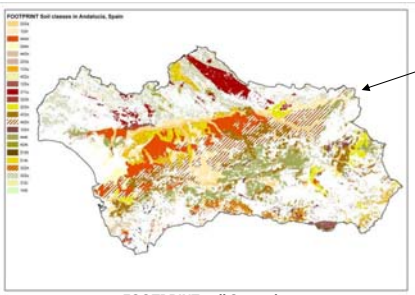
Defining FOOTPRINT Soil codes

FOOTPRINT Soil class:

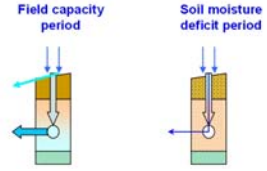


SGDBE



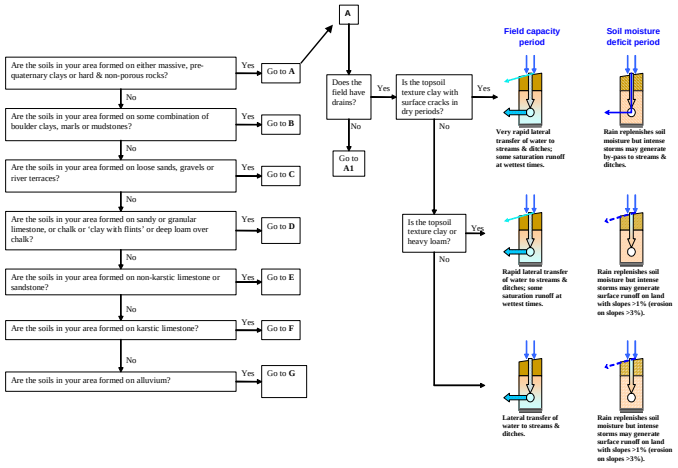


FOOTPRINT soil Scenarios

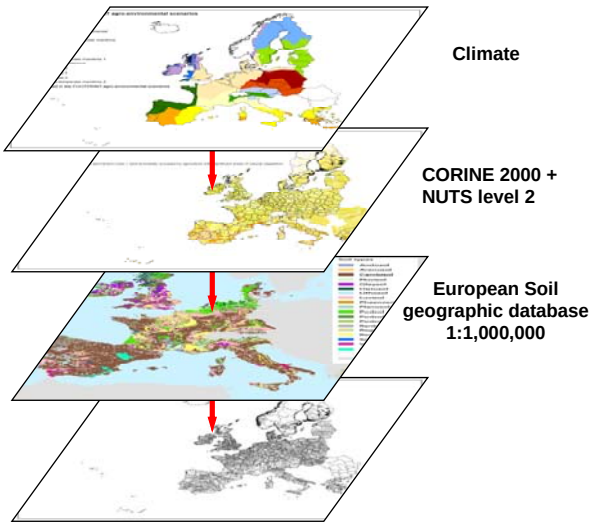


Yes, but what if I've got my own maps?

> Use the FST decision tree!



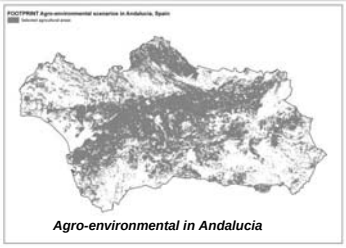
GIS Intersection



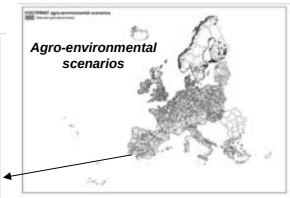
Combined Climate/NUTS2/CORINE 2000/soil type polygons

Agro-environmental scenarios

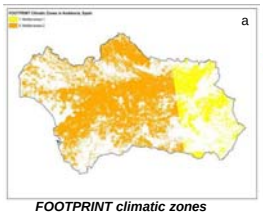
Example of Andalucia, Spain



Agro-environmental in Andalucia



Agro-environmental scenarios



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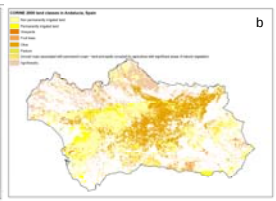
FOOTPRINT climatic zones



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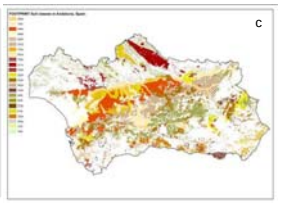
FOOTPRINT agronomic scenarios



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FOOTPRINT soil Scenarios

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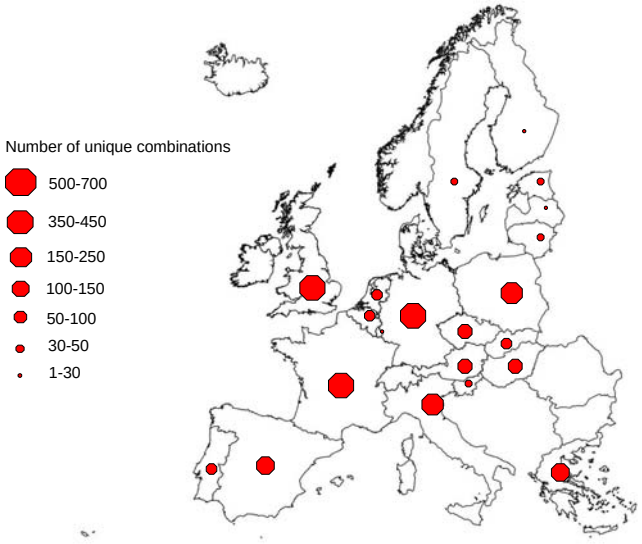
Heterogeneity across Europe



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FOOTPRINT agro-environmental scenarios and the FOOT tools

- 13,753 unique combinations of FOOTPRINT climatic zone, FOOTPRINT soil types and crop occurrence have identified.
- When application periods are considered, the number of scenarios is ca. 90,000 scenarios
- Use of the scenarios in the FOOT tools:
  - **Option 1: no data**
    - Use of the spatial distribution of agro-environmental scenarios for areas where detailed data are not available (ArcGIS in FOOT-CRS and -NES, GoogleEarth for FOOT-FS)
  - **Option 2: better data (e.g. soil map)**
    - Relationship drawn between soils on your map and FOOTPRINT soil types through a flow chart based on simple questions

Conclusions

- A large number of unique combinations of FOOTPRINT climatic zone, FOOTPRINT soil types and crop occurrence have been identified.
- The scenarios represent the spatial variation and the heterogeneity of the European landscape
- The scenarios and their supporting information are used to:
  - Identify contamination pathways across Europe
  - underpin model parameterization.