



SIXTH FRAMEWORK PROGRAMME



FOOTPRINT

Developing agro-environmental scenarios for the whole of Europe



John Hollis, WP2 leader
FOOTPRINT annual meeting, 23-24 November 2006

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WP2

Defining Agro-environmental scenarios for Europe - Objectives



- Develop and apply a methodology for defining generic scenarios for characterising the complete spectrum of European agricultural environments (integrate crop, weather, soil, & hydrogeological 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 & unsaturated & saturated zone transfer coefficients.



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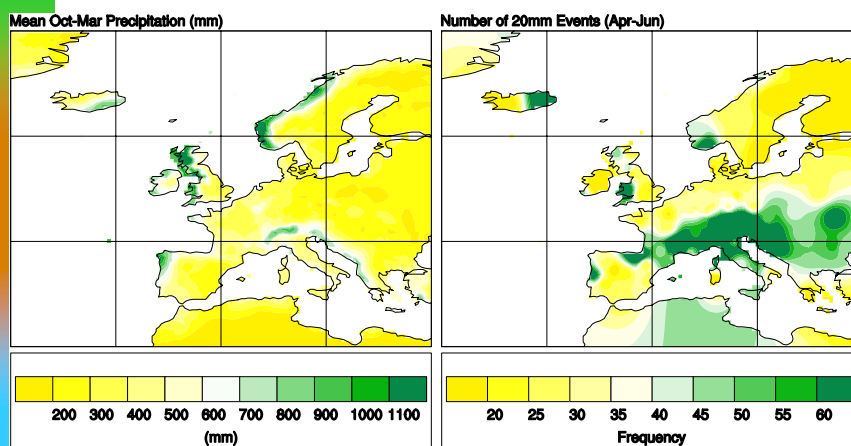
Climate & Weather patterns Methods & data sources



1. Determine important climatic variables that affect pesticide transport: **Igor's presentation**.
2. Use European Climate Assessment dataset and CRU TS 2.0 dataset, to derive spatial variability of these variables within Europe..
3. Use principal components analysis (PCA) to define spatial groupings where the critical climatic variables are 'homogeneous: **'FOOTPRINT Climate zones'**
4. Produce consistent, representative daily rainfall and temperature, PET, wind speed, solar radiation time series for these climatic zones using the MARS daily weather datasets for Europe.

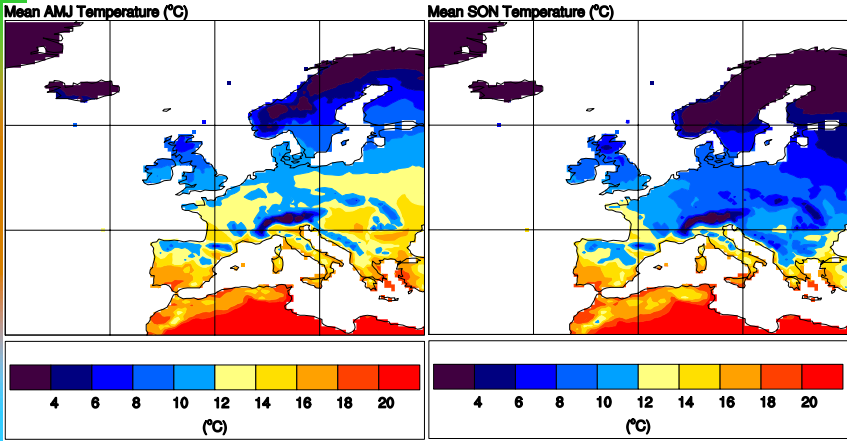
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Critical climatic variables: Rainfall



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Critical climatic variables: Temperature



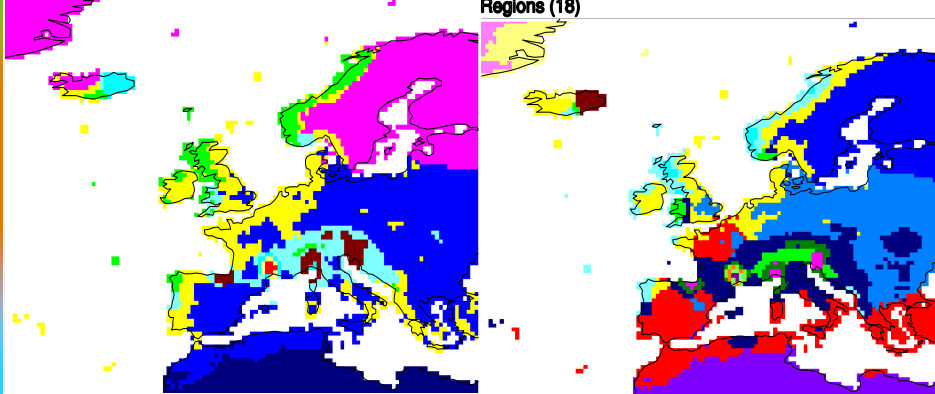
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FOOTPRINT Climate zones – Very first draft !



Regions (10)

Regions (18)



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Agronomic Scenarios: Methods



- Define groups of agronomic practices (at NUTS-2 level) representative of EU agriculture with respect to pesticide usage by:
 1. Producing templates of the crop growth stages required by the models (MACRO & PRZM) & 'application windows'.
 2. Defining a set of agronomic zones within Europe that group together crop ranges and farm holding ("homogeneous" areas).
- Locate crops by overlaying CORINE 2000 land cover data (250m x 250m) and NUTS-2 cropping statistics.



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Crops included



Barley	Other Cereals
Cotton	Potato
Durum Wheat	Pulse
Flax	Rape
Fodder roots & brassicas	Rye
Fresh veg.* , melon, and strawberries	Soft wheat
Grassland	Soya
Maize fodder	Sugar beet
Maize grain	Sunflower
Oats	Tobacco
Oilseed	Vineyard
Olive plantation	Agro-Forestry?
Orchards	

* Including tomatoes



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Crop templates: Data Sources



- MOCA study. Crop Monographies on Candidate Countries. 2003. Final report. European Commission, Joint Research Centre.
- Narciso G., Ragni P., and Venturi A. 1992. Agro meteorological aspect of crops in Italy, Spain and Greece. ECSC-EEC-EAEC, Brussels, Luxembourg.
- Saur R., Strobel D., Stammler G., and Scherer M. 2001. Development of Growth Stages of Crops in Different European Regions for the FOCUS Groundwater scenarios. Final report. BASF Aktiengesellschaft, AP Agricultural Products Division, 67114 Limburgerhof, Germany
- And experts advise gathered by FOOTPRINT partners

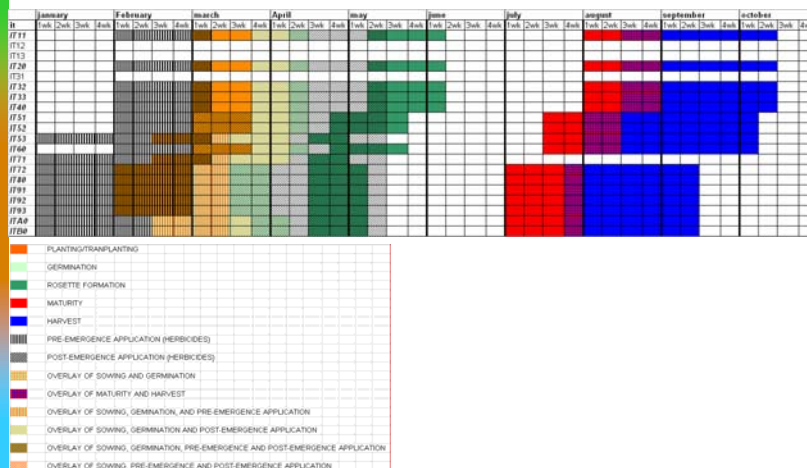


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Crop templates: Example 1



Spring Sugar beet

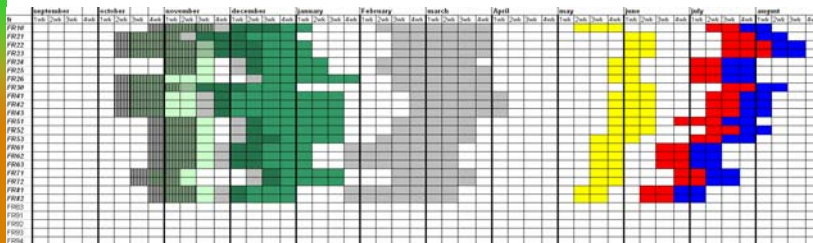


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Crop templates: Example 2



Winter Soft Wheat



Color	FR20	FR21	FR22	FR23	FR24	FR25	FR26	FR27	FR28	FR29
Orange										
Grey										
Light Green										
Yellow										
Red										
Blue										
Dark Grey										
Light Grey										
Dark Red										
Light Red										
Light Orange										
Light Yellow										
Light Green										
Light Blue										
Light Grey										
Light Orange										
Light Yellow										
Light Green										
Light Blue										
Light Grey										



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Agronomic zones



- NUTS 2 agricultural statistics
- PCA using: crops; holding size; holding economic size (ESU's); holders age; labour force (fully employed); holding's income (gross margin).
- Preliminary analysis gives 35 zones.

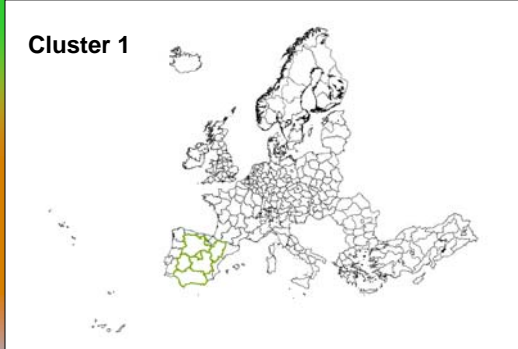


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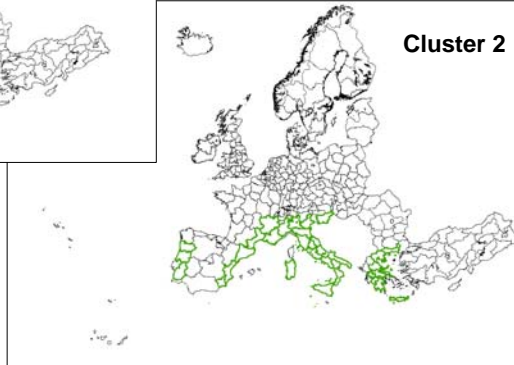
Agronomic zones: An example



Cluster 1

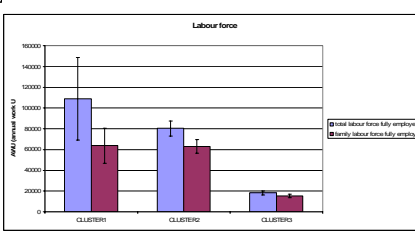
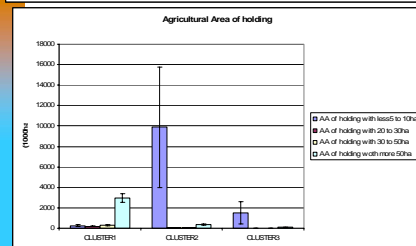
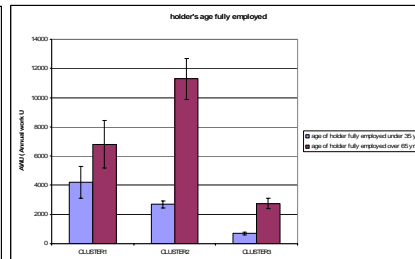
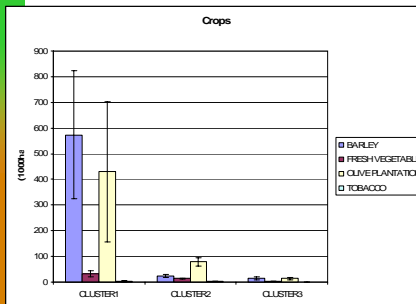


Cluster 2



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Agronomic zones: An example



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Agronomic zones - summary



- PCA shows some significant differences within both N & S.
- Factors likely to be important for pesticide usage differences across Europe.
- Difficult to see how this can be used directly in WP2.
- Possible use in designing effective mitigation strategies & in designing the 'validation step (WP6).
- Comments from AC requested!



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Representative Soil Scenarios - Methods



- Define soil hydrological characteristics:
HOST attributes; CORPEN soil attributes; Textures.
- Define sorption attributes:
Texture; (from *stu.dbf*)
Organic matter profiles; pH?; (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.



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SGDBE



- **Soil.dbf:** Spatial distribution and stats on soil polygons – Soil Map Units (SMU) identified by a number (123456).



- **STU_org.dbf:** Component soil types (STUs) within the SMU - STU identified by a number (123456)!; % cover within SMU (not spatially differentiated within SMU).

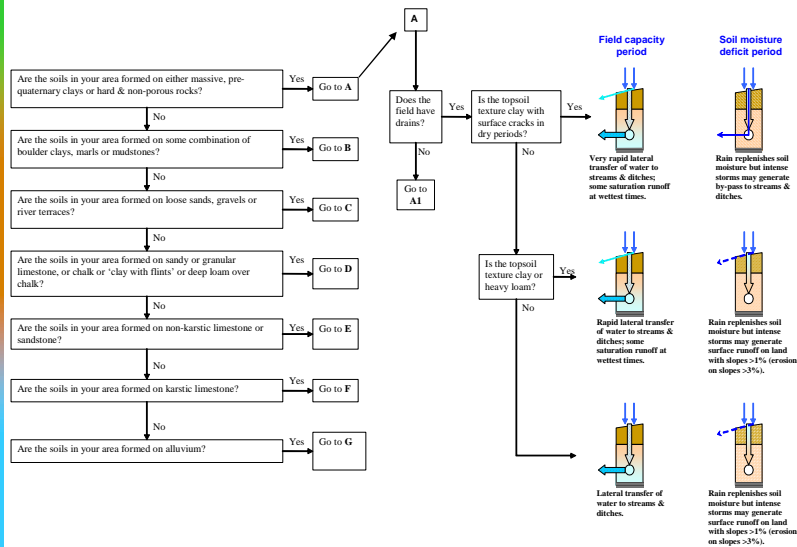


- **STU.dbf:** Attributes of each STU – broad texture, soil class water regime & more.



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The Hydrological component: HOST / CORPEN



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FOOTPRINT Soil class: Profile parameters



Ah32 - Arable

Layer code	U_depth	L_depth	clay%	silt %	very fine s	fine sand %	medium s	coarse s	stones%	Org_C %	pH	Db
Ap	0	25	25	40	7	10	15	3	10	2.1	6.4	1.40
Bw	25	55	20	38	5	12	19	6	15	0.7	6.3	1.33
BC	55	75	12	25	5	12	25	21	50	0.4	5.8	1.42
R	75	150	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7



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Unsaturated & Saturated Zone Characterisation



- Too complex and data not comprehensive enough to have 'default' transfer coefficients.

THUS

- Keep it simple in the FOOT tools, do not make it look like the precision is higher than it really is!
- Make it flexible, allowing the user to use detailed data (water managers must develop a conceptual model of the subsurface in WFD)
- Approach not linked to scale but levels of user input (complexity).



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Groundwater Vulnerability



Default (no data input from user)

Main flow path

- Predominantly runoff/gw. infiltration (HOST/CORPEN)

Aquifer conditions

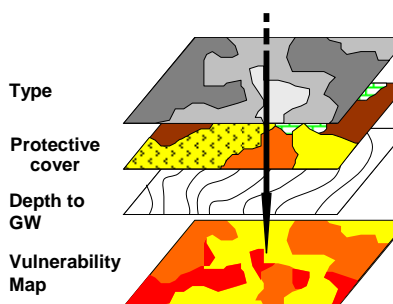
- Porous media/ Karst; high/low yield (IHME maps)
- Confined/unconfined (GWres. maps, 9 countries only)

Descriptions

- What makes an aquifer vulnerable
- What information should be collected to assess the vulnerability

User input

- User provides GIS layers
 - Tools computes vulnerability map
- Two approaches, Porous media/Karst



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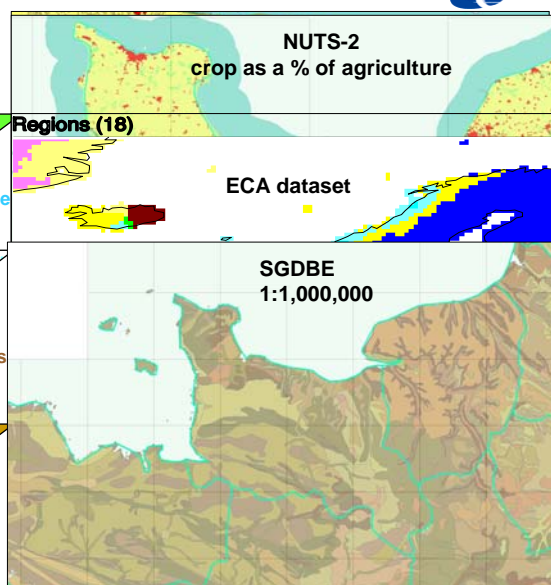
Application of Scenarios



CROPS
25 x ? crop templates

CLIMATE
15 zones with representative MARS dataset

SOIL
125 FOOTPRINT soil types with land use specific profile datasets



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Acknowledgements



The funding of the **FOOTPRINT** project
by the European Commission
through its Sixth Framework Programme
is gratefully acknowledged



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