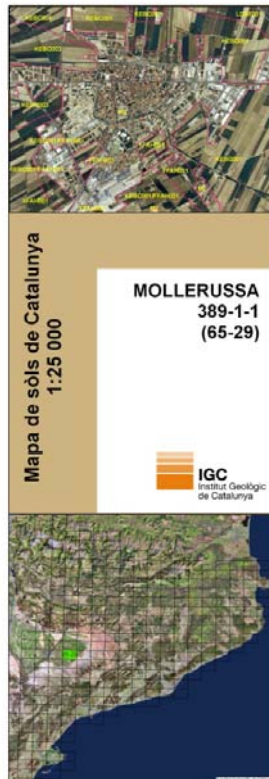


**THE “SOIL MAP OF CATALONIA”  
PROJECT**

**THE “SOIL MAP OF CATALONIA”  
PROJECT**

**EMILIO ASCASO / MARC VICENS  
GEOLOGY AREA**

## THE “SOIL MAP OF CATALONIA” PROJECT



### TOPICS OF DISCUSSION

- IGC FUNCTIONS
- THE “SOIL MAP OF CATALONIA” PROJECT
- GETTING TO KNOW CATALONIA
- THE SOIL MAPPING PROGRAM
- RESEARCH ON SOIL INFORMATION
- ANALYSIS OF SOIL INFORMATION
- SOIL INFORMATION DELIVERY SYSTEM

## IGC FUNCTIONS

# INSTITUT GEOLÒGIC DE CATALUNYA (IGC)

### **Main function:**

- Providing, in the field of soils, counseling and technical assistance to the Government of Catalonia.

## IGC FUNCTIONS

### Topics of interest

- Knowledge
- Crop growing
- Soil erosion / soil conservation
- Soil capability
- Soil Suitability (framework for land evaluation)
- Environmental impact
- Sustainability
- Soil protection / Soil health

## IGC FUNCTIONS

### Topics of interest

- Soil protection / Soil health
  - Soil erosion
  - Decline in organic matter
  - Soil compaction
  - Soil salinization
  - Floods and landslides
  - Soil contamination (diffuse contamination)
  - Soil sealing
  - Decline in soil biodiversity
  
- New requirements related with European strategies

**THE “SOIL MAP OF CATALONIA”  
PROJECT**

**THE “SOIL MAP OF CATALONIA”  
PROJECT**

**BEST STRATEGY TO GENERATE, STORE,  
UPDATE, PROCESS, AND SPREAD THE  
BASIC INFORMATION OF THE SOILS IN  
CATALONIA.**

## THE “SOIL MAP OF CATALONIA” PROJECT

# THE “SOIL MAP OF CATALONIA” PROJECT

### MAIN WORK FIELDS:

- Soil cartography
- Design of a Geographical Information System (GIS)
- Gathering of soil information
- Research on soil science
- Analysis of soil information (Advisory groups)
- Soil survey delivery system

## THE “SOIL MAP OF CATALONIA” PROJECT

### THE “SOIL MAP OF CATALONIA” PROJECT IS A PART OF THE “GEOWORKS”

A SET OF PROGRAMS CARRIED OUT BY THE IGC TO GENERATE, PROCESS AND SPREAD THE BASIC GEOLOGICAL, EDAFOLOGICAL AND GEOTHEMATIC INFORMATION, AND MADE IT AVAILABLE FOR CONSULTATION BY THE PUBLIC, IN GENERAL, AND BY THE ADMINISTRATION, IN PARTICULAR



## GETTING TO KNOW CATALONIA



AREA: 32.100 Km<sup>2</sup>

POPULATION: 7.134.697

CLIMA: MEDITERRANEAN

MUNICIPALITIES: 946

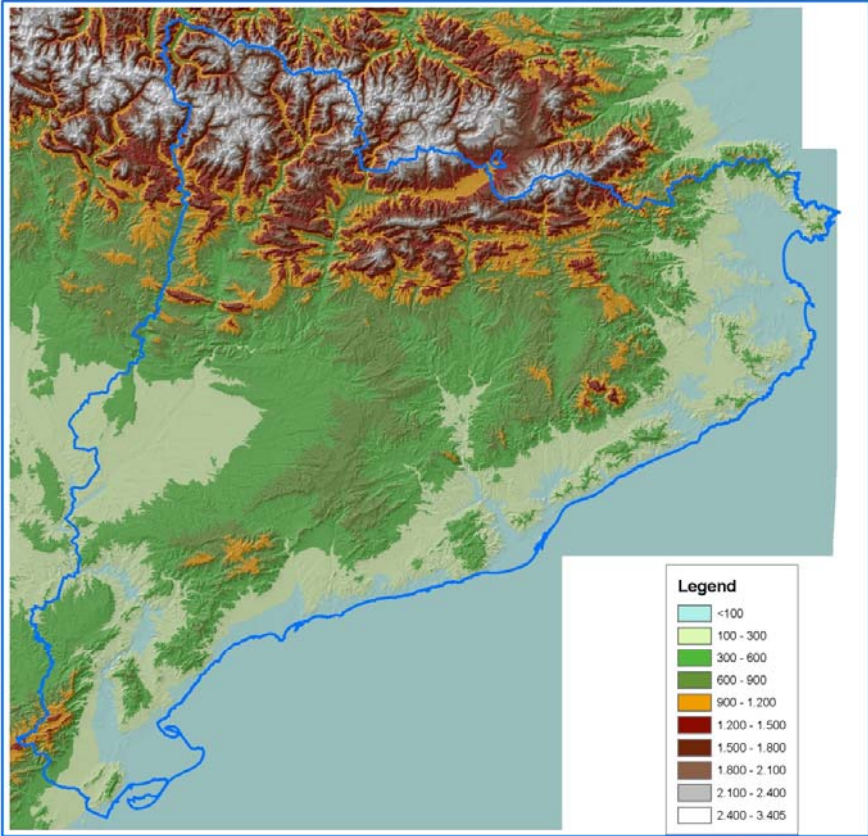
### PHYSIOGRAPHY

Pyrenees mountain

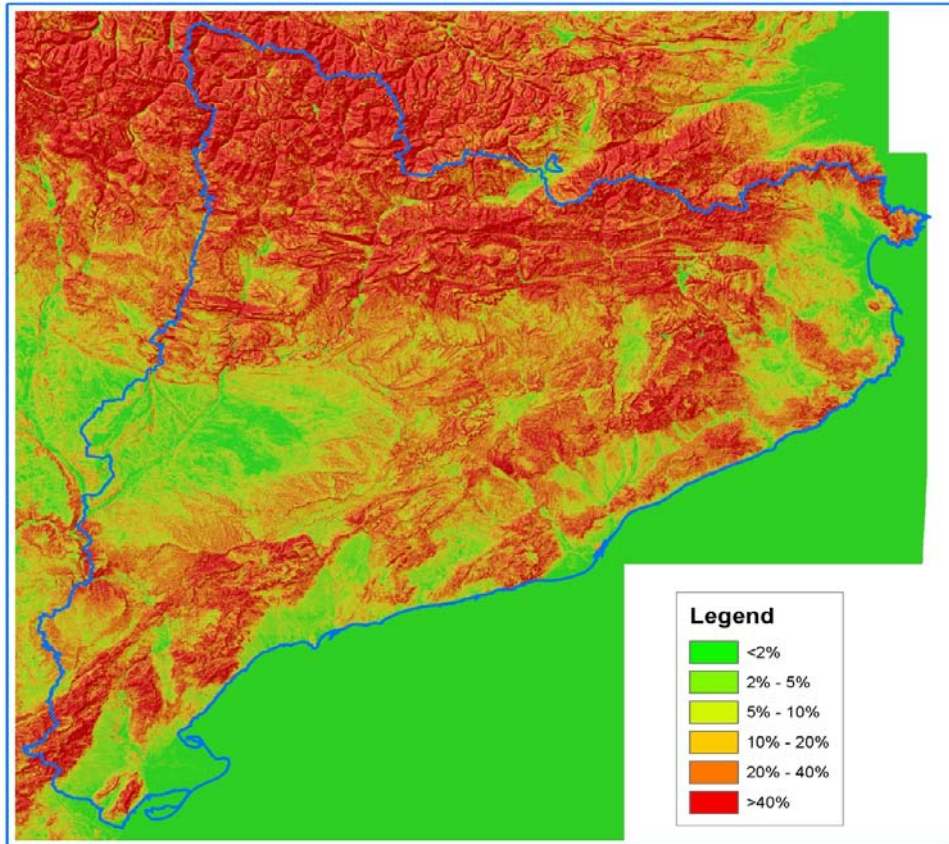
Mediterranean system

Ebro/Central basin

# GETTING TO KNOW CATALONIA



## GETTING TO KNOW CATALONIA



SLOPE	AREA (Km2)	%
<2%	2.482	8
2-5%	3.256	10
5-10%	3.835	12
10-20%	5.427	17
20-40%	8.460	26
>40%	8.646	27



# GETTING TO KNOW CATALONIA



IGC  
04/06/09



# GETTING TO KNOW CATALONIA

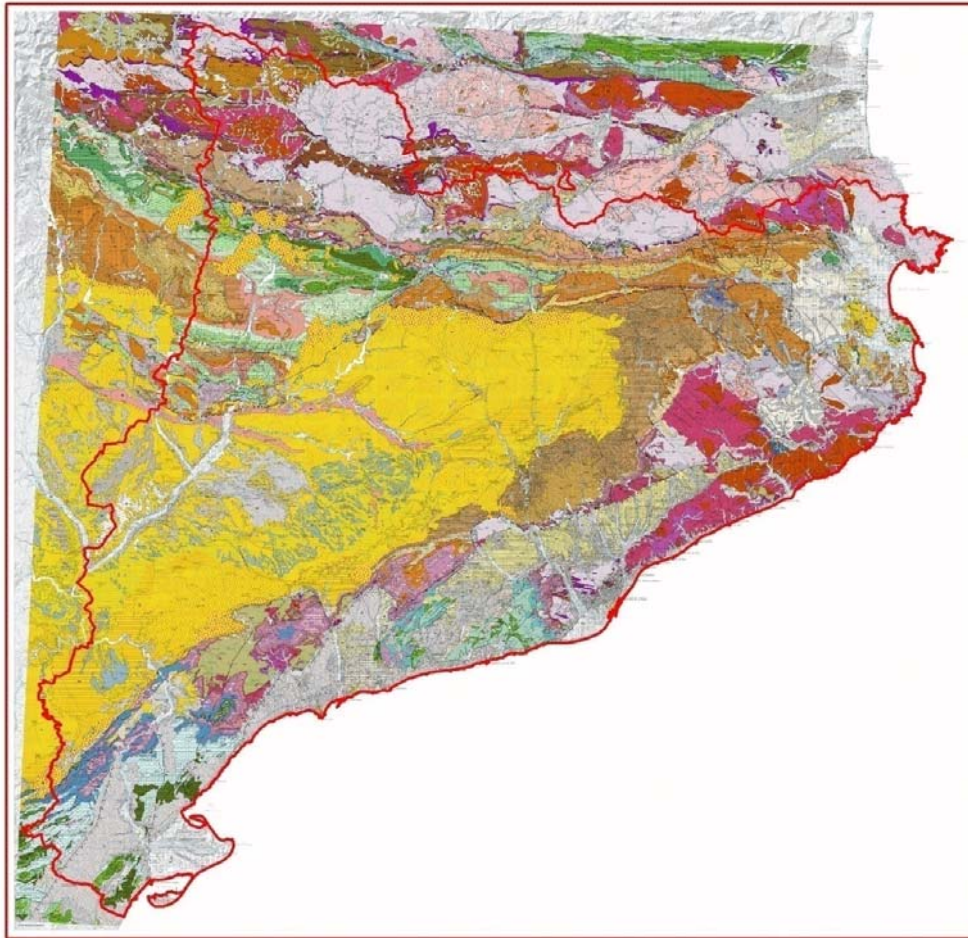


IGC  
04/06/09





## GETTING TO KNOW CATALONIA



### PYRENEES AND COASTAL RANGES

#### Basement

- Paleozoic metamorphic rocks (slates and schist)
- Granitic batholiths crop out
- Devonian limestones and calcareous slates locally

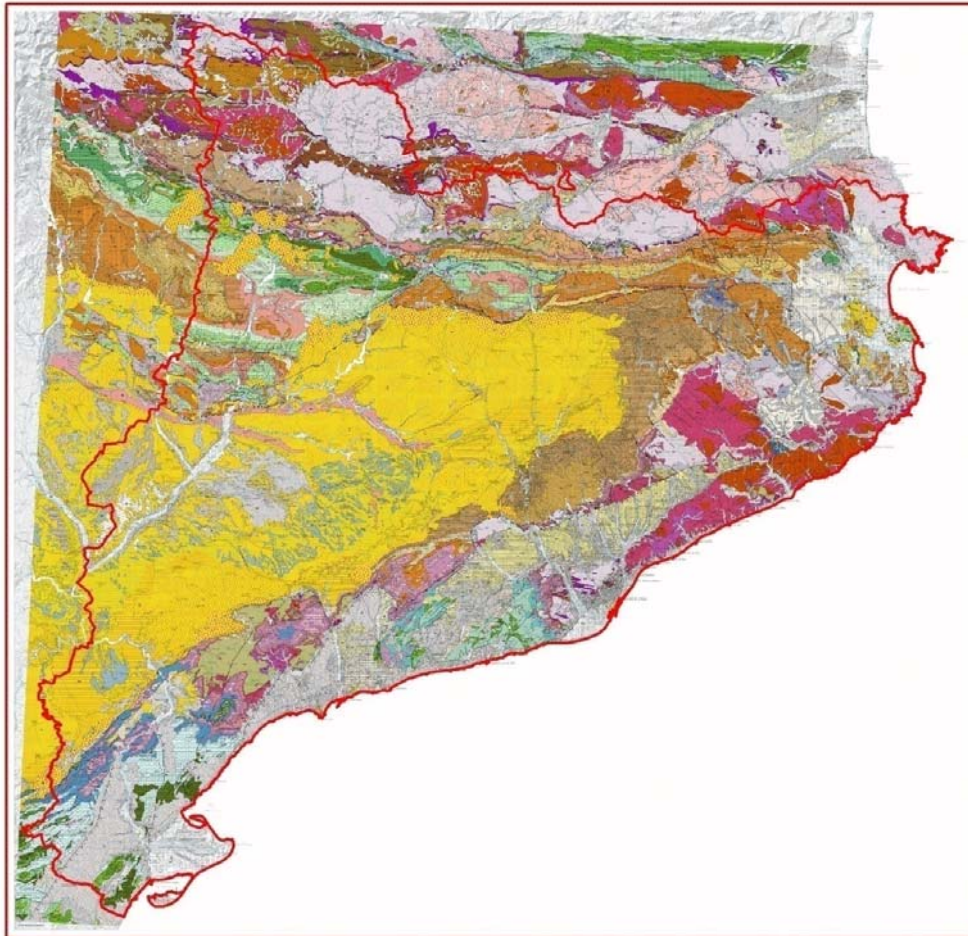
#### Cover

- Mesozoic rocks: Cretaceous limestones and Triassic conglomerates, sandstones and gypsum

### INTRAMONTANEOUS BASINS

- Miocen and Pliocen mudrocks, sandstones, conglomerates and gravels

## GETTING TO KNOW CATALONIA



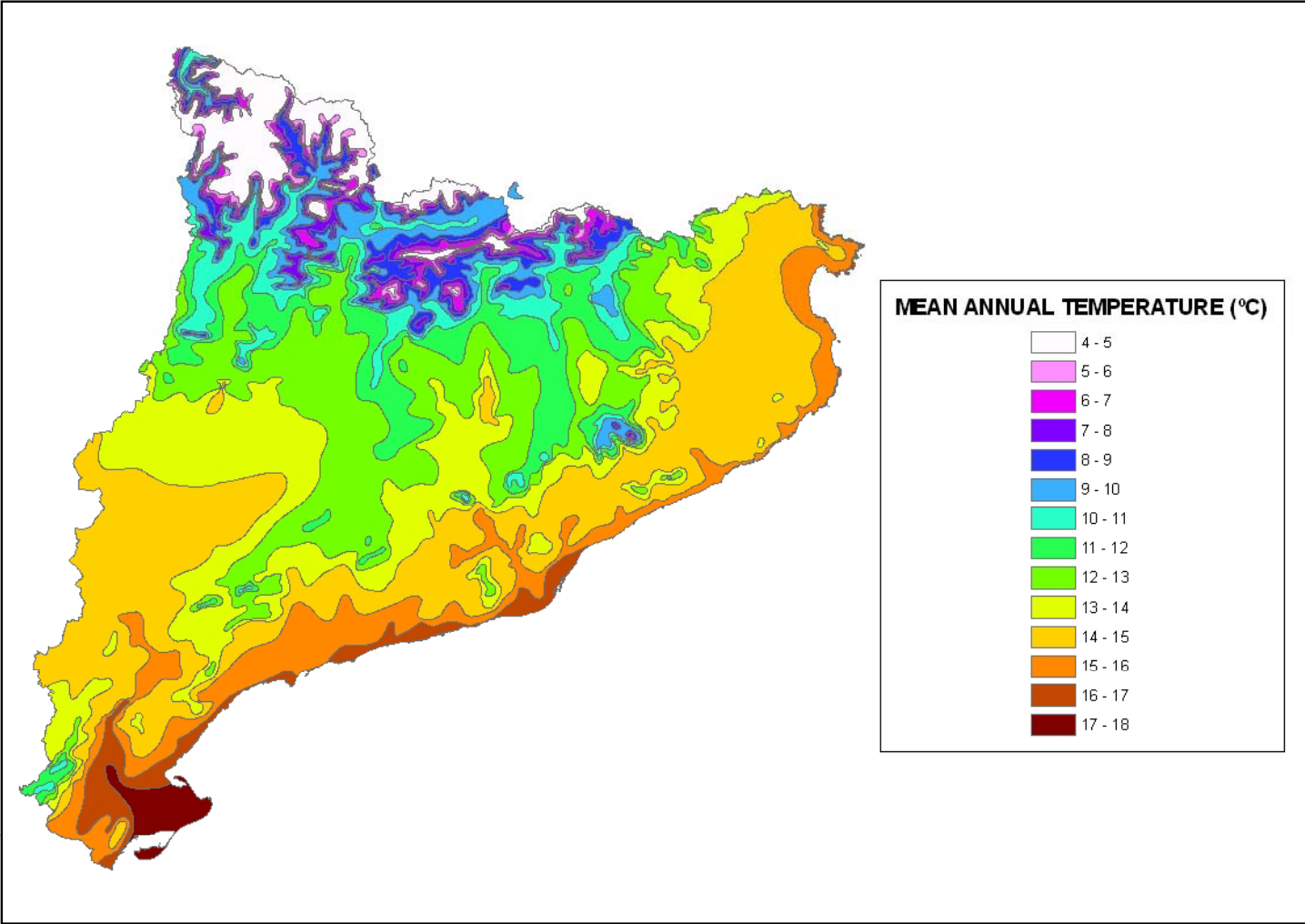
### EBRO BASIN

- Tertiary mudrocks, sandstones and conglomerates
- Limestones, marls and gypsum also occur

### QUATERNARY SEDIMENTS

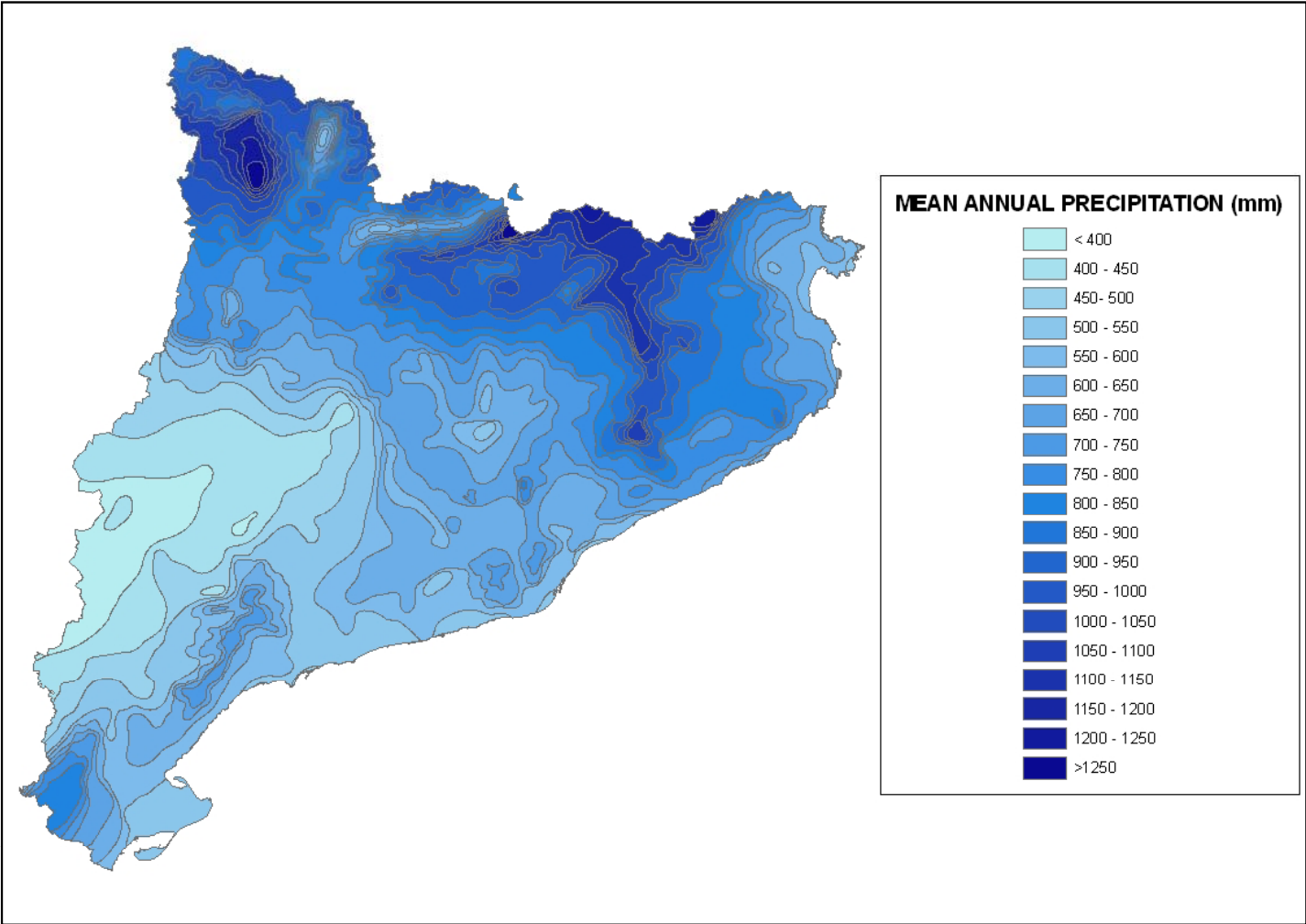
- Along large fluviale terraces and alluvial fans: gravels, sands and silt
- Glacial deposits are also important in the high Pyrennees

# GETTING TO KNOW CATALONIA





# GETTING TO KNOW CATALONIA



## GETTING TO KNOW CATALONIA



### Land Use:

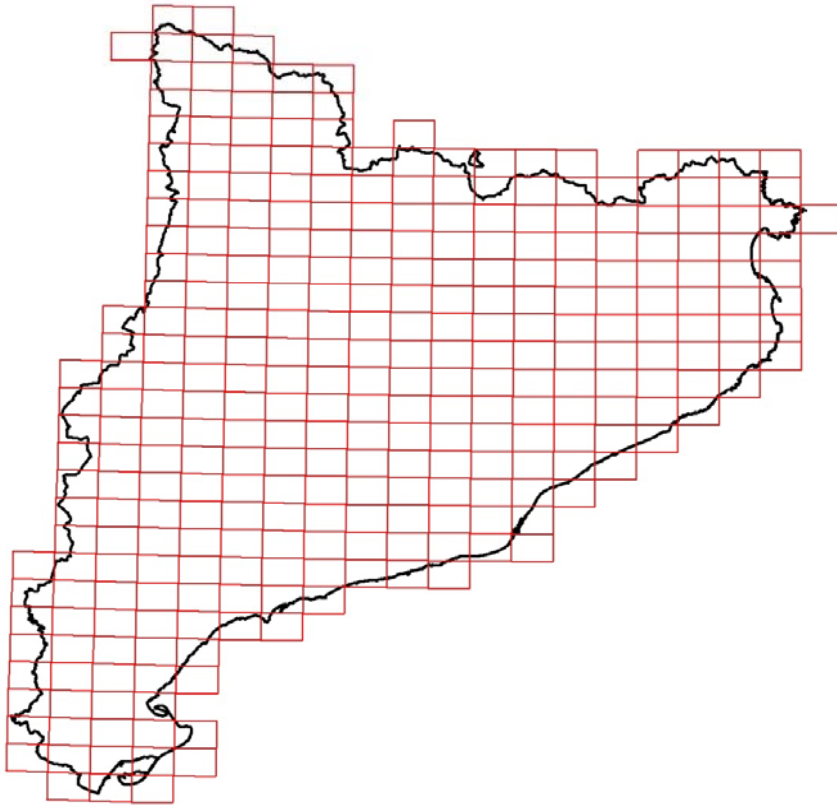
- Forestry: 60%
- Agriculture: 29%
- Urban: 6%
- Miscellaneous: 5%

**SOIL MAPPING PROGRAM**

# Soil mapping program

- Soil map (1:25.000)
- Other maps
  - Soil map (1:250.000)
  - Soil erosion risk
  - Organic Carbon contents...

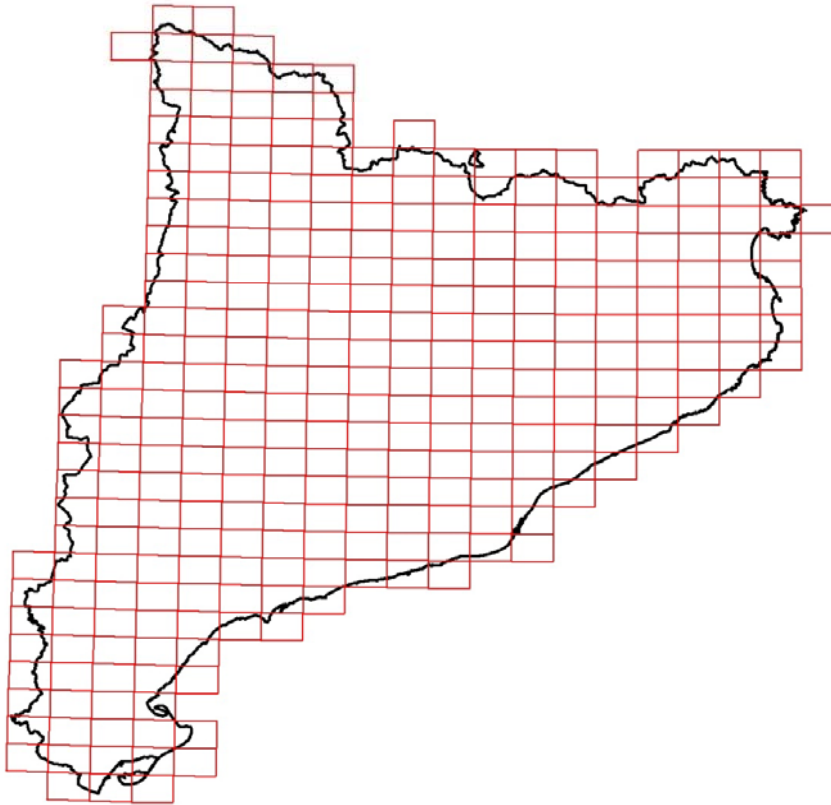
## SOIL MAPPING PROGRAM



### **Soil map (1:25.000)**

- 304 sheets
- Area: (5 – 13.037 ha)
- Methodology:
  - DAR (based on Soil Survey Manual)
- Density of observations:
  - 0,25-0,50/cm<sup>2</sup> of final map
- Relation Pits - Observations:
  - 2:5 – 2:10
- Sampling:
  - 2-3 profiles/representative soils and sheet
- Taxonomic unit:
  - Serie (SSS, 1999)
- Cartographic Units:
  - Consociations and complex (SSS, 1999)

## SOIL MAPPING PROGRAM



### Minimum data set required

- Organic Carbon / Organic Matter
- pH
- Carbonates
- Electrical Conductivity
- Effective Cation Exchange Capacity
- Extractable Cations (Ca/Mg/K/Na)
- Texture
- Bulk density
- Water holding capacity
- Ksat
- Infiltration

## Soil Map Prototypes

- Map
- Associated report
  - Methodology
  - The study area (location, geology, vegetation, land use...)
  - Description of the map units
  - Description of the representative soil types
  - Measured and/or estimated properties
  - Interpretations and evaluations



# SOIL MAPPING PROGRAM

## Soil Map Prototypes

**LLEGENDA**

**COBERTA I CONTRACOBERTA**

**AUTORS**

**Símbol mapa geològic**

**PROGRAMA COMPLET DE CLASSES DE SÒLS, 2008**

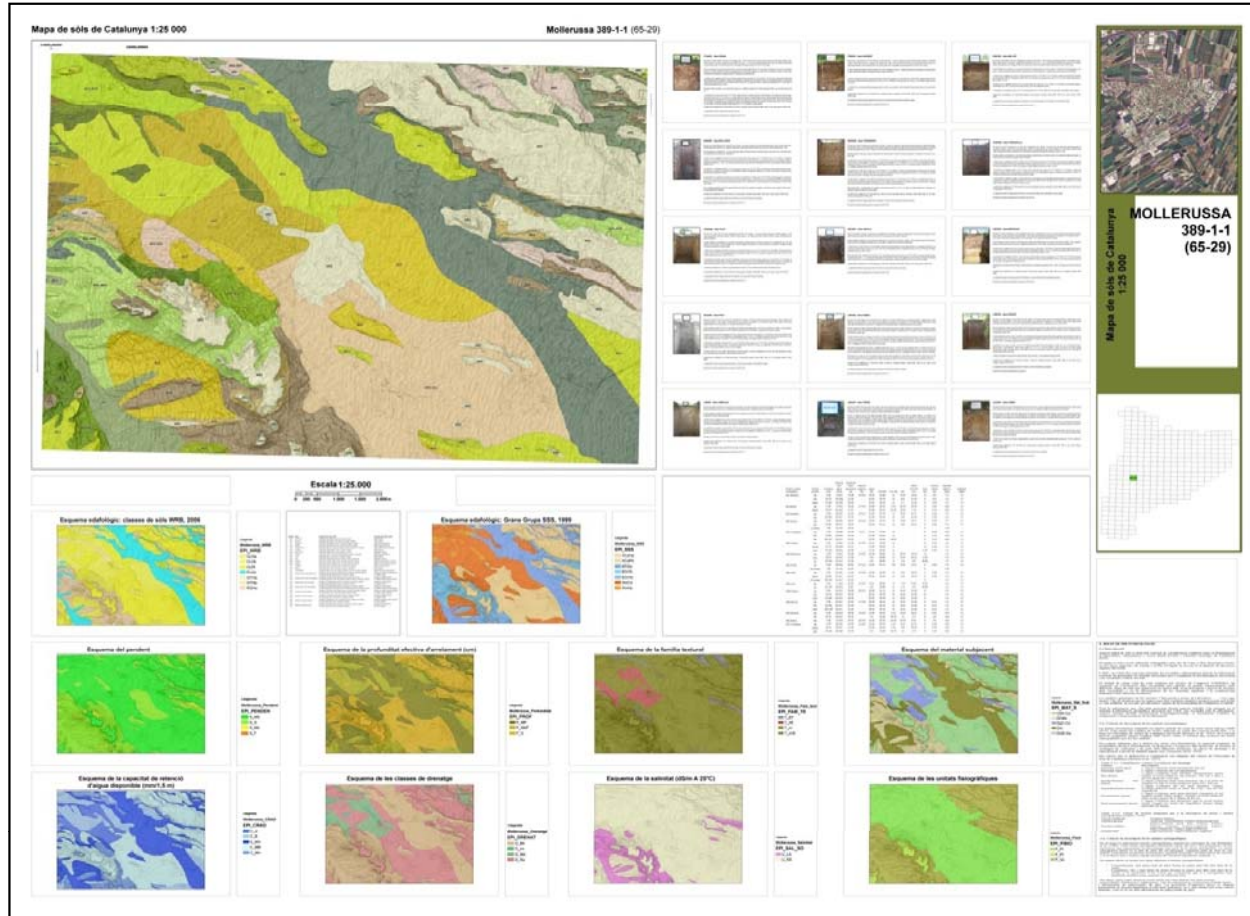
**PROGRAMA RELIEU**

**TIPUS DE SÒLS**

The image displays a comprehensive soil map prototype. It features a large legend table on the left side, a central aerial photograph with a soil map overlay, a geological map symbol, a soil classification program, a relief program, and a bottom section with soil profiles and descriptions.

SOIL MAPPING PROGRAM

# Soil Map Prototypes





## SOIL MAPPING PROGRAM

## Soil Map Prototypes



## ATP

## Sèrie TORNABOUS (Referència Pedió Típic VdBE-001)

Els sòls de la sèrie Tornabous són profunds, ben drenats i de textura mitjana amb abundants elements grossos de naturalesa calcària a partir de 40-80 cm de profunditat. S'han desenvolupat sobre els sediments detrítics amb freqüents elements grossos de calcàries als cons de dejecció dels rius Corb i Ondara, així com als barrancs que drenen les plataformes estructurals que envolten el Pla d'urgell.

El perfil presenta moltes acumulacions secundàries de carbonat càlcic revestint els elements grossos. La seqüència d'horitzons és Ap-Bw(k)-2Bk.

L'horitzó Ap té un espessor de 20 a 35 cm. Presenta un color (humit) de bru clar a bru (7,5YR 4-5/3-4) o de bru fosc a bru groguenc (10YR 3-5/3-6). La seva textura és franca, franco-llimosa o franco-argilosa. El pH és de moderadament bàsic a lleugerament alcalí, el contingut de carbonat càlcic de mitjà a alt i el de matèria orgànica és de baix a mitjà.

L'horitzó Bw presenta un espessor de 30-60 cm. Té un color de bru a groc bru (7,5YR 4-5/4-6 o 10YR 5-6/6-8). La textura dominant és franca i franco-llimosa amb molts elements grossos. El pH és de moderadament bàsic a lleugerament alcalí i el contingut en carbonat càlcic és de mitjà a alt.

L'horitzó 2Bk té un espessor molt variable, si bé sempre més gran de 40 cm. Té color taronja (7,5YR 6/6-7). Es caracteritza per tenir una gran abundància d'elements grossos de naturalesa calcària, estant farcits els espais entre calcàries de sorres o carbonat càlcic. Presenta una forta acumulació de carbonats, en forma pulverulenta i recobrint els elements grossos.

Sota l'horitzó 2Bk, i a profunditats molt variables, però sempre superiors a 120 cm, es troben les lutites pràcticament inalterades que poden presentar reacció alcalina en alguns casos.

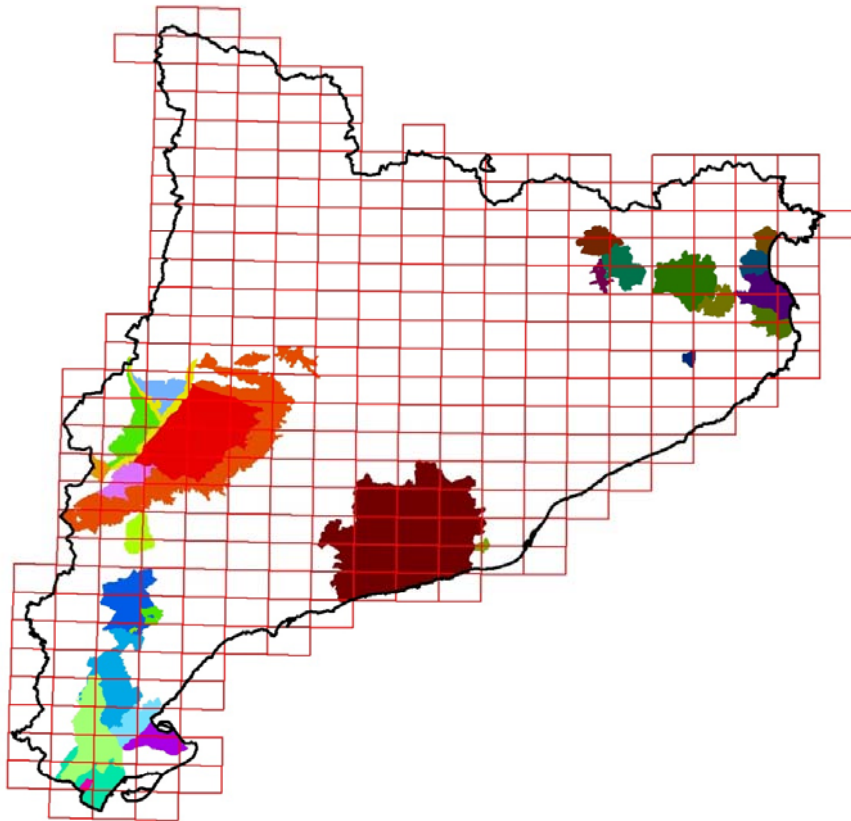
Aquests sòls es classifiquen com Calcixerept típic, franca fina sobre esquelètica arenosa, mesclada, tèrmica (SSS, 1999, 2a. ed). hàplic Calcisol (endoesquelètic) (WRB, 2006).

La capacitat de retenció d'aigua disponible és moderada i la conductivitat hidràulica de moderada a ràpida.

El pedió típic dels sòls d'aquesta sèrie en aquest full és VdBE-001.

## SOIL MAPPING PROGRAM

# CURRENT STATUS

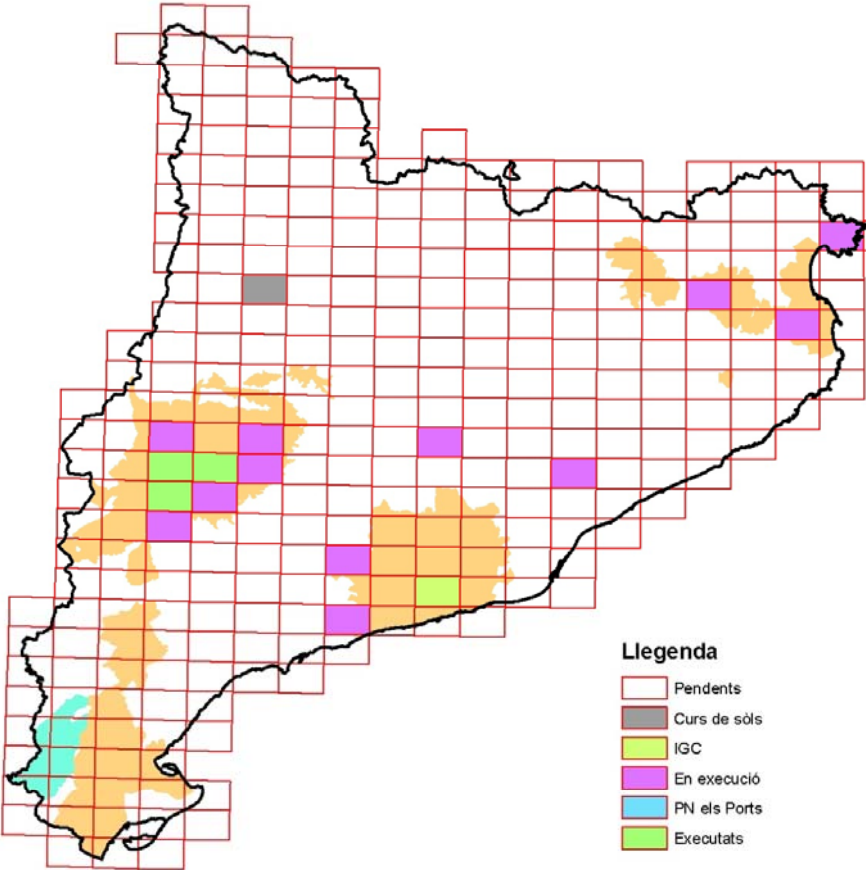


### CHARACTERISTICS:

- Time
- Teams
- Correlation
- Soil moisture regimes
- Soil temperature regimes
- Forest soils
- Antropic soils

# SOIL MAPPING PROGRAM

## CURRENT STATUS



## SOIL MAPPING PROGRAM



### Soil map (1:250.000)

- 41 “Comarques”
- Area: 14.575 – 178.407 ha
- Methodology:  
DAR (based on Soil Survey Manual)
- Density of observations:  
0,25-0,50/cm<sup>2</sup> of final map
- Sampling:  
2-3 profiles/representative soils
- Taxonomic unit:  
Subgroup (SSS, 1999)
- Cartographic Units:  
Associations of Subgroups (SSS, 1999)

## SOIL MAPPING PROGRAM

## CURRENT STATUS



## Llegenda

- Pendants
- En licitació
- IGC
- En Execució
- Executats

## SOIL MAPPING PROGRAM

# SOIL EROSION RISK

- GEOLOGICAL MAP (1:250.000)
- RAIN AGRESSIVENESS (METEOCAT)
- TOPOGRAPHICAL CHARACTERISTICS



## RESEARCH ON SOIL SCIENCE

### THE “SOIL MAP OF CATALONIA” PROJECT REPRESENTS INTERESTING RESEARCH OPPORTUNITIES:

#### - SOIL MAPPING

- DIGITAL SOIL MAPPING TECHNOLOGIES
- PREMAPPING PRODUCTS AND ANALYSIS
- GATHERING OF SOIL INFORMATION (TRAINING)
- DEVELOPMENT OF A SOIL GEOSPATIAL DATABASE

#### - SOIL CHARACTERISTICS MEASUREMENTS

- HYDROLOGICAL PROPERTIES
- DYNAMIC SOIL PROPERTIES

#### - PEDOTRANSFER FUNCTIONS

## RESEARCH ON SOIL SCIENCE

### THE “SOIL MAP OF CATALONIA” PROJECT REPRESENTS INTERESTING RESEARCH OPPORTUNITIES:

- IDENTIFICATION OF RESEARCH PROJECTS OF INTEREST IN THE FIELD OF SOILS (NATIONAL COOPERATIVE SOIL SURVEY (NCSS))
  - AGRICULTURAL EXPERIMENTS
  - UNIVERSITY
  - GOVERNMENTAL ORGANIZATIONS
  - RESEARCH AGENCIES
  - PRIVATE COMPANIES
  - RESEARCHERS
  - .....
  - PARTICIPATION IN CONGRESS AND CONFERENCES



## ANALYSIS OF SOIL INFORMATION

- SOIL INFORMATION MUST BE DELIVER IN A WAY THAT MAKES EASY TO PREDICT HOW THE SOIL WILL BEHAVE UNDER DIFFERENT SCENARIOS.
  
- MAKE SOIL INFORMATION AVAILABLE AND EASY TO ACCESS TO THE CUSTOMERS
  - DECISION SUPPORT SYSTEMS
  - CUSTOMERS DRIVEN INTERPRETATIONS
  - ANALYSIS TOOLS
  - ADVISORY GROUPS
  
- KEEP THE SOIL MAP OF CATALONIA PROJECT RELEVANT IN ORDER TO BE PREPARED TO FACE FUTURE CHALLENGES

## SOIL INFORMATION DELIVERY SYSTEM

### ACCESSIBILITY ON-LINE

- DEVELOP A SOIL GEOSPATIAL DATABASE
  - DAR – IGC DATABASE (10.000 profiles)
  - SPATIAL SOIL DATA (shapefiles)
  - MANUSCRIPTS (pdf)
  - INTERPRETATIONS / EVALUATIONS
  - SOIL CATALOG (update)
- ANALYSIS TOOLS

**THE “SOIL MAP OF CATALONIA”  
PROJECT**

**THANK YOU!!!**