

Georange Science Meeting, JRC ISPRA March 2004

European Land Degradation and Desertification Research

John B. Thornes, KCL.

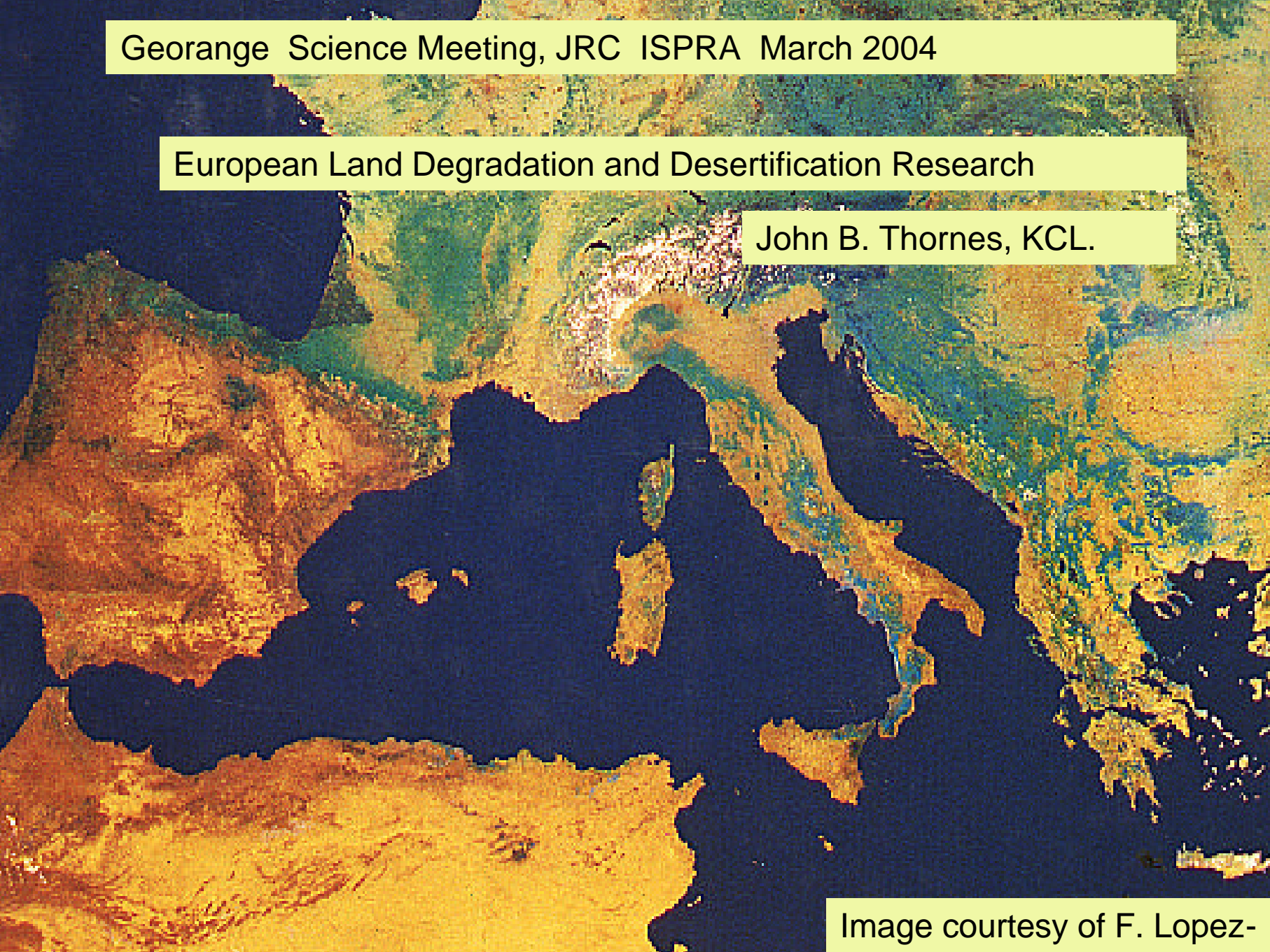


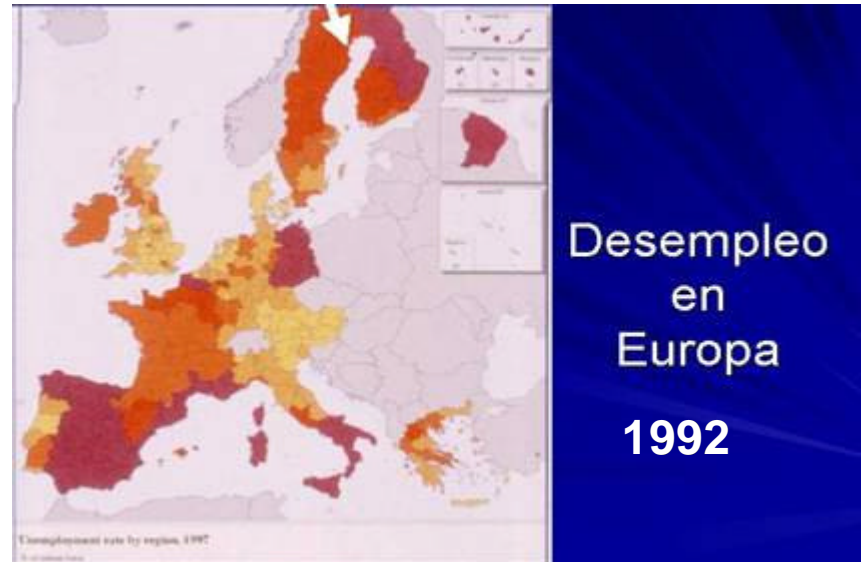
Image courtesy of F. Lopez-

# **A Thematic Review of EU Mediterranean Desertification research in Frameworks III and IV (eds. J.B. Thornes and Sophia Burke (Advances in Environmental Monitoring and Modelling, Vol 1 No.4(2004)**

- The history and evolution of Mediterranean Desertification(John Wainwright)
- Processes of Mediterranean Desertification (J.C. Hawkes
- Monitoring Mediterranean Desertification(N. Drake and A. Vafeidis)
- Modelling Mediterranean Desertification(Mark Mulligan)
- Mitigation of Mediterranean Desertification(B. Schirone, S. Borelli and R. Isopi)
- IN
- Advances in Environmental Monitoring and Modelling
- On-line journal at <http://www.kcl.ac.uk/advances>

# Work Package

- Introduction
- Objectives
- Methodology
- Deliverables
- Milestones
- Partners
- Changes in objectives
- Innovations



**Desertification** is (UNEP, 1992)

**'land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities.'**

**Land** means:

**The terrestrial bio-productive system that comprises soil, vegetation, other biota and the ecological and hydrological processes that operate within the system.**

## **Land degradation** means:

- The reduction and loss of the biological or economic productivity caused by land-use change, a physical process, or a combination of the two. These include processes arising from human activities and habitation patterns, such as soil erosion, deterioration of the physical, chemical and biological or economic properties of the soil, and long-term loss of vegetation.

# Methodology

- **Mathematical models (Navier-Stokes equations)**
- **Empirical Observations**
- **Including remote sensing**
- **Physical models**
- **Public participation**
- **Mitigation strategies**
- **Policy-oriented studies (indicators)**

$$\dot{\rho} + \rho(\vec{\nabla} \cdot \mathbf{v}) = 0$$

fluid continuity

$$\vec{\nabla} \cdot \underline{\underline{\mathbf{T}}} + \rho \mathbf{b} = \rho \dot{\mathbf{v}}$$

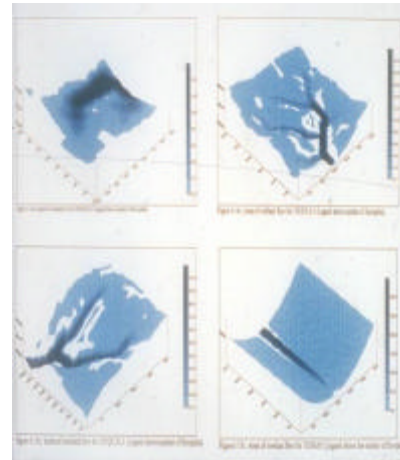
equation of motion

$$\underline{\underline{\mathbf{T}}} = -p \underline{\underline{\mathbf{I}}} - \frac{2}{3} \mu (\text{tr} \underline{\underline{\mathbf{D}}}) \underline{\underline{\mathbf{I}}} + 2\mu \underline{\underline{\mathbf{D}}}$$

constitutive relation

$$\underline{\underline{\mathbf{D}}} = \frac{1}{2} (\mathbf{v} \vec{\nabla} + \vec{\nabla} \mathbf{v})$$

fluid kinematics



# Objectives

- Understanding the combination of environmental and human factors which collectively generate land degradation.

Perez Trejo 1992

The challenge is three-fold

- 1. To identify the local causes of desertification and its manifestations and to develop suitable sensitive indicators to do this.

- 2. To understand the historical development of the problem
- To develop regulations that, far from being applicable to the whole of Europe, are sufficiently flexible to accommodate local variations in history and conditions.  
(Thornes, 2002)

# Timetable

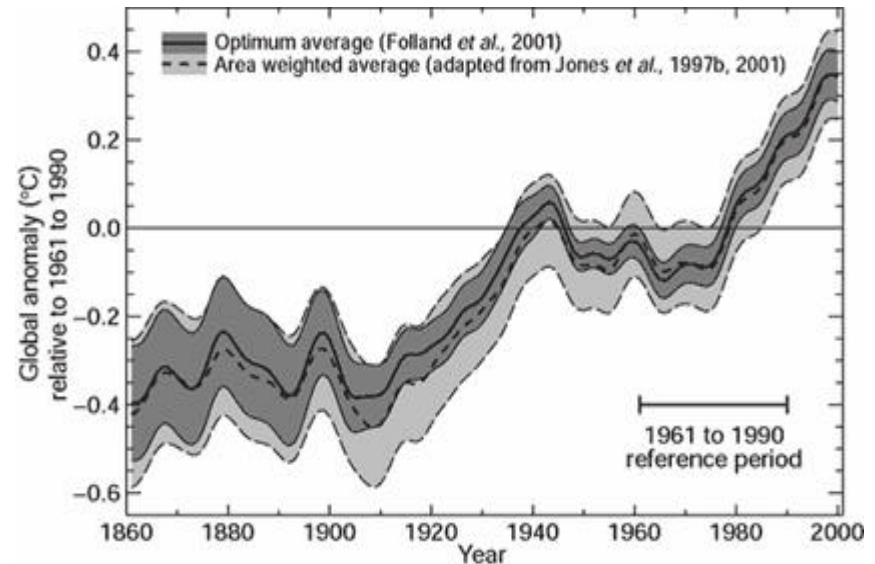
- **1986 Mytilene Conference -  
Desertification in Europe: mitigation, strategies,  
land-use.**
- **1992 AGU Barcelona Conference -  
MEDALUS + EFEDA established.**
- **1994 Crete Conference -  
Mediterranean desertification.  
ARCHEOMEDES soon followed as did  
MEDACTION & DESERTLINKS and DEMON and  
GEORANGE (PESERA survived).**
- **1999 Alghero - Advanced study course -  
Desertification planning**

# Sissi (Crete) outcomes - the research perspective

- Future research must be multidisciplinary
- Focus on target areas
- Water Resources as an integrative research focus
- Assessment of national action plans from the research perspective
- Development of multi-objective analysis and integrated models
- Development of fast-track operational tools
- Linking of actor levels
- Participatory research approach
- Interaction and embedding of Mediterranean change in the European and global context
- Gaps in process knowledge
- Flood generation mechanism
- Vegetation dynamics

# Changes to Project

- ICCD
- IPCC
- Out of Africa
- Human dimensions
- Social empowerment
- European research dynamic
- Indicator fixation.
- Complexity
- Agenda 2000 and agri-environmental measures



# New Perspectives

- Water Framework Directive
- River restoration
- Socio-economic changes and development
- ERD-globalisation
- Myths continue
  - Grazing
  - Forestry
  - Composition
  - Soil erosion rates

# Expected innovations

- **Address grazing issues (again; and building on Greek contribution of past 30 years)**
- **Address the rivers problem**
- **Create Land Degradation Directive**
- **Globalise (Framework V)**



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