Institute of Geography and Spatial Planning
University of Lisbon

KlimHist


# Contribuição para a climatologia histórica em Portugal: o projecto Klimhist

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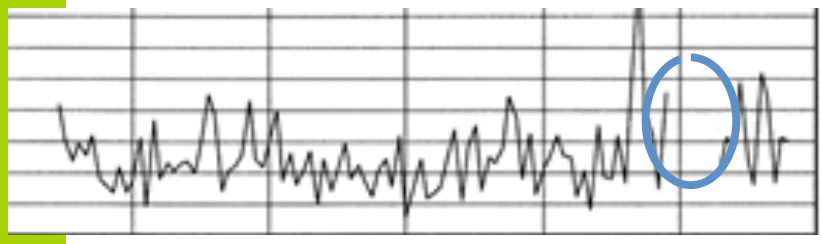
## Projecto KlimHist

"Reconstruction and model simulations of past climate in Portugal using documentary and early instrumental sources (17th-19th century)".

http://clima.ul.pt/klimhist



D.L. Dunkerley, 1999

# Plano

1. Introdução
   - Porquê a climatologia histórica?
   - Porquê em Portugal?
2. Objectivos do Klimhist
3. Estudos anteriores
4. Tarefas, objectivos e procedimentos

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## 1. 1. Porquê a Climatologia histórica?



THE GLOBE AND MAIL

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### Predicting future climate change may lie in the past

ZINTA ZOMMERS
THE GLOBE AND MAIL
Last updated Thursday, Mar. 21 2013, 9:28 PM EDT

Victoria Slonosky, who is documenting climate change records in Canada, poses with a North-face thermometer outside her home in S

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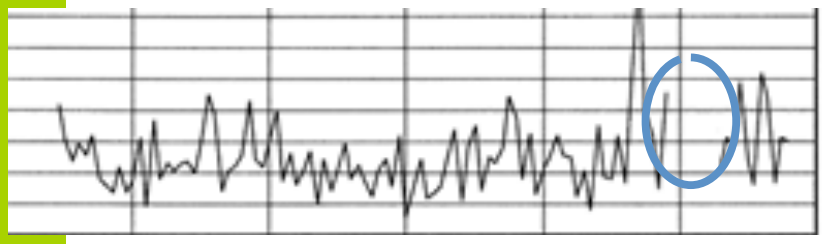

D.L. Dunkerley, 1999

# 1.2. Porquê em Portugal?

A variabilidade climática é hoje bastante bem conhecida.

No entanto, persistem **lacunas espaciais e temporais,** particularmente no período pre-instrumental e no SW da Europa

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KlimHist 2012-2014
Financiado pela FCT

# 2. Principais objectivos

**1.**Contribuir para o **conhecimento da história do clima em Portugal**

**2**. Contribuir para completar a **cobertura espacial do clima passado na Europa**

**3. Validar séries reconstruídas** usando modelos climáticos e diferentes tipos de fontes

**4. Estudar eventos extremos do passado,** o seu impacto e a vulnerabilidade das sociedades

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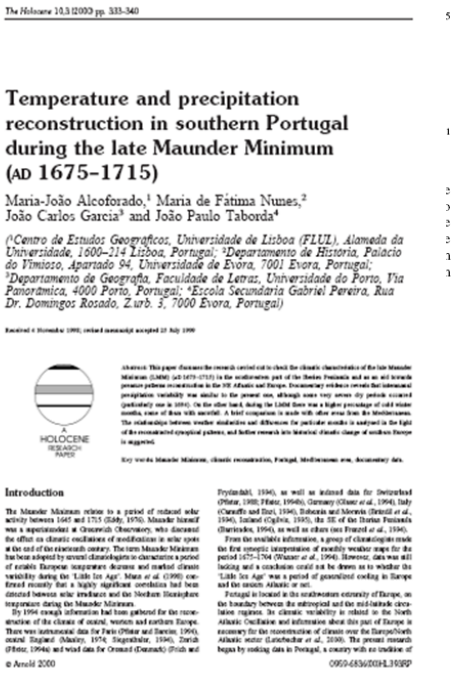
## 3. Exemplos de estudos prévios de climatologia histórica em Portugal no CEG (1)

- Artigo de **Suzanne Daveau** sobre a reconstrução de tempo a partir das cartas do **Padre António V**ieira (1997)

* Projecto EU ADVICE (1996-1998)

Reconstrução da temperatura e precipitação durante o LLM (1675-1715)



The Holocene 10,3 (2000) pp. 333–340

**Temperature and precipitation reconstruction in southern Portugal during the late Maunder Minimum (AD 1675–1715)**

Maria-João Alcoforado,[1] Maria de Fátima Nunes,[2] João Carlos Garcia[3] and João Paulo Taborda[4]

([1]Centro de Estudos Geográficos, Universidade de Lisboa (FLUL), Alameda da Universidade, 1600–214 Lisboa, Portugal; [2]Departamento de História, Palácio do Vimioso, Apartado 94, Universidade de Évora, 7001 Évora, Portugal; [3]Departamento de Geografia, Faculdade de Letras, Universidade do Porto, Via Panorâmica, 4000 Porto, Portugal; [4]Escola Secundária Gabriel Pereira, Rua Dr. Domingos Rosado, Z.urb. 5, 7000 Évora, Portugal)

Received 6 November 1998; revised manuscript accepted 25 July 1999

Abstract: This paper discusses the research carried out to check the climatic characteristics of the late Maunder Minimum (LMM) (AD 1675–1715) in the southwestern part of the Iberian Peninsula and on an old records proxy-climate reconstruction in the NW Atlantic and Europe. Documentary evidence reveals that interannual precipitation variability was similar to the present one, although some very severe dry periods occurred (particularly one in 1694). On the other hand, during the LMM there was a higher percentage of cold winter months, some of them very snowfall. A brief comparison is made with other areas from the Mediterranean. The relationships between weather situations and differences for particular months is analysed in the light of the reconstructed synoptical patterns, and further research into historical climatic change of southern Europe is suggested.

Key words: Maunder Minimum, climatic reconstruction, Portugal, Mediterranean area, documentary data.

HOLOCENE RESEARCH PAPER

**Introduction**

The Maunder Minimum refers to a period of reduced solar activity between 1645 and 1715 (Eddy, 1976). Maunder himself was a superintendent at Greenwich Observatory, who discussed the effect on climatic oscillations of modifications in solar spots at the end of the nineteenth century. The term Maunder Minimum has been adopted by several climatologists to characterize a period of notable European temperature decrease and marked climatic variability during the 'Little Ice Age'. Mann *et al.* (1998) confirmed recently that a highly significant correlation had been detected between solar irradiance and the Northern Hemisphere temperature during the Maunder Minimum.

By 1996 enough information had been gathered for the reconstruction of the climate of central, western and northern Europe. There was instrumental data for Paris (Pfister and Rutishe, 1996), central England (Manley, 1974; Slegenthaler, 1996), Zurich (Pfister, 1996a) and wind data for Cromard (Denmark) (Frich and Frydendahl, 1996), as well as indexed data for Switzerland (Pfister, 1988; Pfister, 1996b), Germany (Glaser *et al.*, 1996), Italy (Camuffo and Enzi, 1996), Bohemia and Moravia (Brázdil *et al.*, 1996), Iceland (Ogilvie, 1995), the SE of the Iberian Peninsula (Barriendos, 1996), as well as others (see Frenzel *et al.*, 1996).

From the available information, a group of climatologists made the first synoptic interpretation of monthly weather maps for the period 1675–1704 (Wanner *et al.*, 1996). However, data was still lacking and a conclusion could not be drawn as to whether the 'Little Ice Age' was a period of generalized cooling in Europe and the western Atlantic or not.

Portugal is located in the southwestern extremity of Europe, on the boundary between the subtropical and the mid-latitude circulation regimes. Its climatic variability is related to the North Atlantic Oscillation and information about this part of Europe is necessary for the reconstruction of climate over the Europe/North Atlantic sector (Lutterbacher *et al.*, 2000). The present research began by making data in Portugal, a country with no tradition of



0959-6836(00)HL393RP

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## 3. Exemplos de estudos prévios de climatologia histórica em Portugal no CEG (2)

- **Reconstrução do clima no sec. XVIII em Portugal** (2004)


- Investigação sobre eventos extremos (Ex: 1739 storm)

- Participação em vários **artigos sobre reconstrução climática na Europa** (1999, 2000, 2010, 2011 – referências completas em http://clima.ul.pt

Climatic Change
DOI 10.1007/s10584-009-9784-y

**The meteorological framework and the cultural memory of three severe winter-storms in early eighteenth-century Europe**

Christian Pfister · Emmanuel Garnier · María-João Alcoforado · Dennis Wheeler · Jürg Luterbacher · Maria Fatima Nunes · João Paulo Taborda

Received: 19 August 2008 / Accepted: 19 November 2009


**Abstract** Three violent eighteenth-century storms that ravaged the North Sea area (1703), western central Europe (1739) and Portugal (1739) are investigated from the point of view of their meteorological setting, their socio-economic impact, and whether and by what means they secured an enduring place in the cultural memory. The evidence draws on individual narrative sources such as chronicles and poems, and institutional sources such as ship's logbooks and state-organised "windthrow" inventories of tree loss. Each of the three storms had socio-economic impacts that could be described as "war-like" in the damage caused to buildings and the destruction of forests. The "Great Storm" of December 1703 jeopardized English naval supremacy in the War of the Spanish Succession by sinking a number of Royal Navy ships and taking the life of more than 8000 seamen. In January 1739 two similarly destructive storms swept over mainland Europe. The cultural memory of the three events here considered was however strikingly different. The

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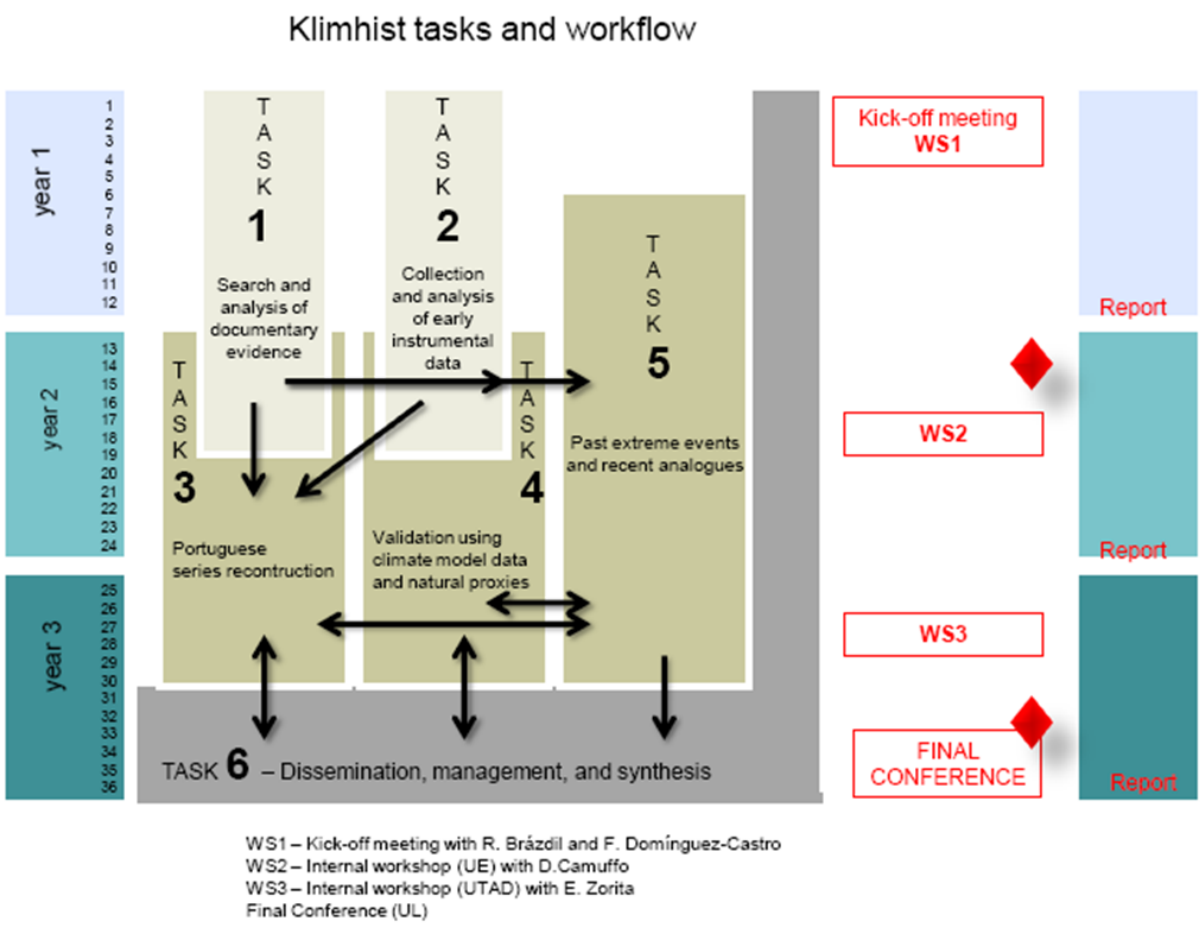
## Estudo interdisciplinar
## Equipa de investigação de diferentes Universidades

- Porto, Lisboa, Évora and Vila Real (UTAD)
- Físicos, Geógrafos, Historiadores e Meteorologistas

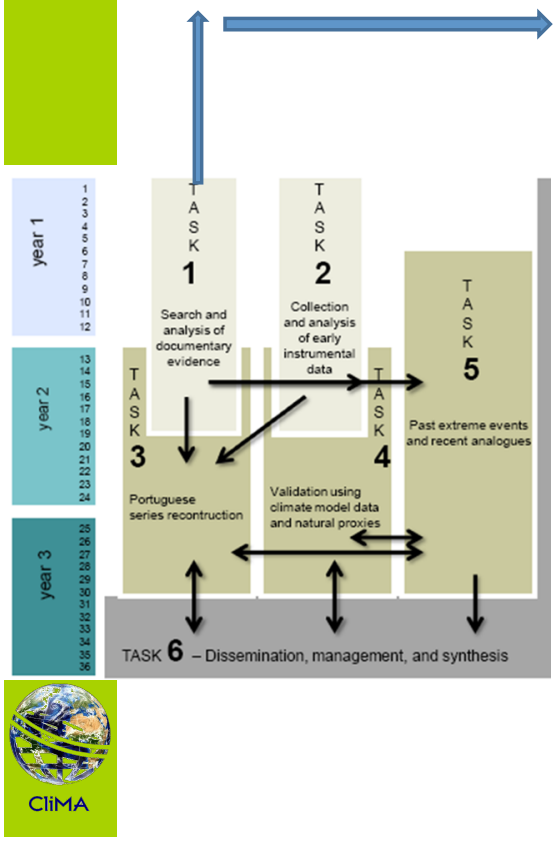
## Consultores

Prof. Rudolf Brázdil- Presidente da "International Society for Historical Climatology and History of Climate"
Prof. Fernando Domínguez-Castro
Prof. Dario Camuffo
Prof. Eduardo Zorita
Dr. Sofia Leal
Prof. António Correia




WS1 – Kick-off meeting with R. Brázdil and F. Domínguez-Castro
WS2 – Internal workshop (UE) with D.Camuffo
WS3 – Internal workshop (UTAD) with E. Zorita
Final Conference (UL)

# Task 1 – Procura e análise de fontes documentais




**Coordenadores :** Inês Amorim and João Garcia

**Procedimento:** selecção de arquivos, escolha do tipo de fontes documentais e construção de uma base de dados para aquisição de dados .


GAZETA DE LISBOA

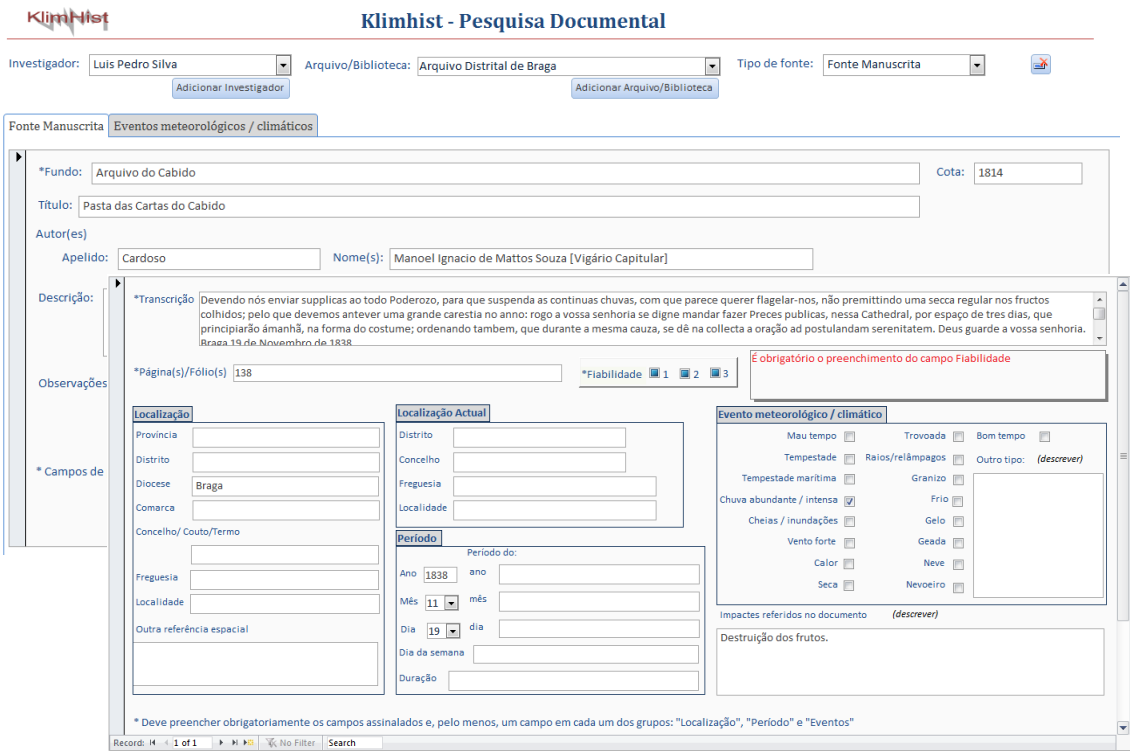
Quinta feira 12 deMayo de 1757.

ALEMANHA.


FOLHETO DE LISBOA.

NOTICIAS DA EUROPA.


Slide de Ezequiel Correia




Slide de Ezequiel Correia

**Registos relativos a excessos de calor, secas, falta de água e chuvas, trovoadas, trovões, raios, granizo, frios recolhidos no Arquivo Distrital do Porto (séculos XVII-XIX)**

| Década | Excessos de calor, secas, falta de água | Chuvas, trovoadas, trovões, raios, granizo, frios | N.º de registos por século |
|---|---|---|---|
| 1600-1609 | | | |
| 1610-1619 | | | |
| 1620-1629 | | | |
| 1630-1639 | | | |
| 1640-1649 | | 29/01/1642 (Procissão) | 4 (10,2%) |
| 1650-1659 | 19/02/1654 (Procissão) | 08/01/1655 (Procissão) | |
| 1660-1669 | | | |
| 1670-1679 | | | |
| 1680-1689 | ??/??/1680 (Procissão) | | |
| 1690-1699 | | | |
| 1700-1709 | | | |
| 1710-1719 | 27/05/1711 (F.M.) | 26/05/1711 (F.M.) | |
| 1720-1729 | 15/08/1726 (Preces + Proc.) | 27/08/1722 (Procissão) | |
| 1730-1739 | 14/08/1734 (Preces + Proc.)<br>18/01/1738 (Preces) | 16/12/1739 (Procissão) | |
| 1740-1749 | | 06/09/1744 (Acção de Graças) | |
| 1750-1759 | ??/06/1753 (Procissão)<br>09/06/1753 (Procissão)<br>17/06/1753 (Procissão) | 20/01/1751 (Preces) | 18 (46,2%) |

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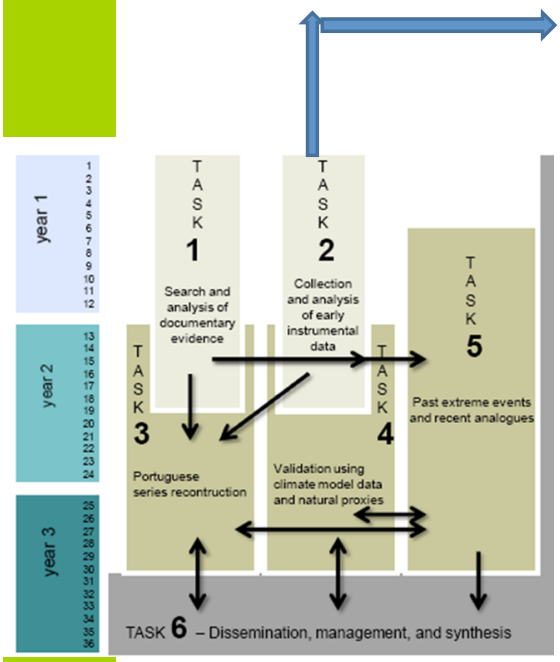
Quadro de Inês Amorim

# Tarefa 2 – Recolha e análise de dados instrumentais



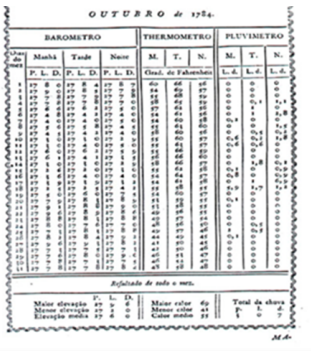

**Coordenadora :** Maria de Fátima Nunes

**Principal objectivo:**

**Procurar, recolher e coligir "early instrumental data"** (EID), anteriores à década 1850.

**Procedimento:**

- selecção de bibliotecas e arquivos;
- preparação de bases de dados (incluindo metadata);
- verificação da qualidade dos dados,
- conversão das unidades.


Clim. Past, 8, 1–19, 2012
www.clim-past.net/8/1/2012/
doi:10.5194/cp-8-1-2012


Climate of the Past

## Early Portuguese meteorological measurements (18th century)

M. J. Alcoforado[1], J. M. Vaquero[2,3], R. M. Trigo[3,4], and J. P. Taborda[5]

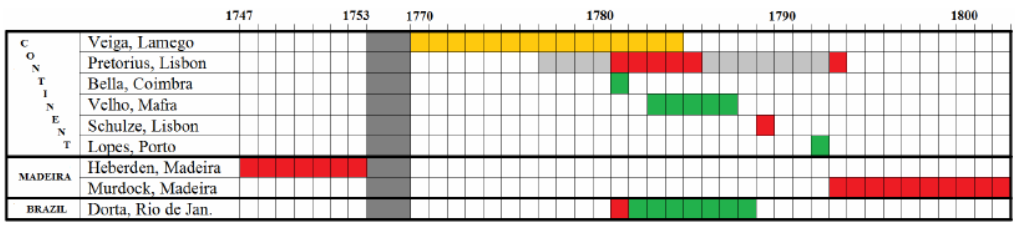
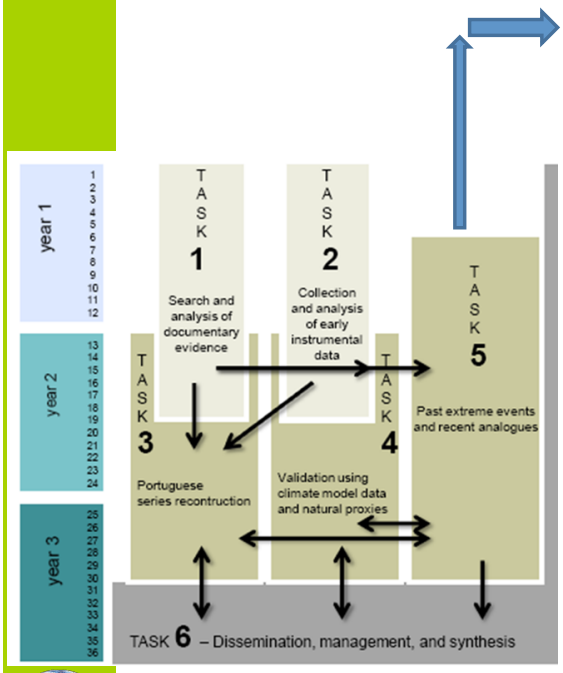



**Fig. 2.** Meteorological data availability in Portugal and overseas during the 18th century (yellow: annual data; red: monthly data; green: daily data; grey: lost data).

# Tarefa 5 – Eventos extremos do passado




**Coordenador:** Marcelo Fragoso

## Objectivos

- estabelecer a **cronologia de eventos extremos** do passado
- Verificar a sua **magnitud**e, a sua **extensão geog**ráfica e as suas **consequências** socio-económicas
- **Caracterizar as condições atmosféricas** durante os extremos identificados e relacioná-los com eventos extremos recentes (analogues)

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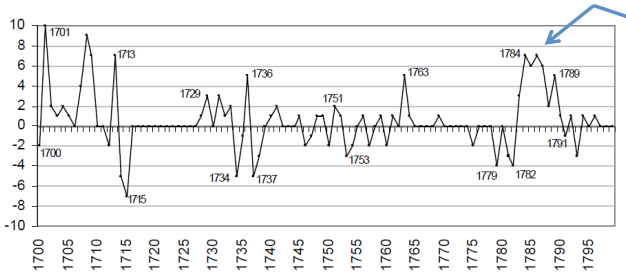
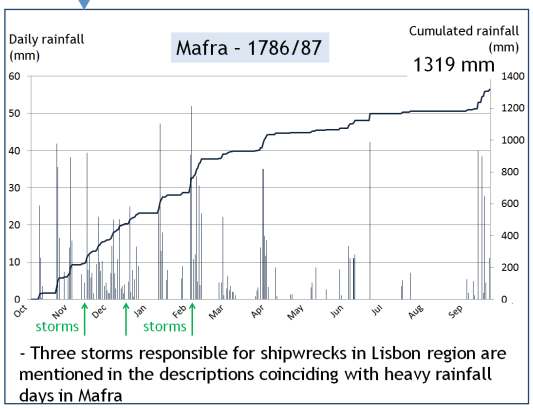
# Tarefa 5: Eventos extremos do passado e seus impactos na sociedade

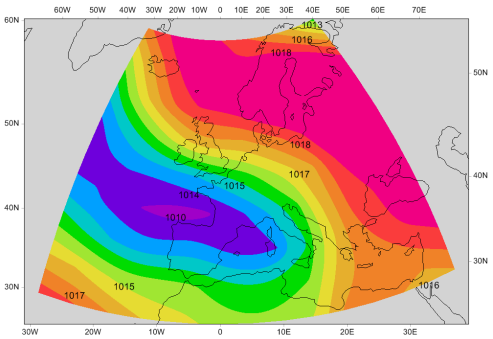


**Reconstrução da variabilidade da precipitação** ao longo do séc.XVIII, no Sul de Portugal

**Inverno muito chuvoso de 1786/87 em Mafra**
registos (tri) diários de J.A. Velho




Slide M. Fragoso



**Pressão ao nível do mar/ Dezembro 1786** (média mensal), reconstrução, Luterbacher *et al*, 2002

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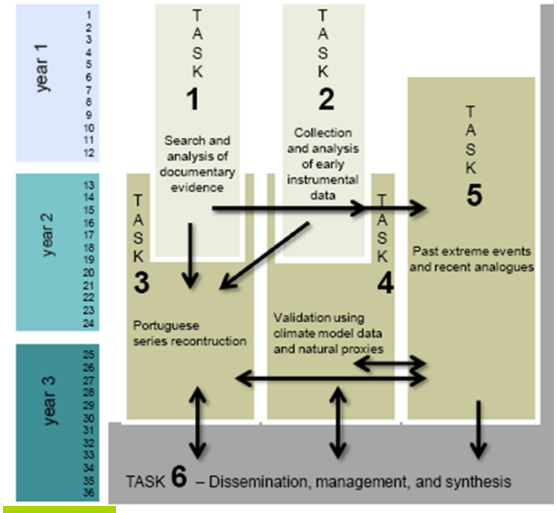
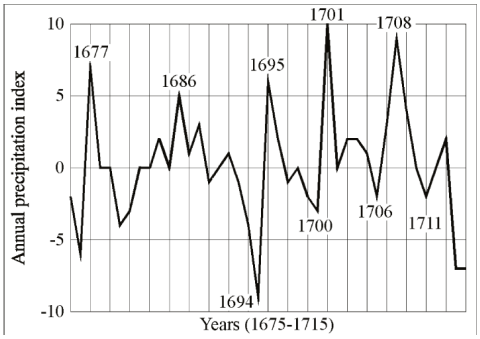
# Tarefa 3 – Reconstrução das séries portuguesas




**Coordenador : Fernando Domínguez-Castro** (que substituiu Henrique Andrade)

**Objectivos:** Derivar índices baseado nos dados documentais e produzir séries reconstruídas para Portugal

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Começará no mês 13

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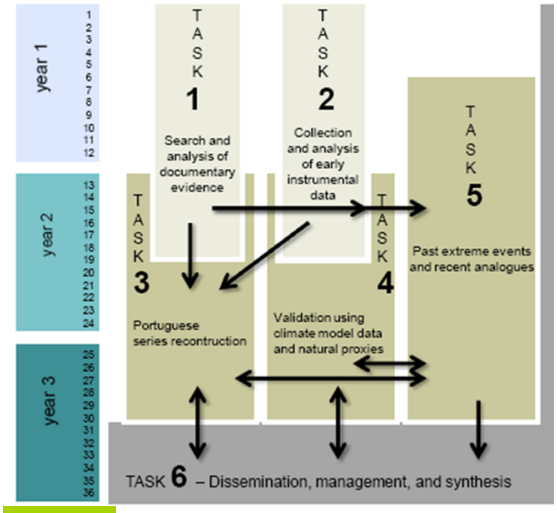
# Tarefa 4 – Validação das séries reconstruídas

**Coordenador :** João Andrade Santos




## Objectivo

**Clarificar o papel de forcing natural e antrópico na variabilidade climática** em Portugal

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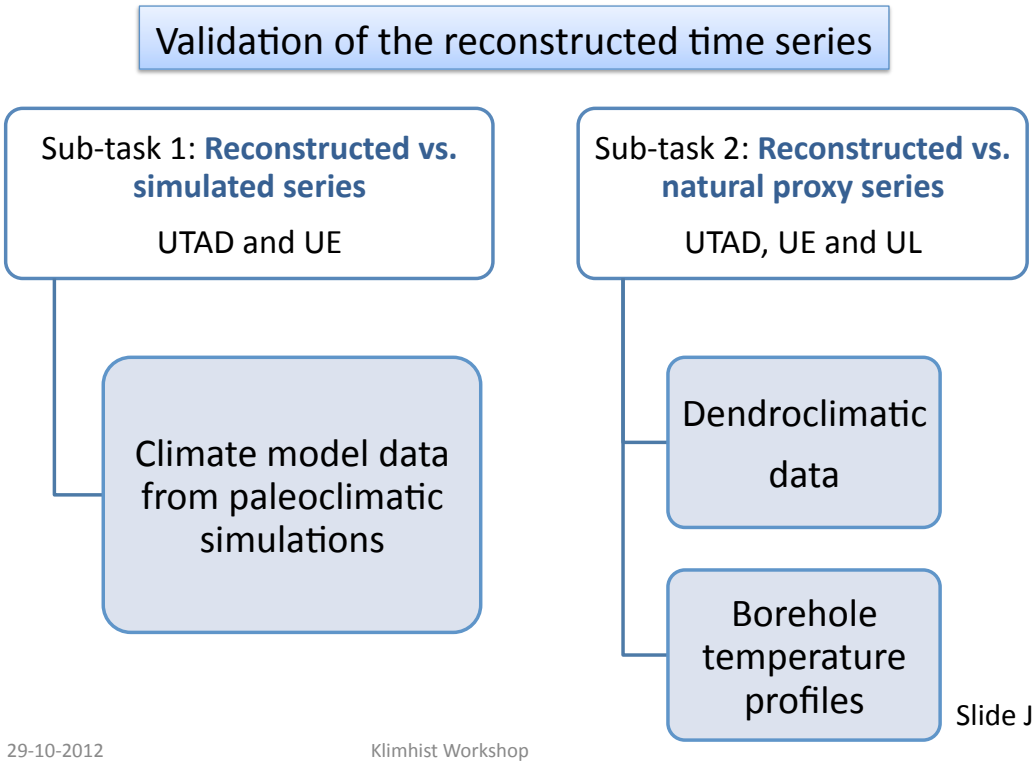
Começará no mês 13

## TASK 4 – Materials and methods



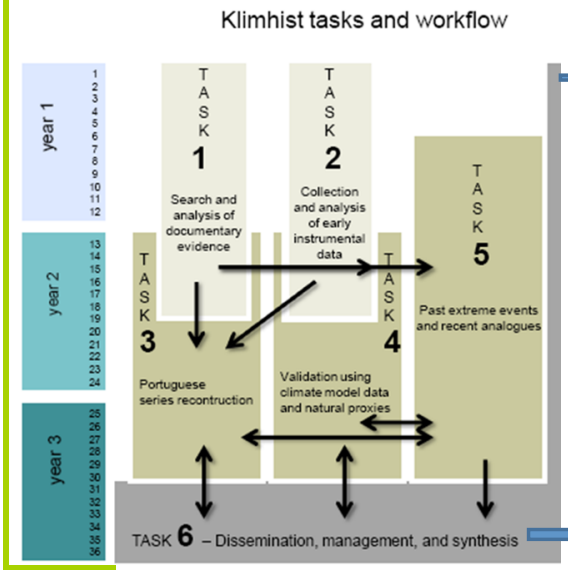

Slide J. Santos



## Simulated time series in Portugal

- Our consultant **Eduardo Zorita** (from Helmholtz-Zentrum Geesthacht – HZG) will provide paleoclimatic simulations produced by the state-of-the-art ECHO-G model
- Data in the **3-4 grid points** over/nearby Portugal will be extracted
- A **two-way validation** of the reconstructed and simulated series is expected

# Tarefa 6 – Disseminação e síntese




**Coordenador** António Lopes

**Objectivos**

- Gerir e compilar todos os outputs das diversas tarefas do projecto (incluindo apoio à construção da base de dados)

- Dar apoio aos workshops e à conferência final.

- Construir um **website**, onde um **atlas climático do passado** será disponibilizado à comunidade científica

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# http://clima.ul.pt/klimhist


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Obrigada pela vossa atenção

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