



# INTERNATIONAL CONFERENCE CLIMATE CHANGE IMPACTS ON TOURISM

7-8 September 2007 | Lisbon - Portugal

## Outdoor Thermal Comfort in Portugal Future Scenarios & Implications for the Tourism Industry

Tiago Capela Lourenço

Elsa Casimiro

Faculty of Sciences | University of Lisbon



# Overview

- ✈ Introduction
- ✈ Climate Change, Thermal Comfort and Tourism
- ✈ CLITOP Scope
- ✈ Recent Trends in Portugal
- ✈ Future Scenarios for Portugal
- ✈ Vulnerability / Adaptive Capacity
- ✈ Closing Remarks

# Introduction

Is thermal comfort a tourism asset?

**Tourists** seek the best probability of finding desirable weather conditions

**Managers** look for a suitable climate to implement their business

**Leisure activities** are highly dependent on climate conditions

**Seasonality** is a clear feature for most tourist

**Nevertheless....**

Climate is **not usually seen** as a limiting factor

Like in many other sectors it relies on historical data, and

Only uses air temperature to transmit the notion of thermal comfort

# Introduction

Is thermal comfort a tourism asset?

Humans (tourists) respond to the integrated thermal environment rather than simple meteorological variables: *warm sunny day*  $\neq$  *warm cloudy day*

Thermal comfort is part of the *tourism equation*:

Critical for the overall **desirability** of a destination (or activity);

Major driver in terms of mental **destination image** formation;

Causes **direct impacts** on tourists and locals;

Leads to **seasonal patterns**.

Thermal comfort rating using an integrated index vs. meteorological variables

**Not so straightforward but much more accurate.**

# Introduction

## Some Research Questions for the Portuguese Tourism

Are the Portuguese tourist destinations sensitive to changes in climate?

How can this changes affect their relative position in a global market?

What strategies can the sector adopt to cope with potential impacts?



looked at some of the key features of the climate-tourism relation:

### **From the supply-side (i.e. destination):**

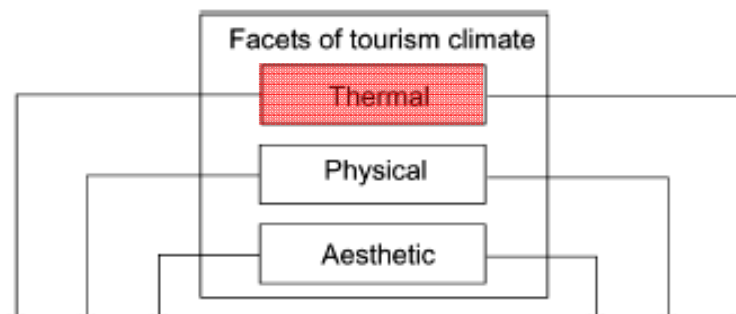
Energy demand

Human Health

Extreme Events

**Outdoor Thermal Comfort**

# Climate Change, Thermal Comfort and Tourism



Use of standard climate data  
+  
Body/atmosphere energy balance  
=  
Integrated effects of climate  
variables on the human body

**On-site behaviour gives  
indications of destination's  
sensitivity to climate facets**

Climate rating allows stakeholders  
(governments, business, promoters,  
agencies) to ***Plan Ahead***

**Scenario Assessment**

**Conceptual framework for tourism climate**  
(adapt. from de Freitas 2003)

# Climate Change, Thermal Comfort and Tourism

## Physiological Equivalent Temperature (PET)

Nine thermal comfort perception levels (thermal stress thresholds)

Uses (inputs) standard meteorological variables:

*Air temperature (°C)*

*Relative humidity (%)*

*Wind velocity (m/s)*

*Cloud cover (/8)*

Expressed in °C

<i><b>PET (°C)</b></i>	<i><b>Human Thermal Perception</b></i>	<i><b>Thermal Stress Threshold</b></i>
>41	Very Hot	Extreme heat
[35-41[	Hot	Strong Heat
[29-35[	Warm	Moderate Heat
[23-29[	Slightly Warm	Slight Heat
[18-23[	Comfortable	Comfortable
[13-18[	Slightly Cool	Slight Cold
[8-13[	Cool	Moderate Cold
[4-8[	Cold	Strong Cold
<4	Very Cold	Extreme Cold

# Climate Change, Thermal Comfort and Tourism

Climate and thermal comfort in Portugal:  
A close relation with tourism?

Tourist nights slept (Summer) (% from year total)  
(average 1995-2004)

Algarve	G. Lisboa	RAM	G. Porto
52.5 %	40%	35%	40%
<u>SS&amp;Sand</u>	<u>City-Break</u>	<u>Nature /adventure</u>	<u>City-Break</u>

Algarve's Winter occupancy rates less than 1/3 of August

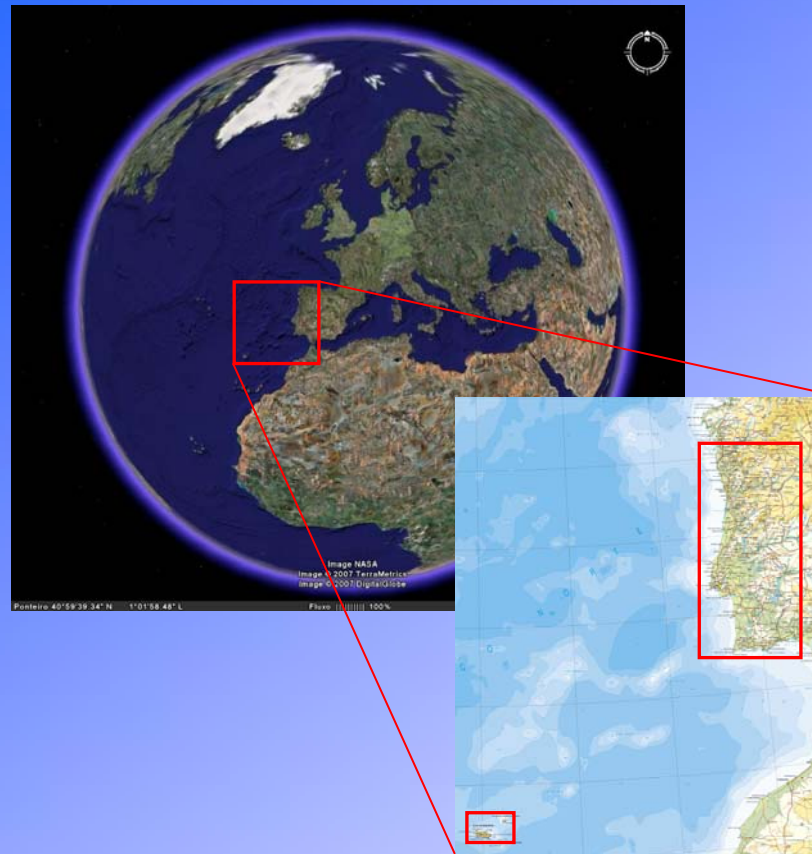
## Tourists?

**8/10 facets** tourists liked best in Madeira (RAM) are climate driven (DRT, 2002)

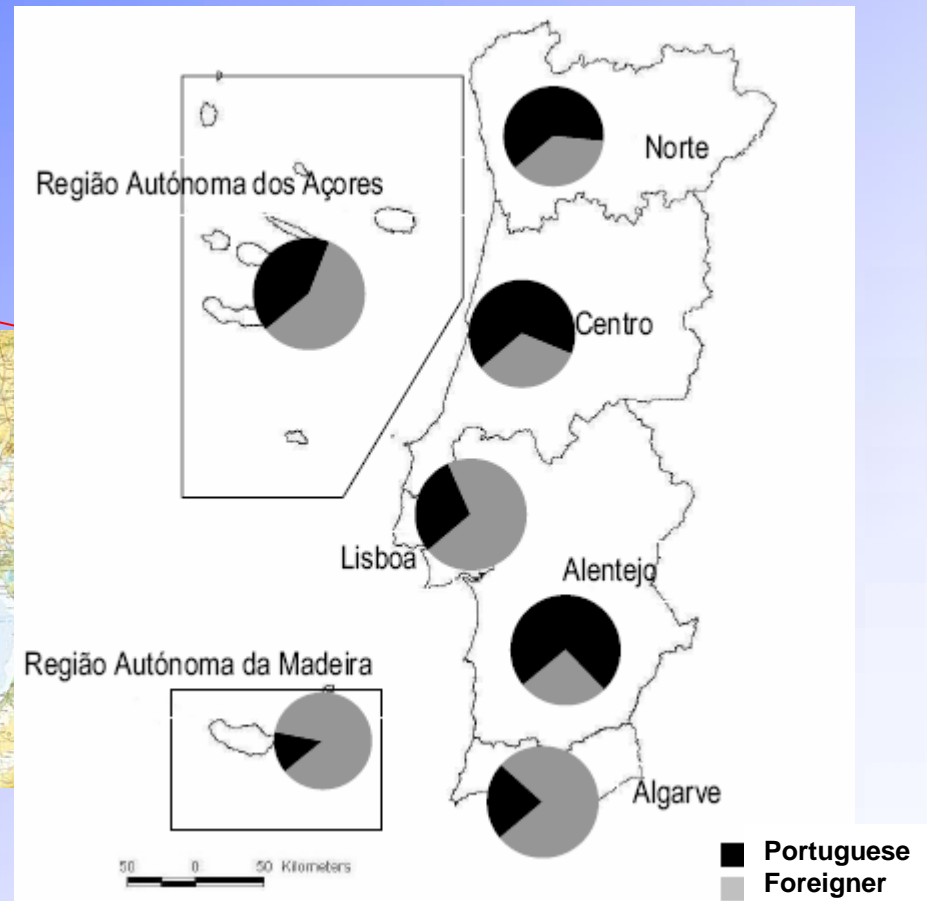
## Agents?

German operators in Portugal acknowledge that **70%** of their clients see the country as a *sun, sea & sand destination* (CCILA, 2005)

# CLITOP Scope



## Regional Destination Assessment

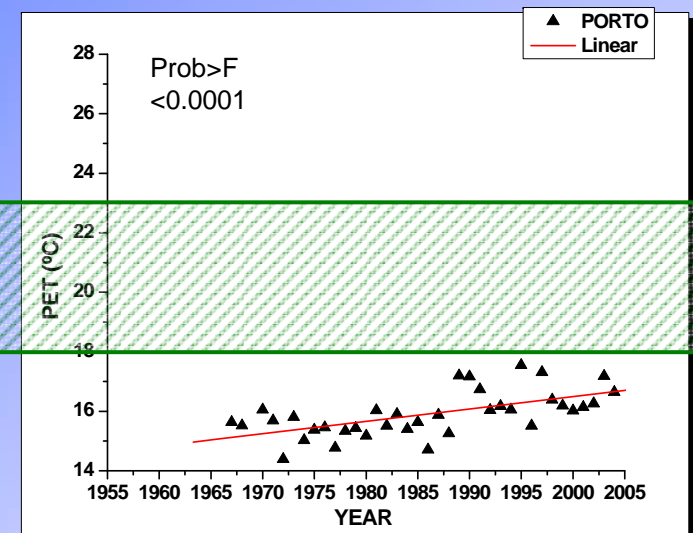
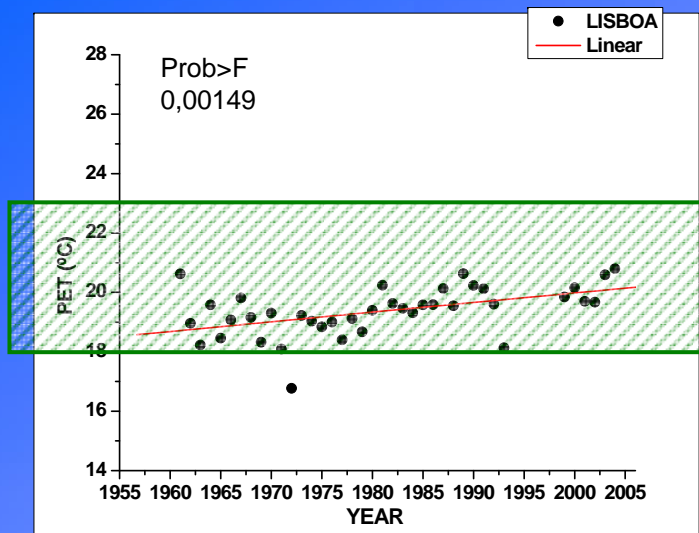


### 4 main tourism regions:

Algarve (45%)  
Great Lisbon Area (21%)  
Madeira Is. (RAM) (20%)  
Great Porto Area (5%)

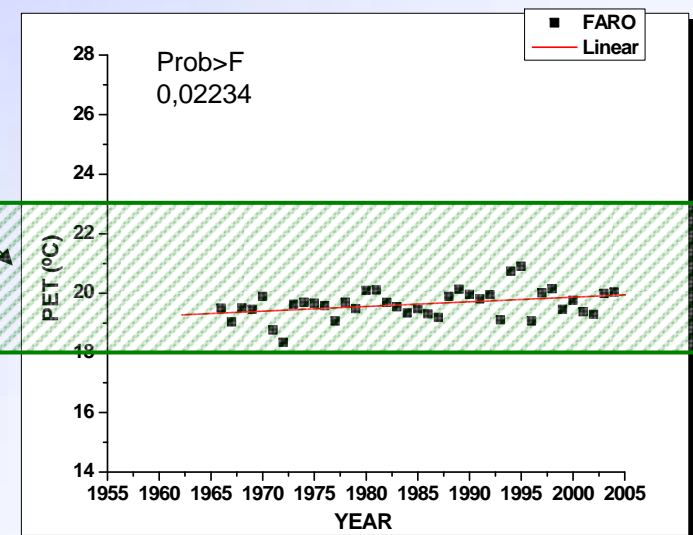
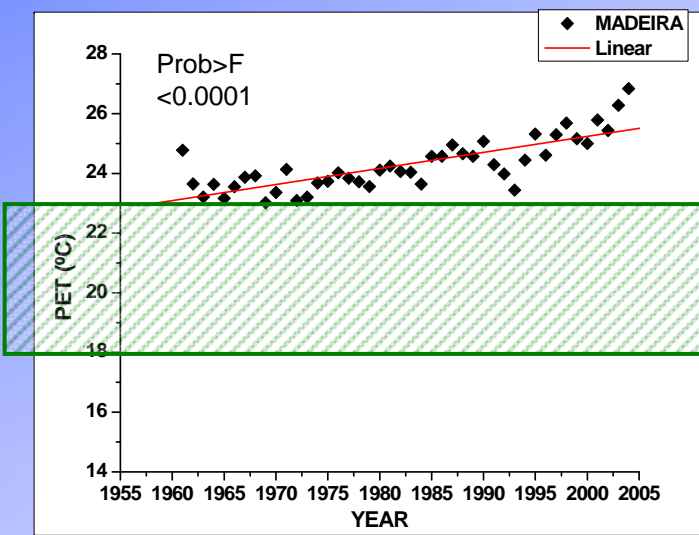
~ 90 % of tourism nights in Portugal (2005)

## PET trends (yearly means)



**Slight increase** during last 4 decades

In **all** 4 tourism regions

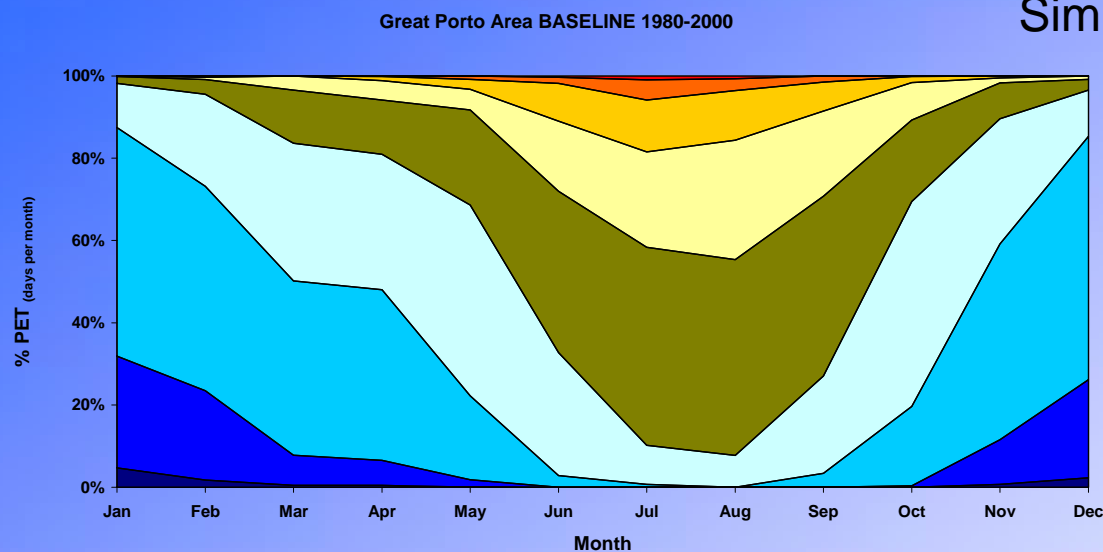


# PET daily values allows:

Seasonal profiles

Number of days above thresholds (extremes)

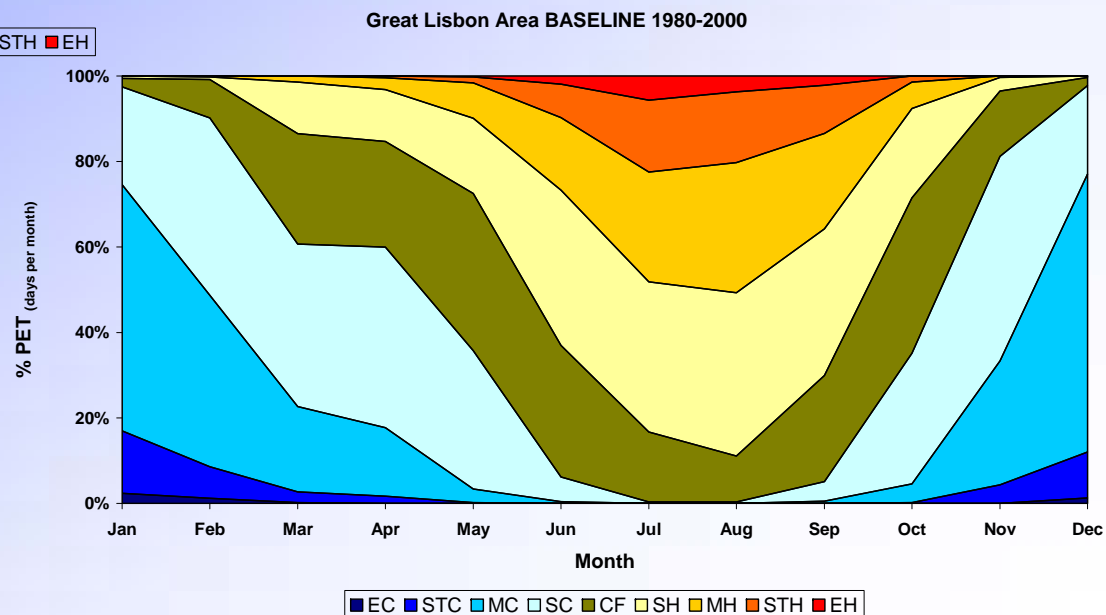
Simpler and straightforward analysis



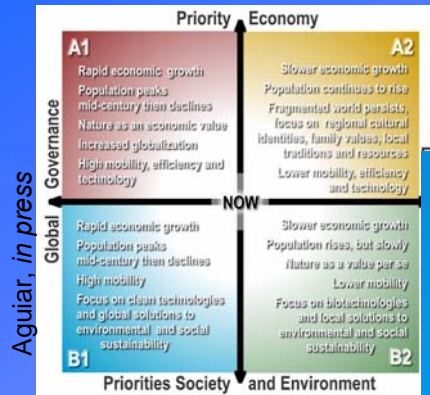
PORTO



LISBOA



## IPCC SRES Scenarios



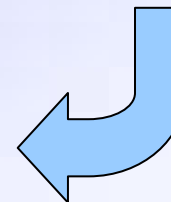
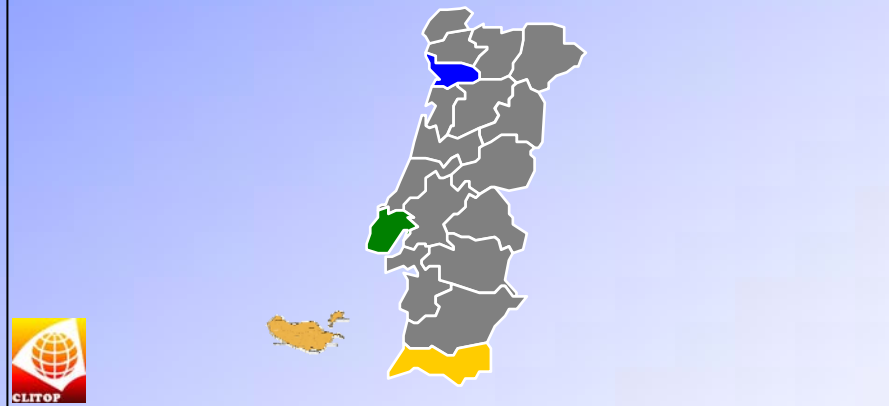
## Climate data downscaling for Portugal



## Thermal comfort index model

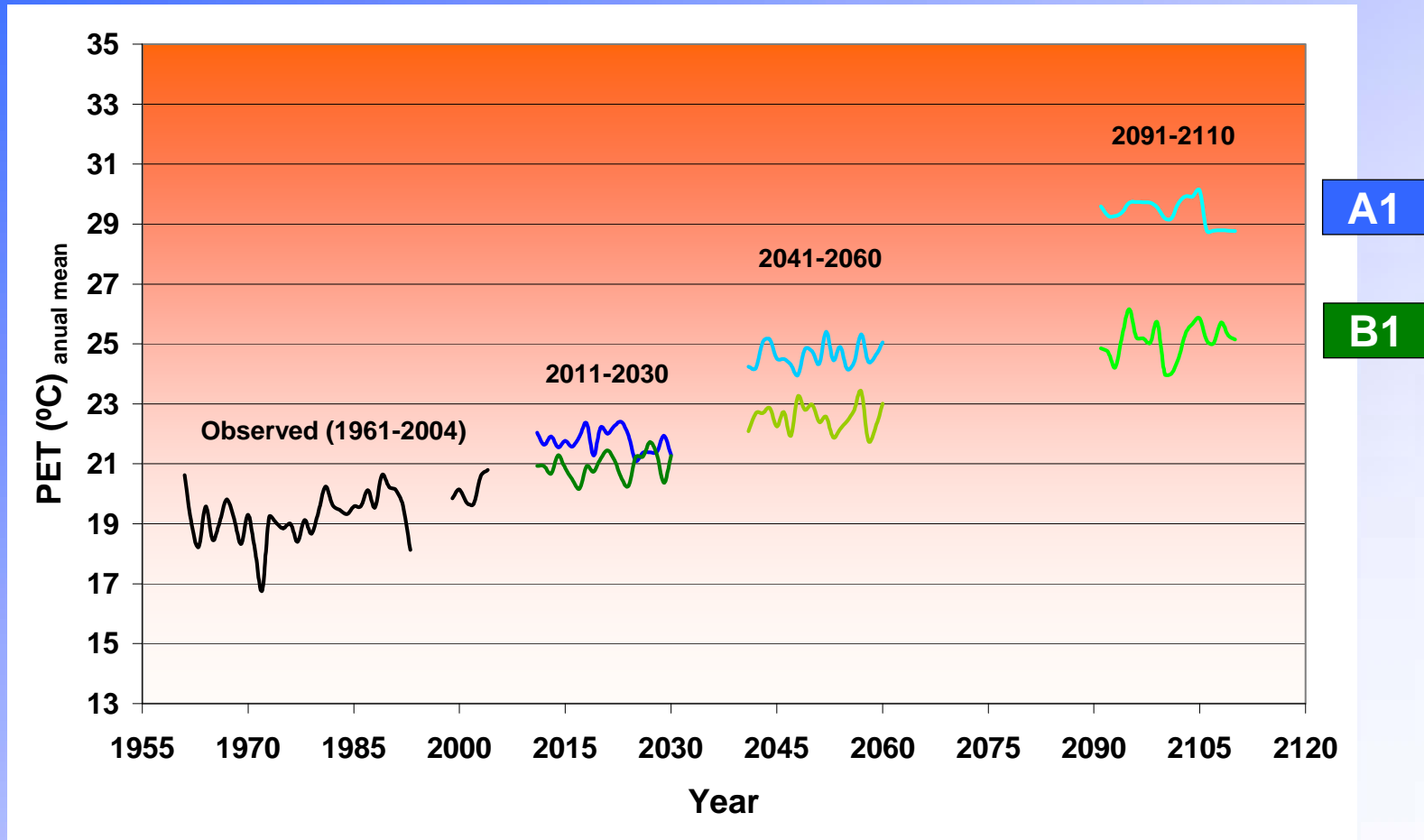


## Regional thermal Comfort Model



# Future Scenarios

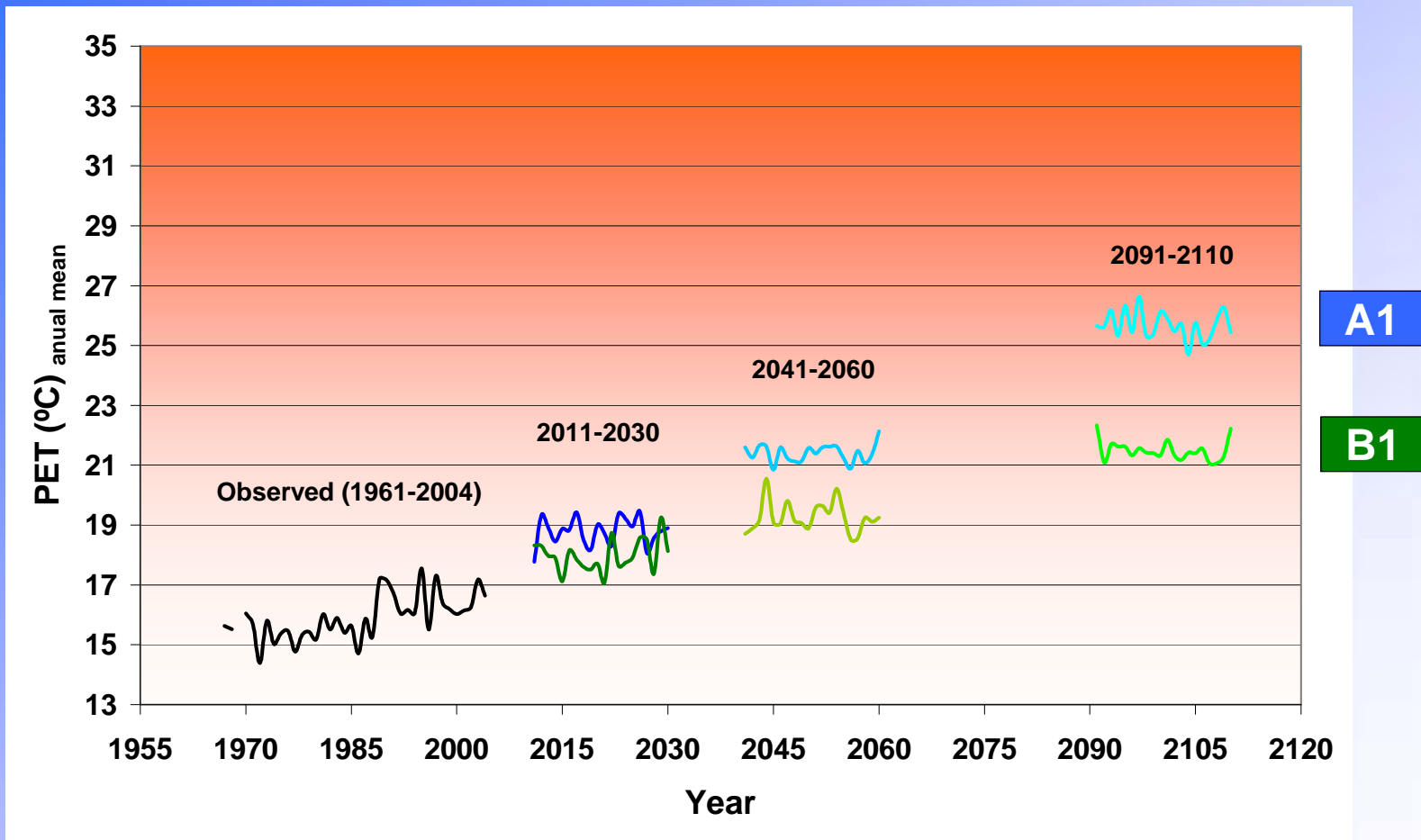
LISBOA 



PET trends  
(yearly means)

# Future Scenarios

PORTO

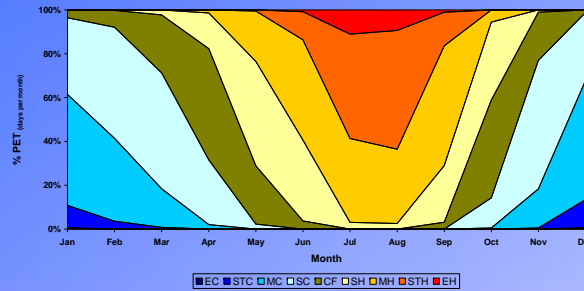


PET trends  
(yearly means)

ALGARVE



Algarve CONTROL 1980-2000



# Future Scenarios

A1

B1

2011-2030

2041-2060

2091-2110

# Future Scenarios

## The Future Ahead?

- ⇒ **Shifts in comfort levels in line with projected changes**
- ⇒ **Regional changes may be significant in the mid- to long- term**
- ⇒ **Overall thermal comfort profiles and thresholds aren't expected to change dramatically fast (except for extreme events)**
- ⇒ **Summer months might experience the most significant impacts**
- ⇒ **Lengthening of summer period in all 4 regions**
- ⇒ **Winter and shoulder months can gain space for promotion and increase activities in all 4 regions**
- ⇒ **Careful attention should be paid to Algarve (*summer heat stress*) and Porto (*all year round increase comfort possibilities*).**
- ⇒ **Changes in the short-term allow time to analysis and adaptation**

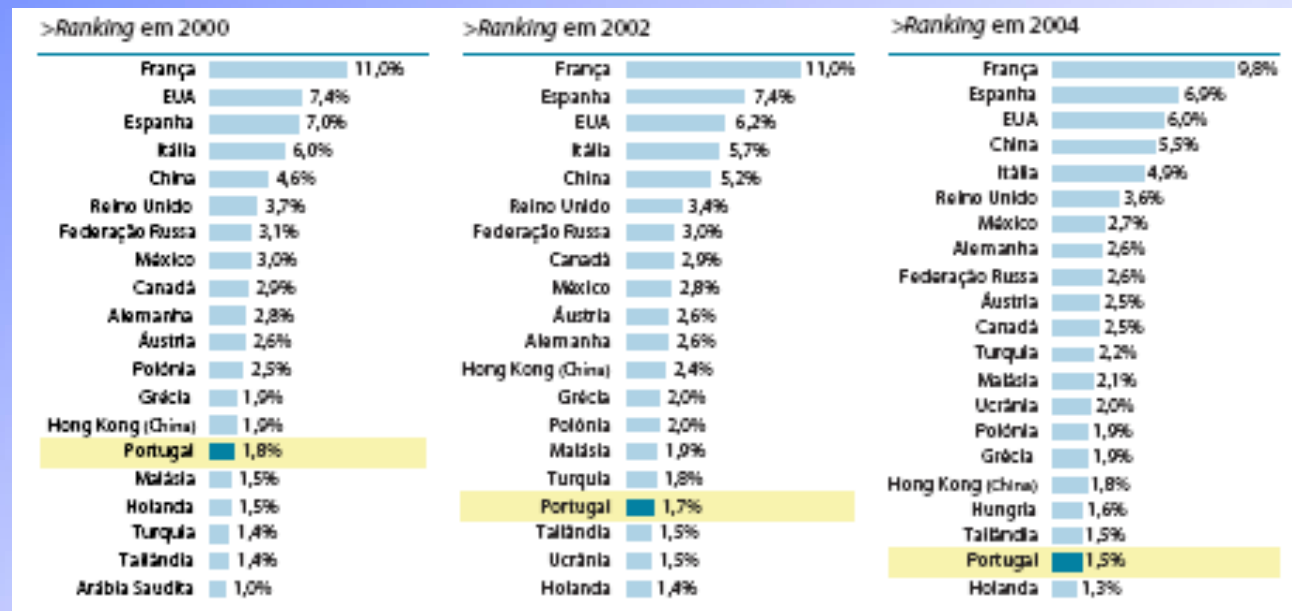
# Vulnerability / Adaptive Capacity

**Tourism industry has different rates of adaptation to changes in resources:**

- ⇒ Tourists can **quickly** choose other destinations
- ⇒ Tourism destinations are **slow** to adapt (*immobility*) and have difficulties to combine intra-regional efforts (*competition*)

Portugal has been loosing ground in a global market and...

(% Share)  
PENT, 2006



...climate change may be a further source of strain to the sector

# Closing Remarks

- ⇒ Thermal comfort is only a part of the tourism-climate relation and of the tourism destination natural resources;
- ⇒ Because global environmental changes project regionalized impacts...
- ⇒ Climate **MUST** be taken into account when defining our strategies.



Will all the regions/activities planned be attractive for each type of tourist (climate wise and other)?

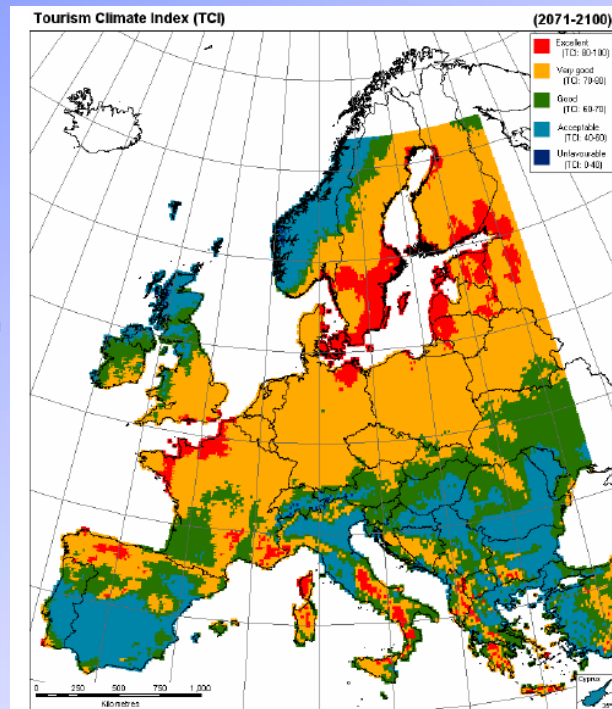
# Closing Remarks

All markets are relative in a global world.

The projected image for the potential tourists can change rapidly (heat waves, fires, insecurity, fuel prices, ...) and having clear future scenarios provides useful help when planning ahead!

We are witnessing an increase concern over adaptation to climate change...

EC GREEN PAPER  
Adapting to climate  
change in Europe –  
options for EU action



... and Portugal can now start to address this issue with **regionalized, up-to-date** and concise information about the **expected impacts!**

# INTERNATIONAL CONFERENCE CLIMATE CHANGE IMPACTS ON TOURISM

7-8 September 2007 | Lisbon - Portugal

## Thank you!

[tcapela@siam.fc.ul.pt](mailto:tcapela@siam.fc.ul.pt)

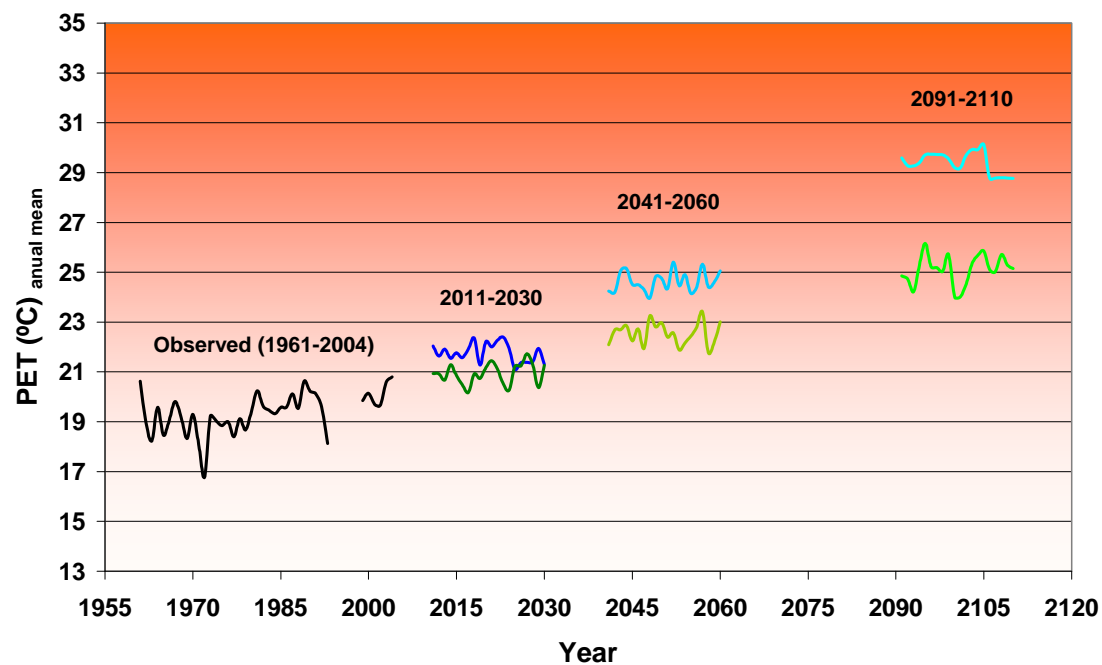
[www.siam.fc.ul.pt/clitop](http://www.siam.fc.ul.pt/clitop)

[www.circle-era.net](http://www.circle-era.net)

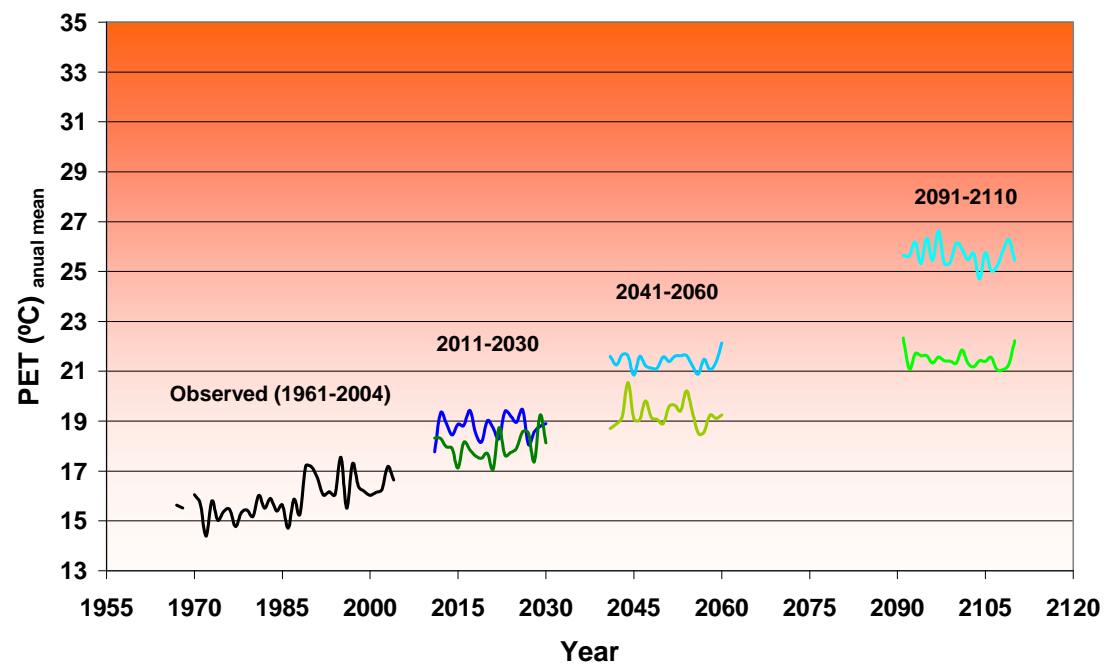


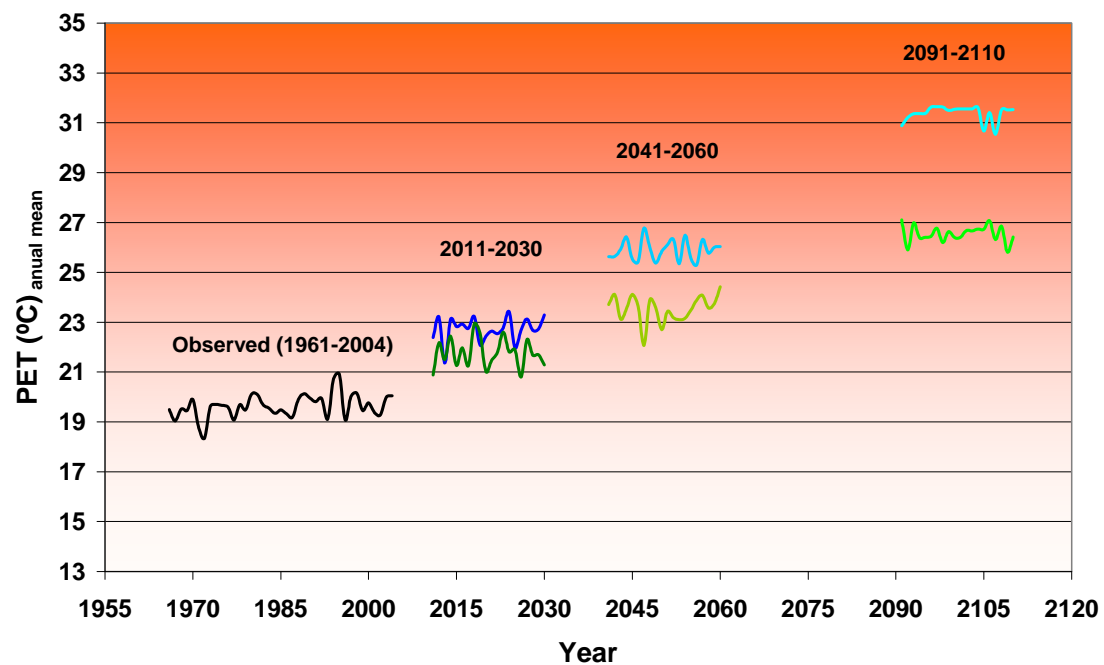
# EXTRAS

## PORTO



## LISBOA





**MADEIRA**



**ALGARVE**

