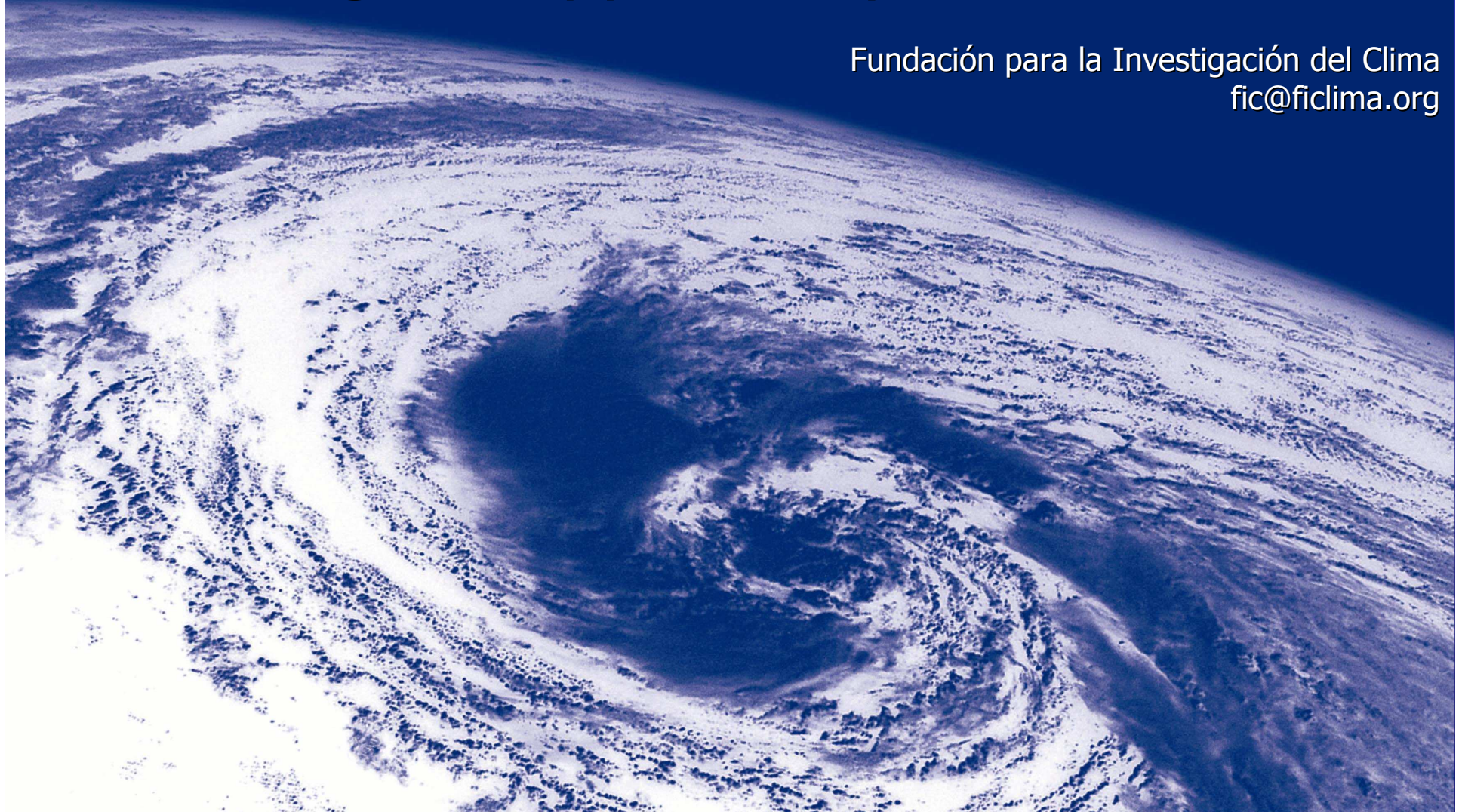


# Uncertainties in Statistical Downscaling

## Range of applicability of SDS methods

Fundación para la Investigación del Clima  
fic@ficlima.org



## UNCERTAINTIES |

- ∅ **This is what we learnt working with our SDS method, both in Climate Change and in operational forecasts, and after theoretical considerations**
- ∅ **It may not be applicable to some other methods**
- ∅ **Rather than giving general answers, we will try to provide questions that should be addressed, and the answers we have found for our specific SDS method**

# UNCERTAINTIES |

## GENERAL UNCERTAINTIES:

- 1. Which will be the low resolution atmospheric situation?:**  $\mathbb{L}$   
**Ensemble and multimodel strategies**
- 2. Supposed a certain low resolution atmospheric situation, which will be the surface effects?**  $\mathbb{L}$  ???

## SDS UNCERTAINTIES:

**3. Can the predictor / predictand relationships be used for the future?**

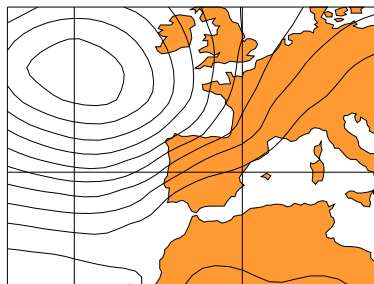
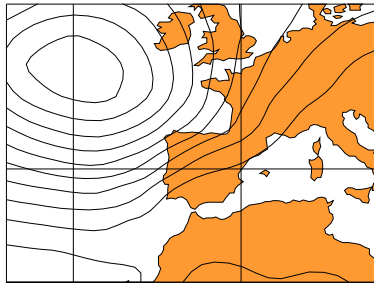
### **3.1. Stationarity problem** $\mathbb{L}$

- \* Predictors (variables, time scale, spatial scale) should be physical forcings of the predictands**
- \* No seasonal stratification (future springs may not be like present ones)**

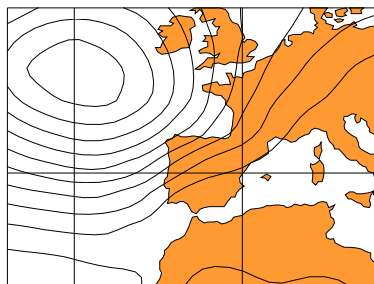
### **3.2. Range of applicability of the SDS method**

# GENERAL UNCERTAINTIES:

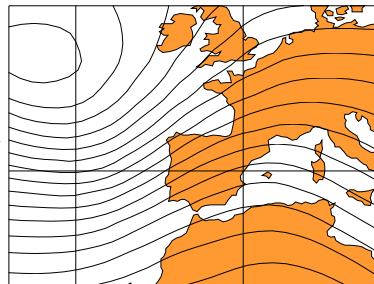
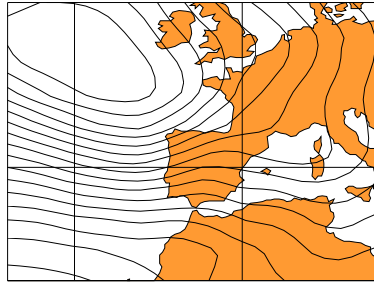
# SITUACION INICIAL



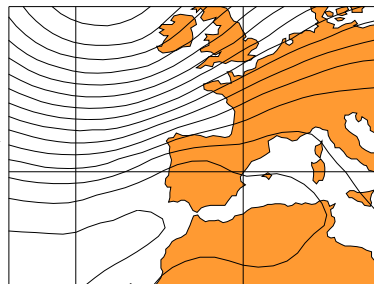
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# SITUACION PREVISTA



•  
•  
•



MCG →

?

MCG →

?

?

MCG →

"DOWNSCALING"



?



∴?



?



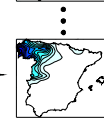
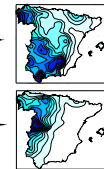
∴?



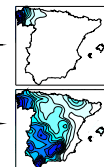
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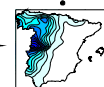
∴?



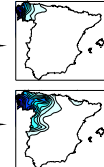
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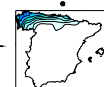
∴



•  
•  
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∴



EFECTOS EN SUPERFICIE

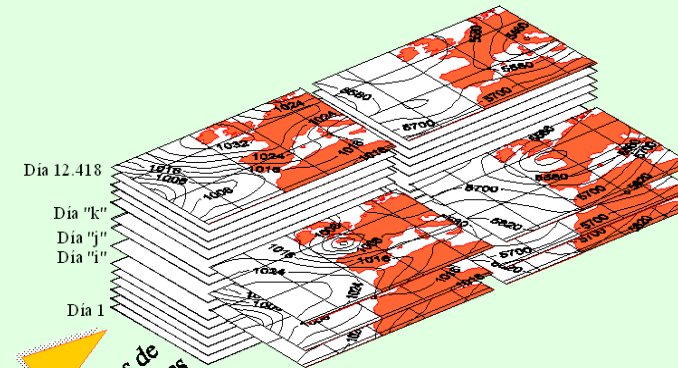
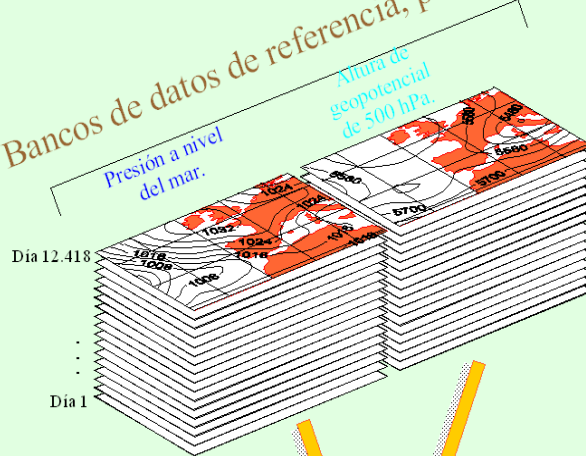
# GENERAL UNCERTAINTIES:

**"Answers" for our SDS method**

# SDS method scheme

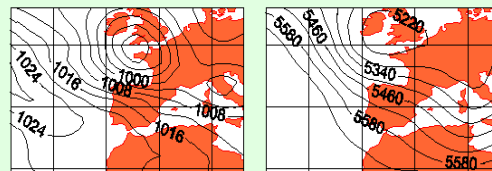
## Paso 1

Bancos de datos de referencia, para 1961-1994.



El método busca, entre todos los días del banco de datos de referencia, los días con configuraciones atmosféricas más similares al día problema "X".

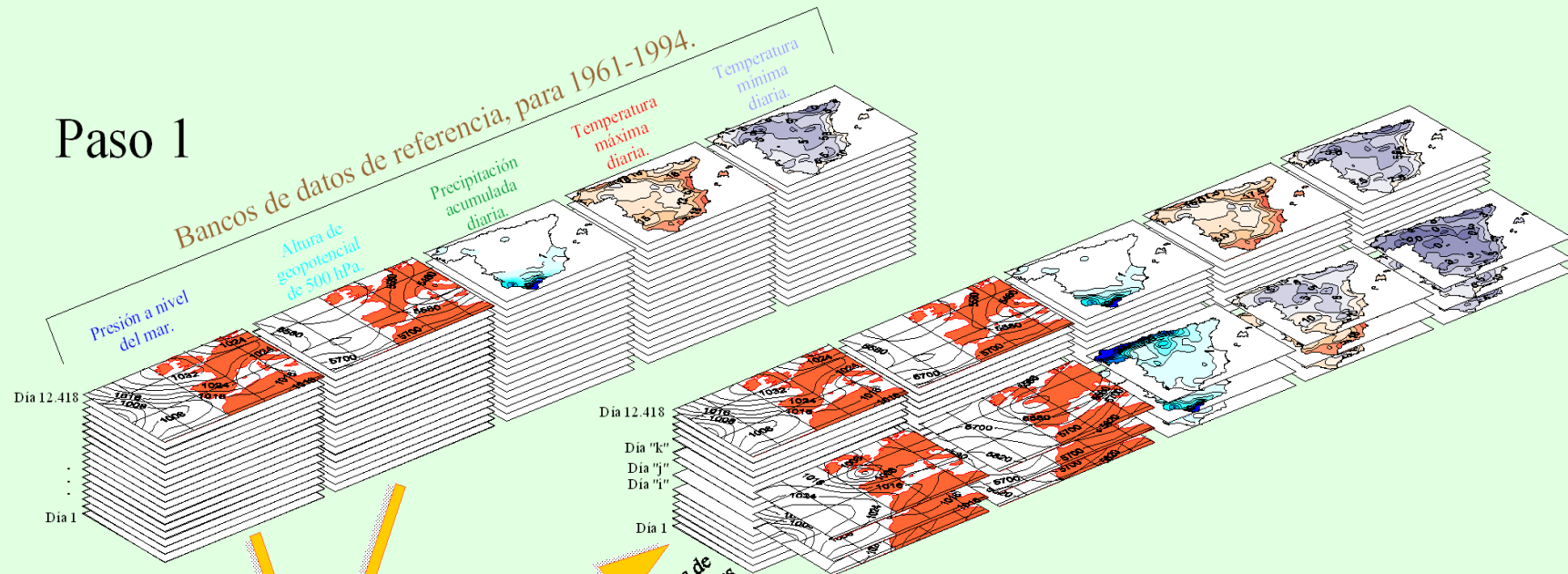
Selecciona, del banco de datos de referencia, los "n" días más similares (en sus campos atmosféricos) al día "X".  
Son los días i,j,k...



Configuraciones atmosféricas de baja resolución del día problema "X", cuyos campos de efectos en superficie de alta resolución se desean estimar.

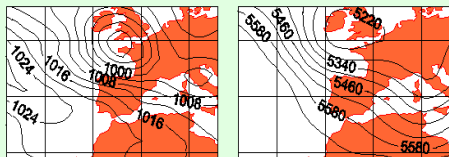
# SDS method scheme

## Paso 1



El método busca, entre todos los días del banco de datos de referencia, los días con configuraciones atmosféricas más similares al día problema "X".

Selecciona, del banco de datos de referencia, los "n" días más similares (en sus campos atmosféricos) al día "X".  
Son los días i,j,k...



Configuraciones atmosféricas de baja resolución del día problema "X", cuyos campos de efectos en superficie de alta resolución se desean estimar.



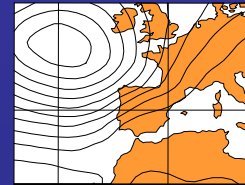
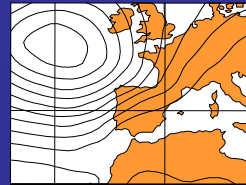
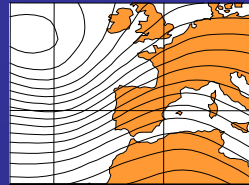
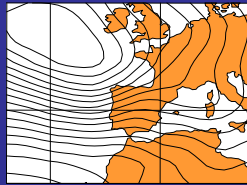
Day num. 1

Day num. 2

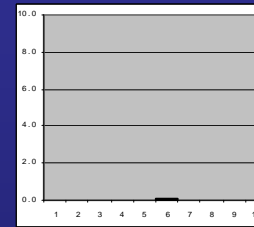
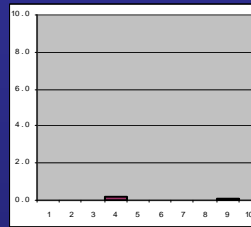
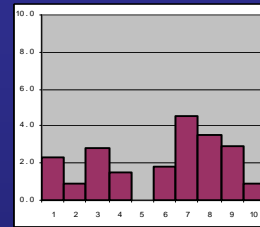
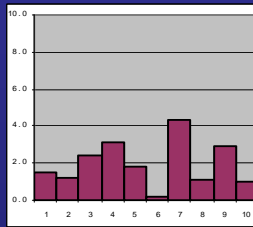
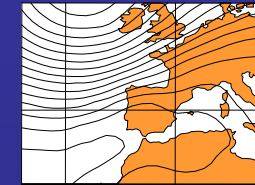
Day num. 3

Day num. 4

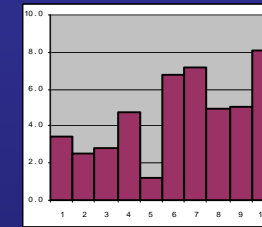
Day num. 92



...



...



AVERAGE: 1.8

2.1

0.03

0.01

4.1

"PROB. APPR.": 1.7

2.2

0.0

0.0

8.5

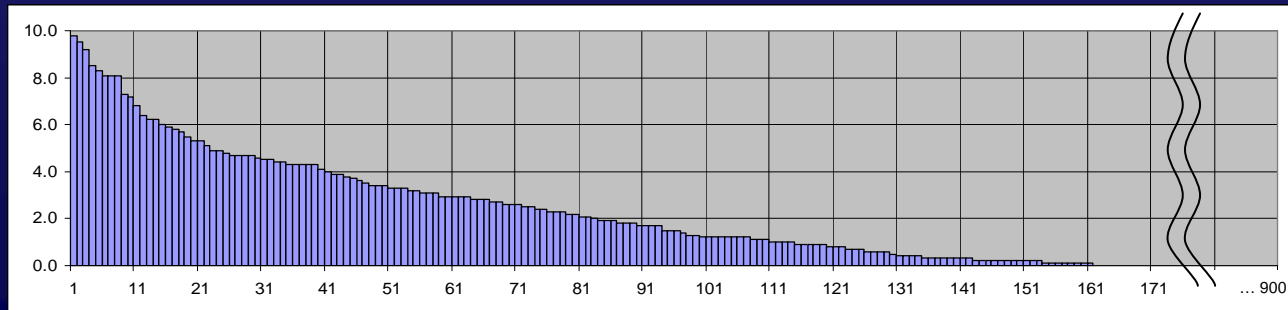
"PROB. APPR.":

8.5 5.6 4.7 .....

2.2 1.9 1.7

...

0.0 ... 0.0



# SDS UNCERTAINTIES:

## 3.1. Stationarity problem $\mathbb{E}$

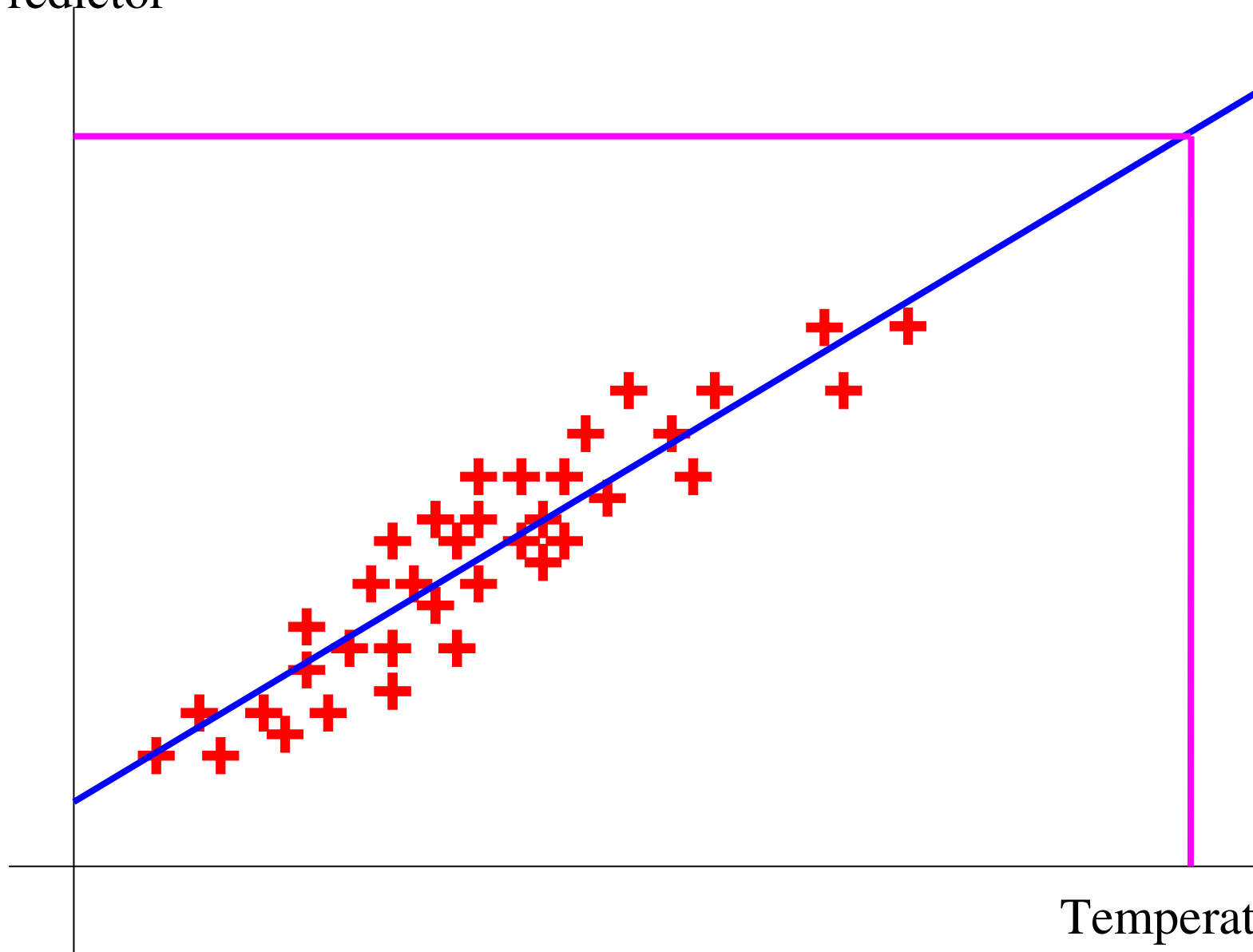
**\* Predictors (variables, time scale, spatial scale) should be physical forcings of the predictands**

**\* No seasonal stratification (future springs could not be like present ones)**

# **SDS UNCERTAINTIES:**

## **3.2. Range of applicability of SDS methods**

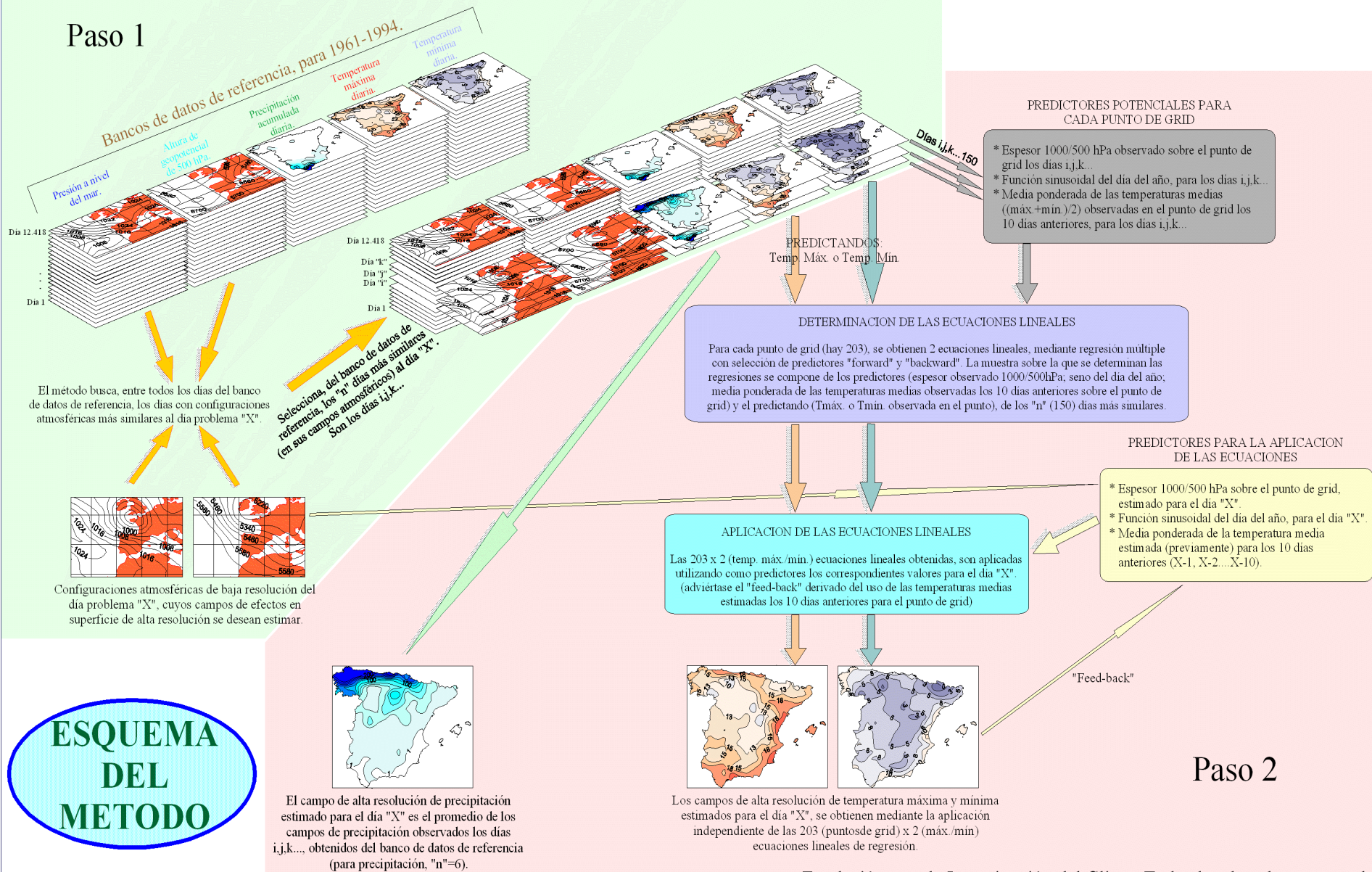
Predictor



Temperature

# SDS method scheme

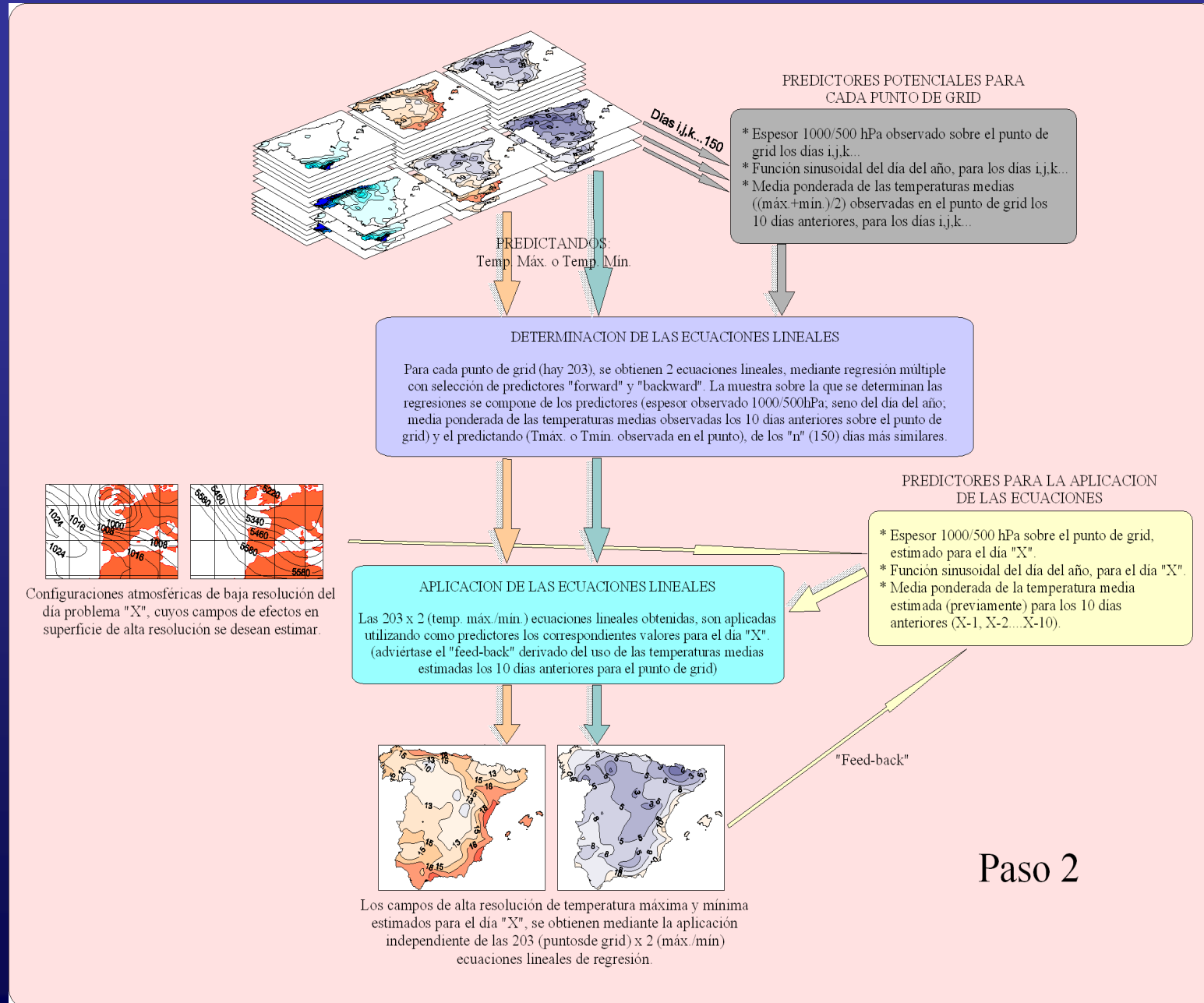
## Paso 1



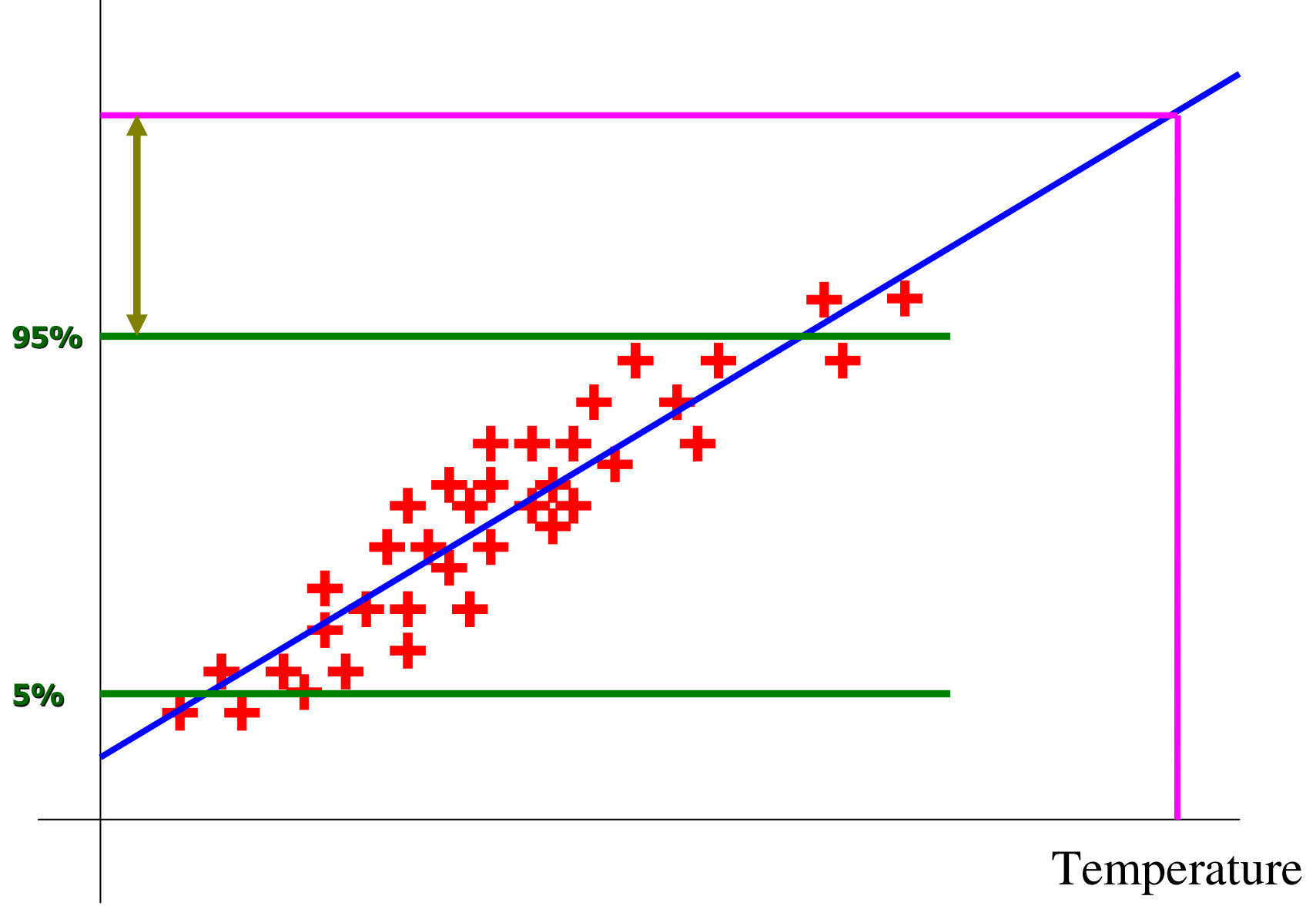
## Paso 2

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# SDS method scheme



Predictor



Temperature

