



# **IMPROVING THE CAPACITY BUILDING FOR NUMERICAL MODELING IN THE CHILEAN NATIONAL WEATHER SERVICE**

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## MISSION

Provide weather and climate services and products to the private and public organizations, as well as to the general community.



To accomplish, in part, the mission and its role the Chilean Weather Service started to develop and use regional numerical models since the beginning of this century.

### Operational models

- The first model used was the MM5
- Then, the ETA hydrostatic model
- The Polyphemus chemical model (for quality air)

### Climate model

- Regional Climate model called PRECIS
- Climate version of the MM5

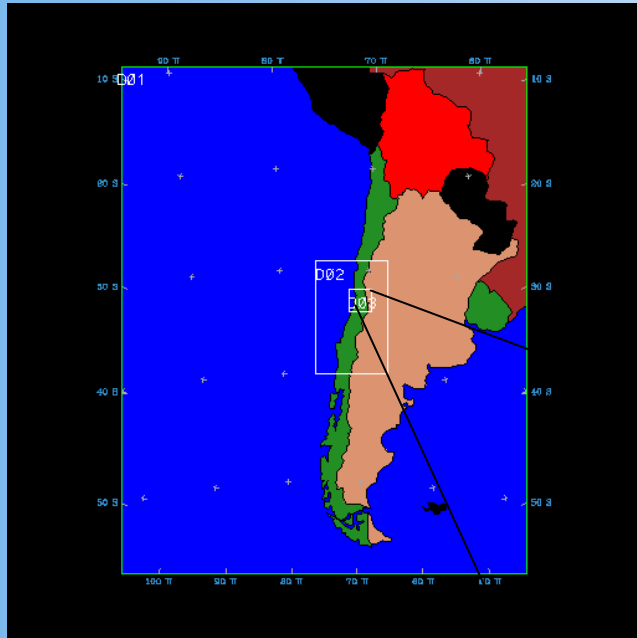


**All this development has been able due to the:**

- free accessibility for acquiring the models,
- Availability of global modeling data via internet for initialization and boundary condition, and
- that the model are able to run in improved-PCs machine which made cheaper infrastructure.

**ALL THESE MODELS ARE STILL UNDER DEVELOPMENT, ADAPTATION AND CHANGES IN IMPLEMENTATION IN ORDER TO IMPROVE THERE PERFORMANCE**

**A example of these models are**

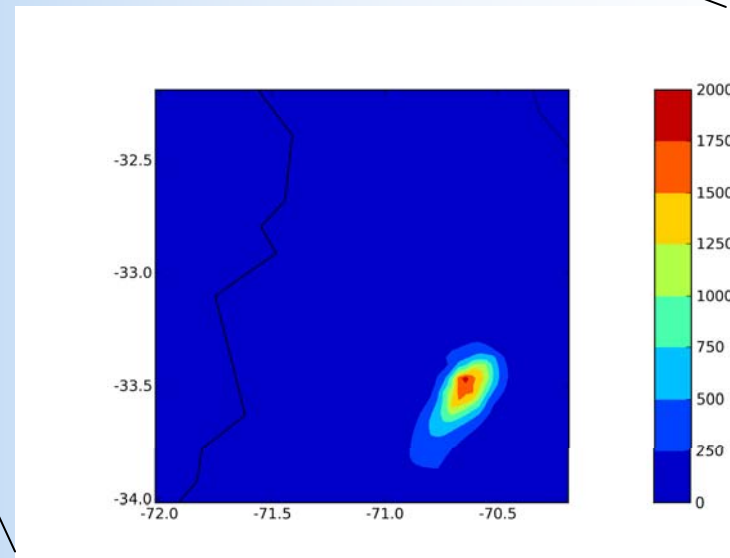
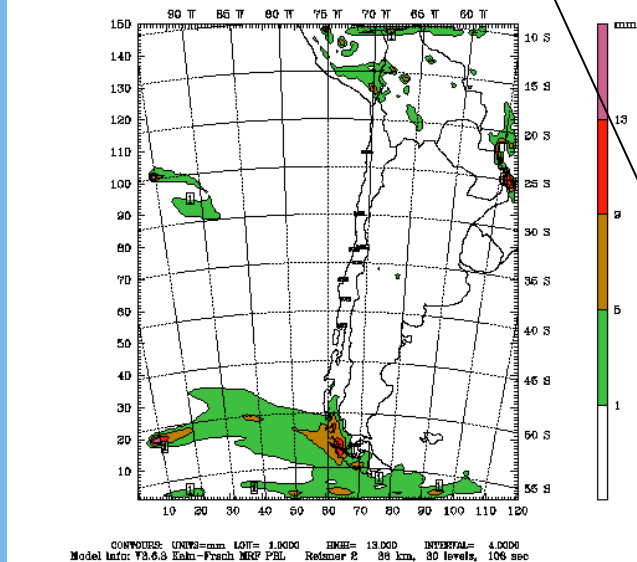


**MM5**, it run in a nested mode that goes from 36 km to 4 km resolution, 31 vertical levels, with the finest one centered at Santiago.

It performs 72 hours forecast

It run on a 5 nodes Cluster PC with a Pentium Xeon of 3 Ghz

Dataset: grilla1 RIP: D1 Precipitacion Init: 0000 UTC Wed 26 Sep 07  
Fcast: 72.00 Valid: 0000 UTC Sat 29 Sep 07 (2000 LST Fri 28 Sep 07)  
Total precip. in past 6 h



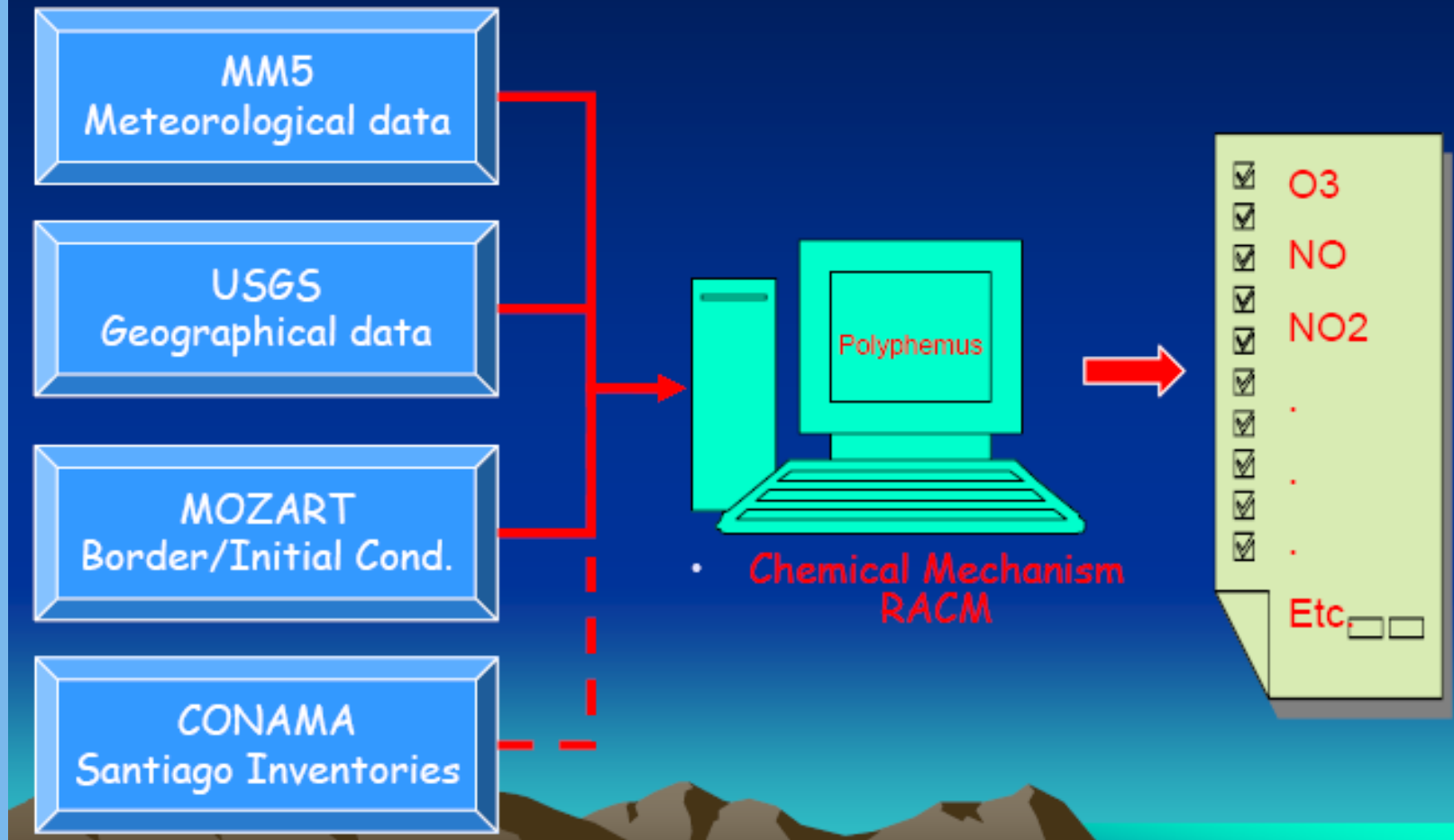


# Polyphemus

- It is an off-line platform and it is being developed by INRIA (Institut National de Recherche en Informatique et en Automatique) and CEREAs (Centre d'Enseignement et de Recherche en Environnement Atmosphérique) ) in France.
- It gathers:
  - Several models: with Gaussian and Eulerians formulations.
  - Several scales: from local to global scales.
  - Multiple pollutants: pasive tracers, photochemical mechanisms, aerosols, radionuclides, among others.
  - Processing from many inputs: meteorological models, lands use models, global chemical models, etc.
  - Many advanced methods: data assimilation, ensemble forecasting, etc.



# Polyphemus implementation at DMC

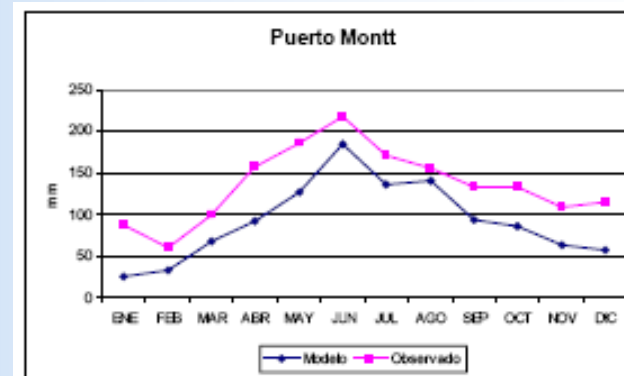
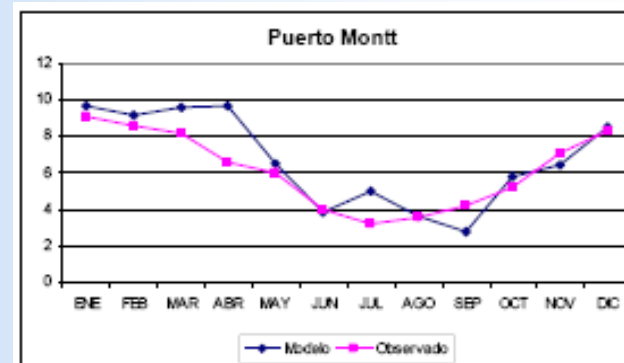
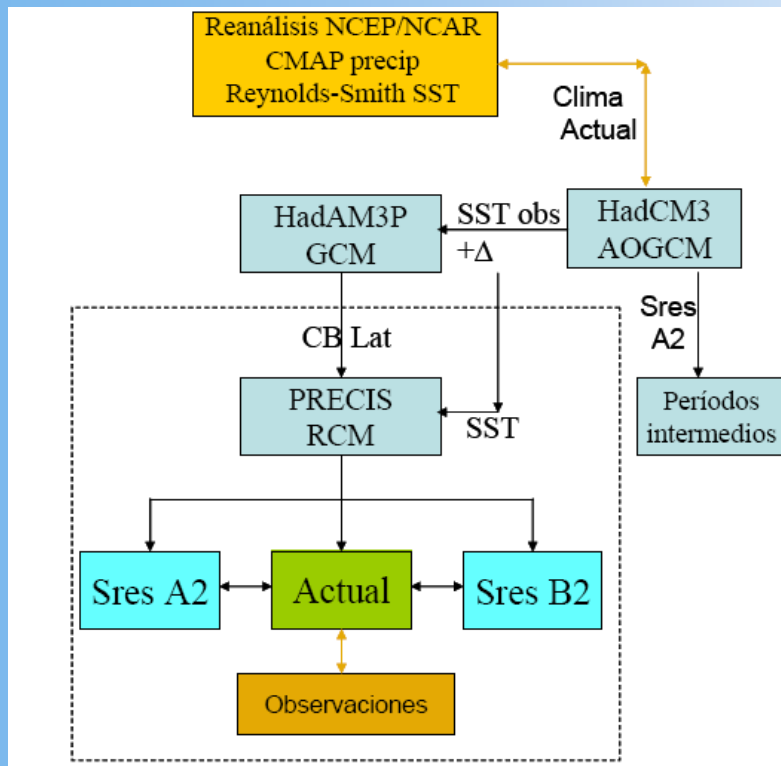


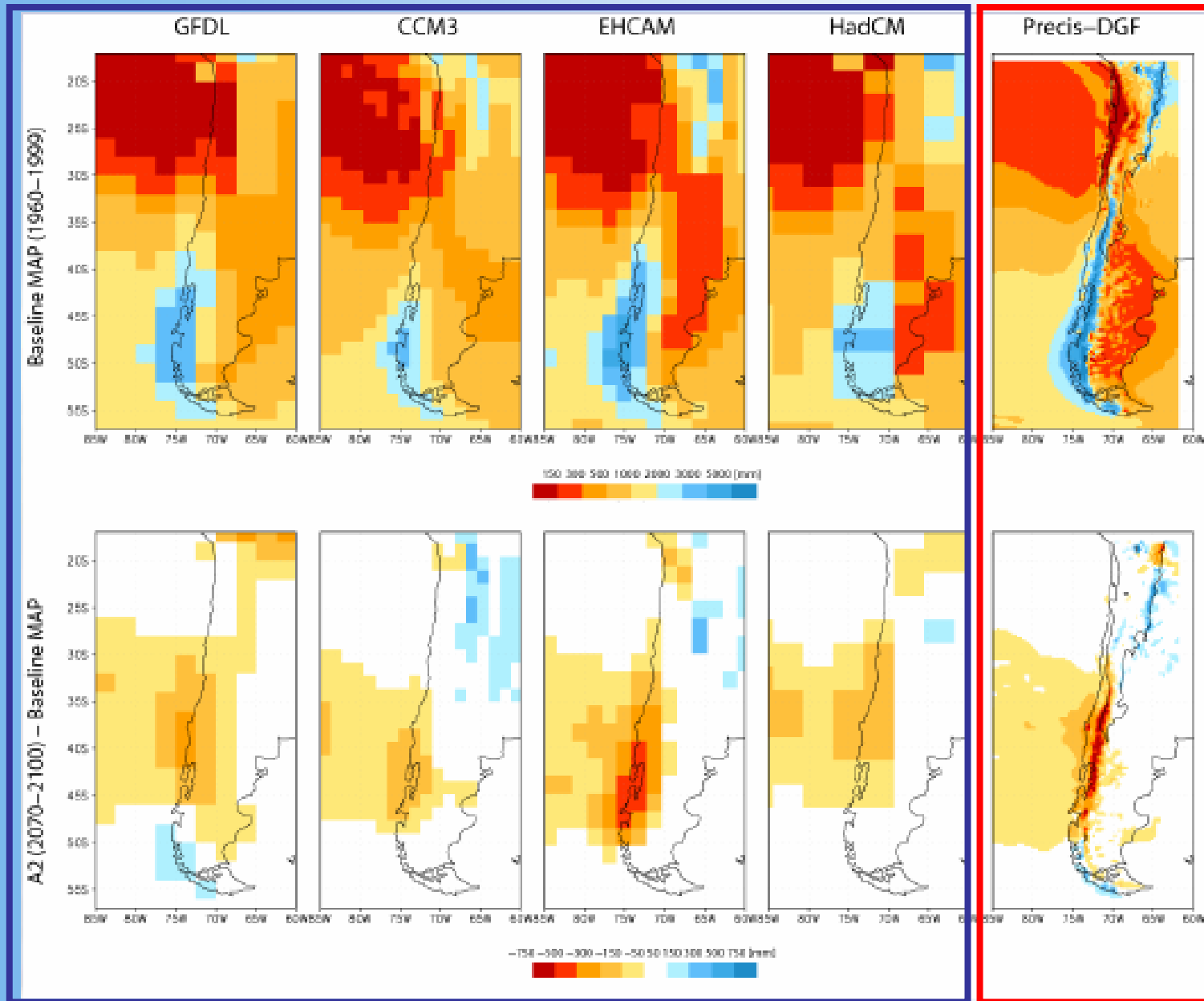


## Climate Regional Model (PRECIS)

In 2006, it was installed the model developed by the Hadley Center of United Kingdom called PRECIS (Providing Regional Climates for Impact Studies), with horizontal resolution 25 km.

The objective was run climate future scenarios for Chile. The model was installed on an improved-Pentium IV PC. It took several months to simulate scenarios A2 and B2, and the current climate.





Global model output

Regional model output



## Today's situation

### MM5



5 nodes Cluster PC with a  
Pentium Xeon de 3 Ghz

### Polyphemus



### PRECIS



Pentium IV

Individual  
development  
without  
integration, no  
resources are  
shared

### CMM5





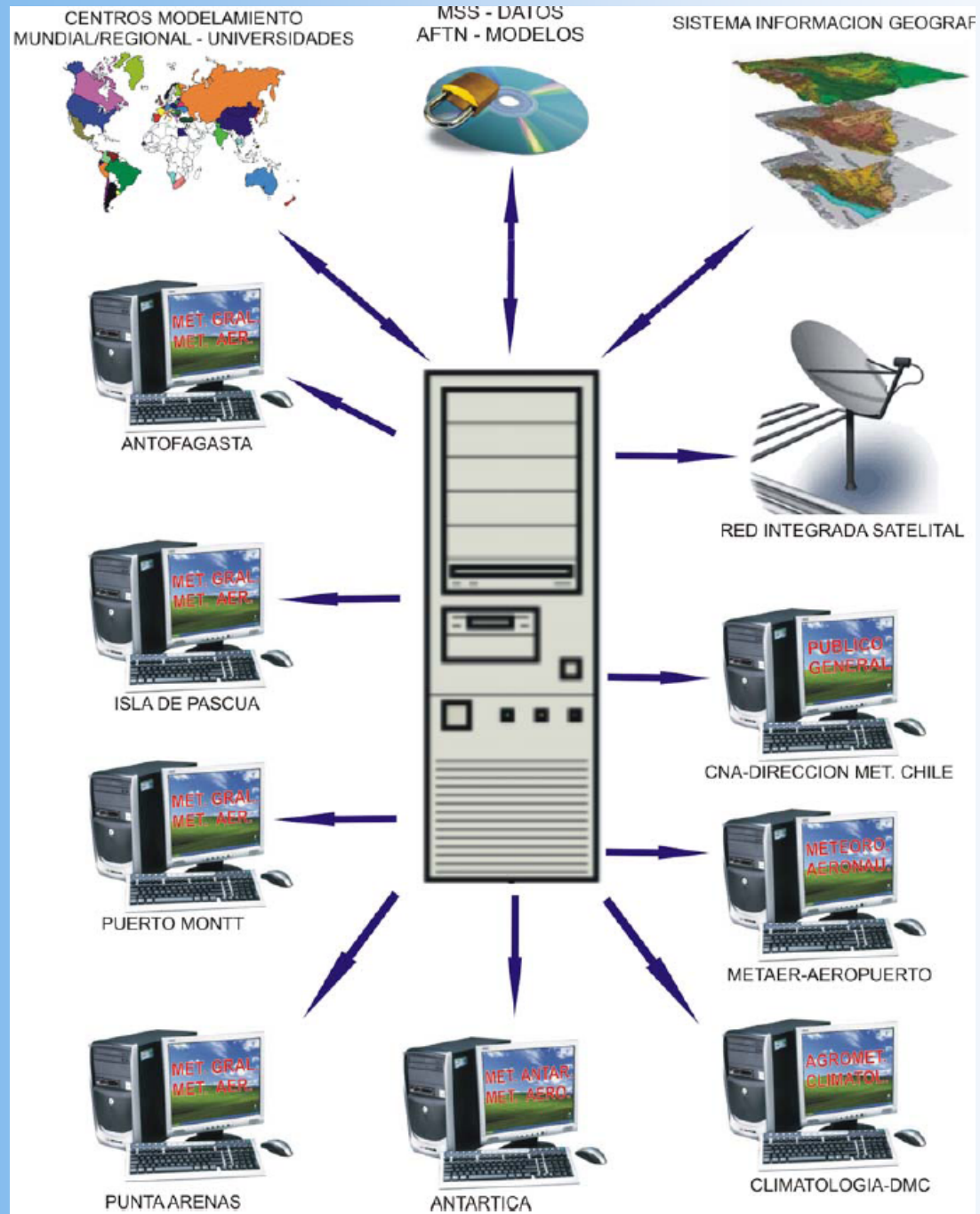
## Project objective

To build the computational infrastructure for running regional models

- Operational weather forecast (MM5 and WFR) and air quality-chemical forecast (polyphemus)
- Seasonal climate prediction (CMM5) as well as future climate prediction (PRECIS).

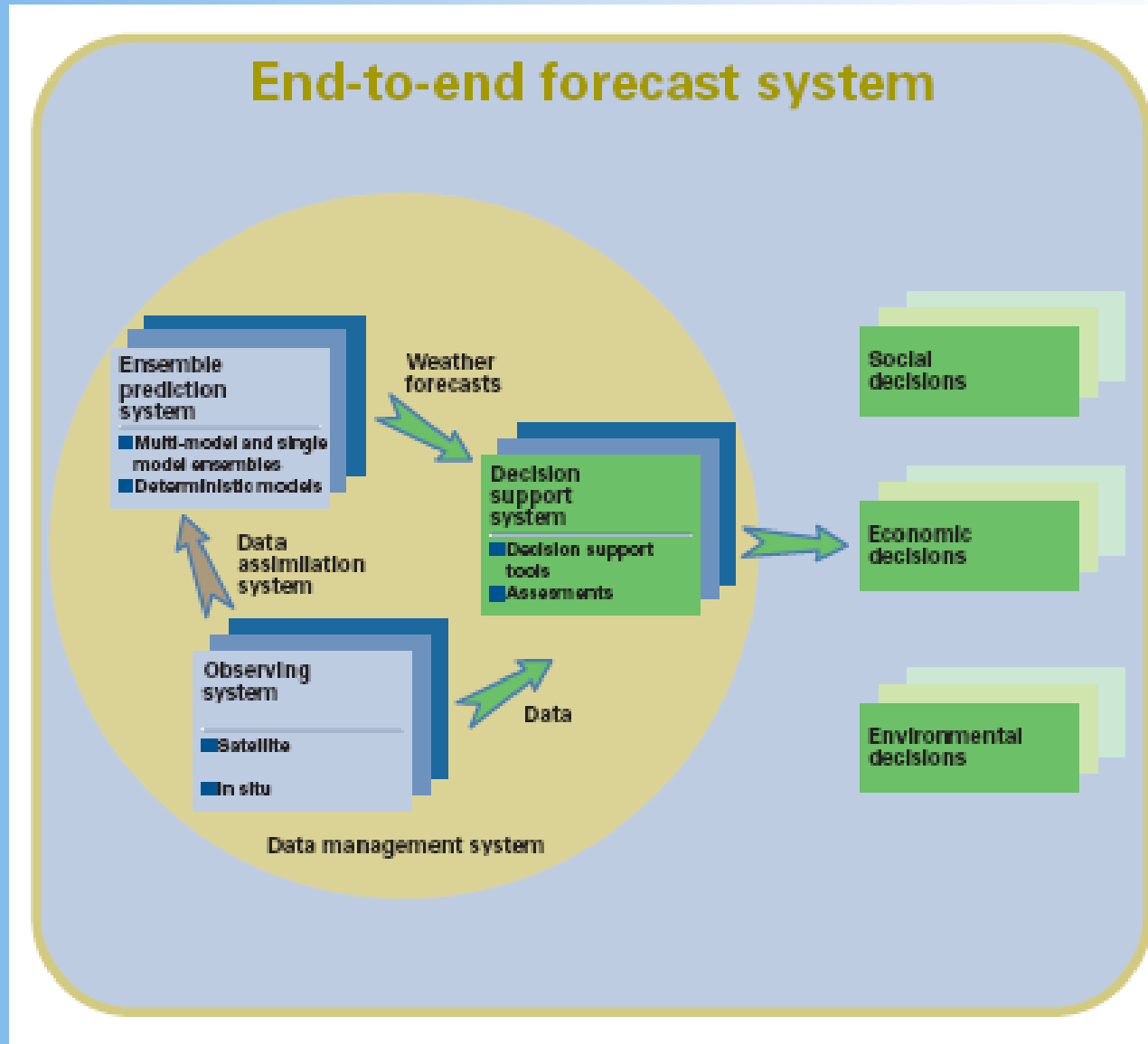
The aim is to develop a main central capacity building, integrated and improved use of computer consuming time.

This implementation will be base on cluster of at least 10 nodes, modern PCs, server and software, as well as, training on modeling and related issues.





With this implementation, we want to follow the THORPEX scheme, in the sense of:





## Conclusion

The Chilean Weather Service has been developing the capacities for running numerical models on operational way using the MM5 and ETA models, and the PRECIS model for climate change studies.

Today, we are in the process of implementing the climate version of the MM5 for running seasonal climate prediction.

All the different models have been developed in relation to individual projects, so, there is not integration among them neither share computational infrastructure.

With the project, we hope to improve our capacity building on both, computational infrastructure and trained personal.



# Gracias