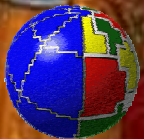


A Global Challenge

Antonio Navarra
INGV

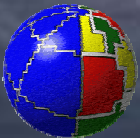
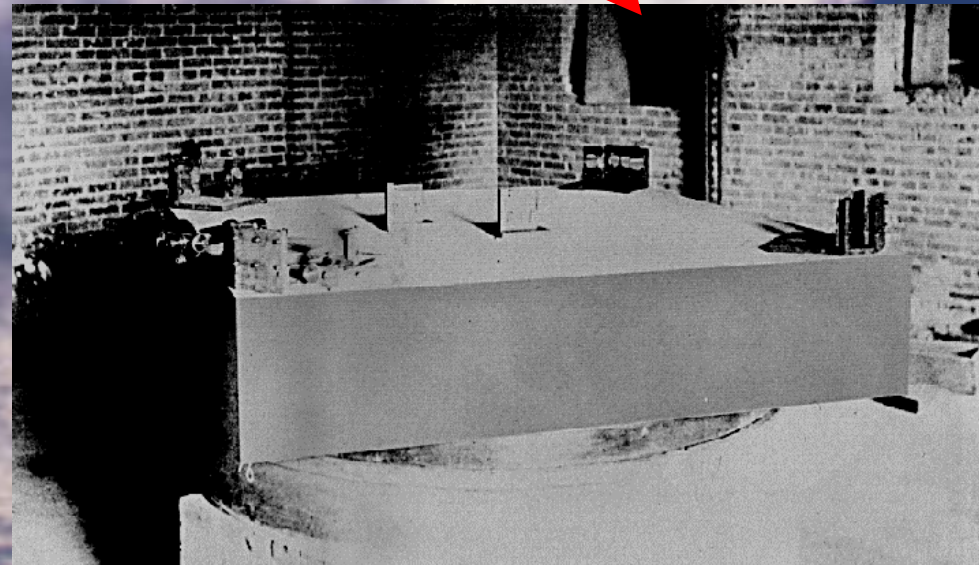
*Centro EuroMediterraneo
per i cambiamenti climatici*



A scientific consideration of climate (I)

Crucial experiments like the famous experiment of Michelson e Morley are not possible in climate science

How is it possible a scientific investigation of climate ?



A scientific consideration of climate (II)

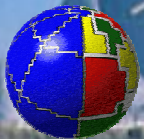
We can make experiments if we represent the climate system via a set of mathematical relations: the equation of climate.

The equations of climate are very difficult, but they can be solved by numerical methods.

We can then treat very complex mathematical equations, paying the price of an enormous number of elementary operations.



The next generation of numerical models will be like new, more powerful, telescopes or particle accelerators and they will allow us to look further into the working of the Earth climate more accurately, extensively and reliably.



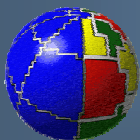


Euro Mediterranean

Center

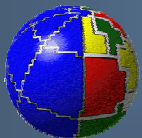
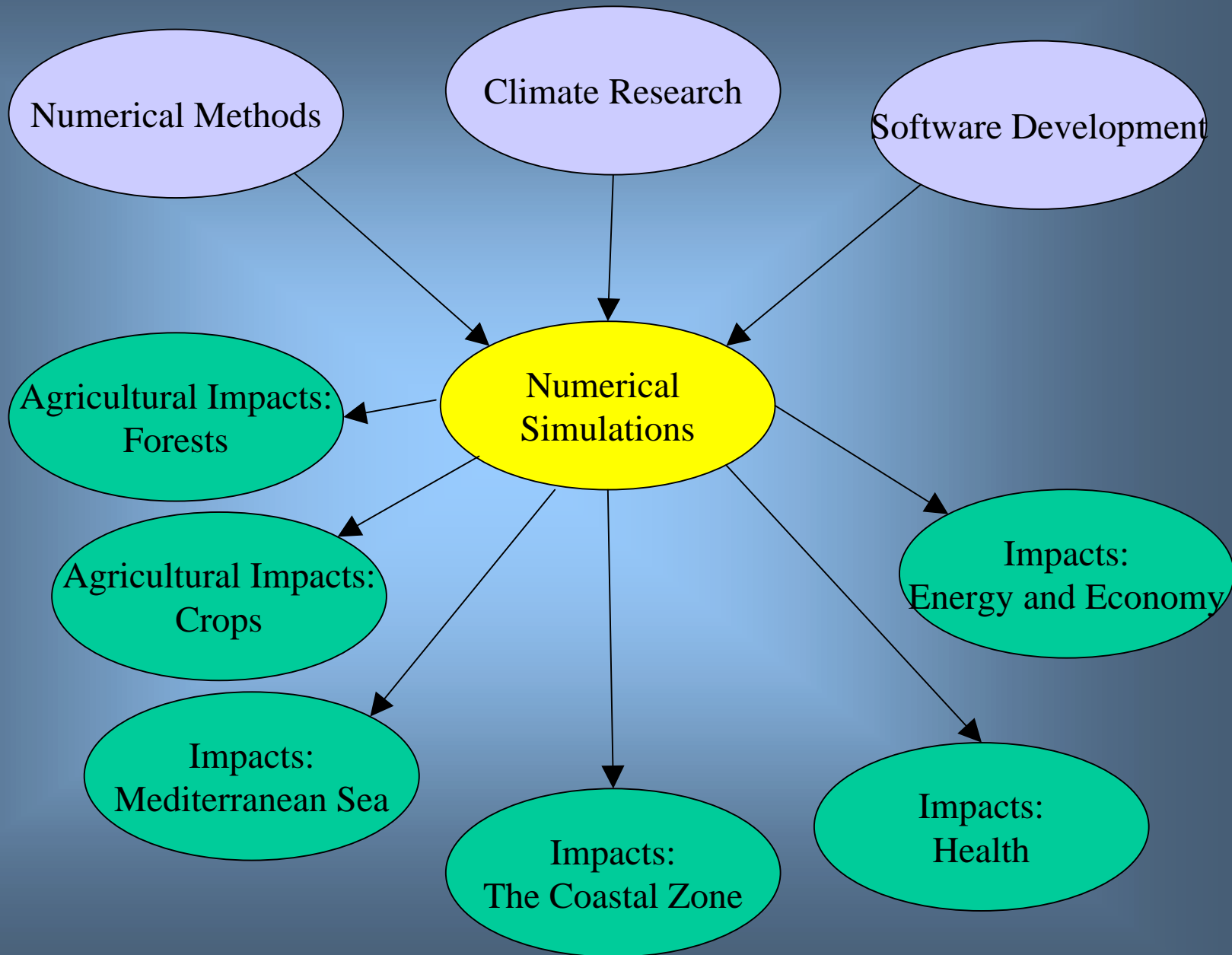
for Climate Change

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The Structure of the CMCC



CMCC Supercomputing Center

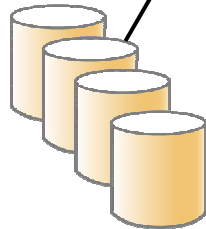
NEC Vector/Parallel
Supercomputer
SX-8R and SX-9
110 Proc. - 3 TBytes RAM
11,1TFlops



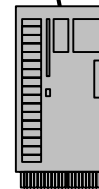
Scalar/Parallel Supercomputer
IBM SP6 ~ 1000 cores
3,2 TBytes RAM - 17,3 TFlops



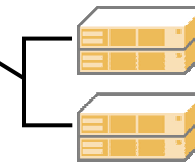
Storage Area Network
12 Gbit/s aggregated



Disk Storage
~ 350 TBytes



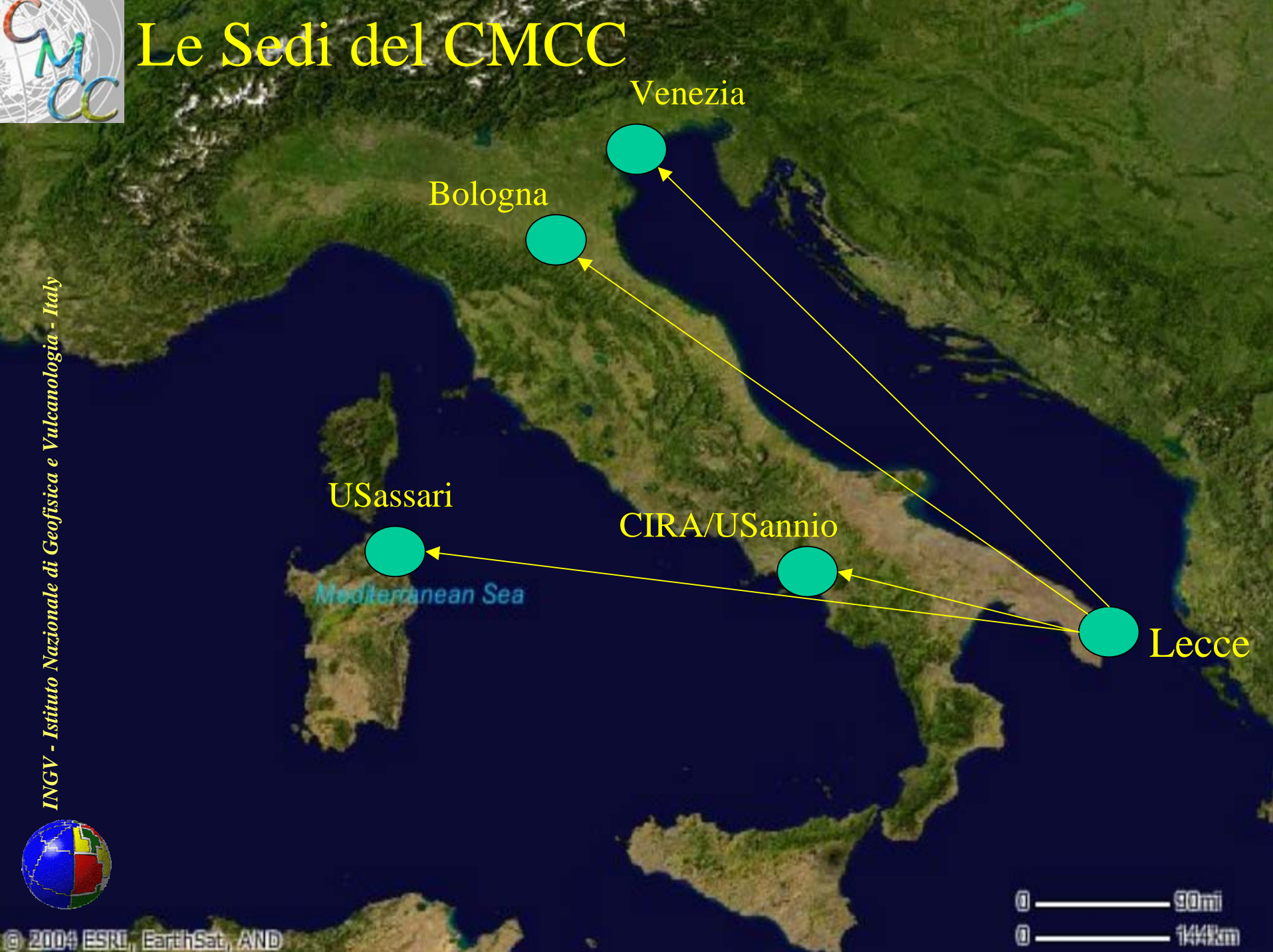
Tape Library
1800 Mbytes/sec
1 PBytes



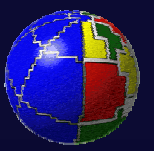
Archive/Backup
HA Cluster Server



Le Sedi del CMCC



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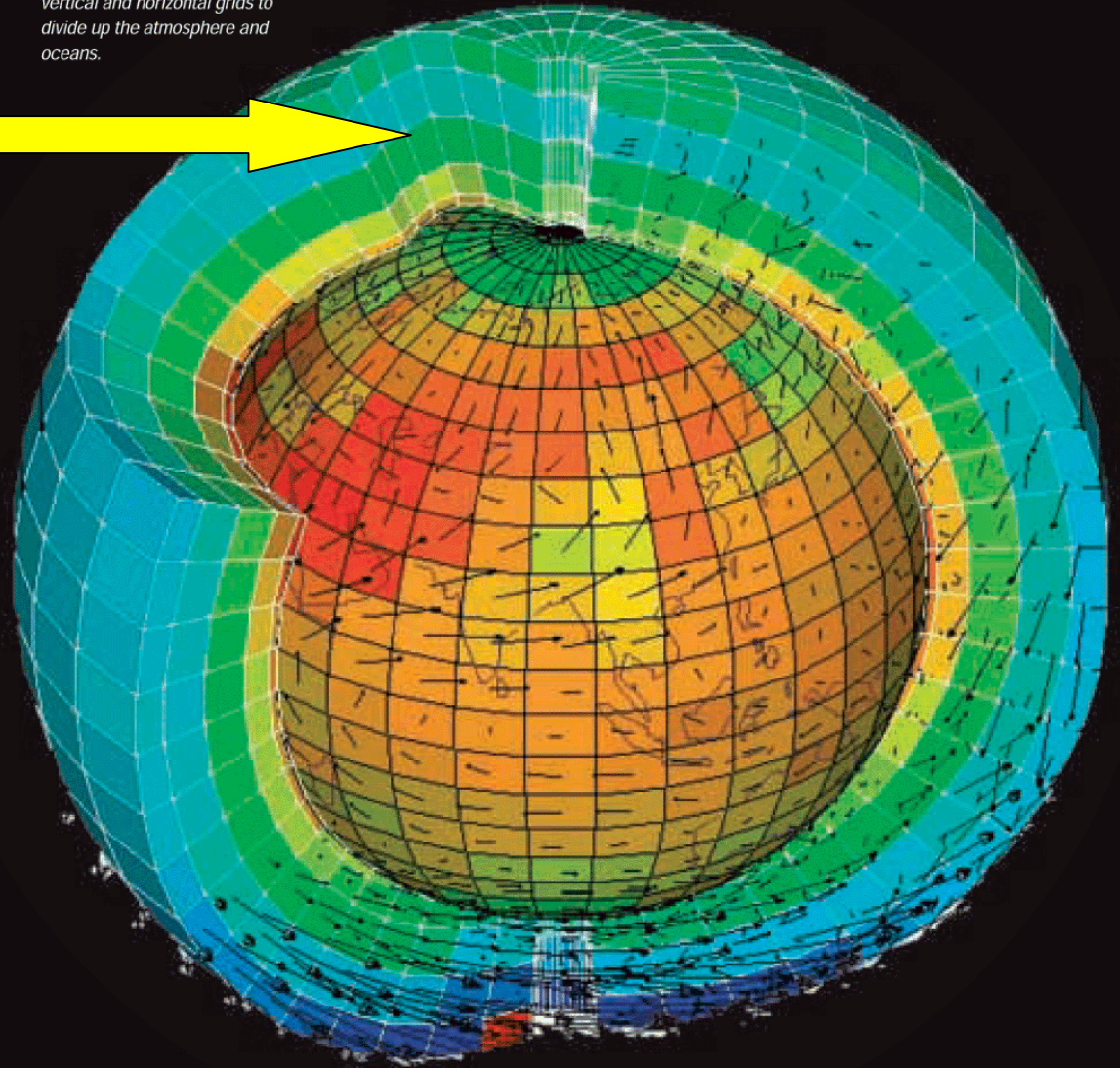


Grids for Earth

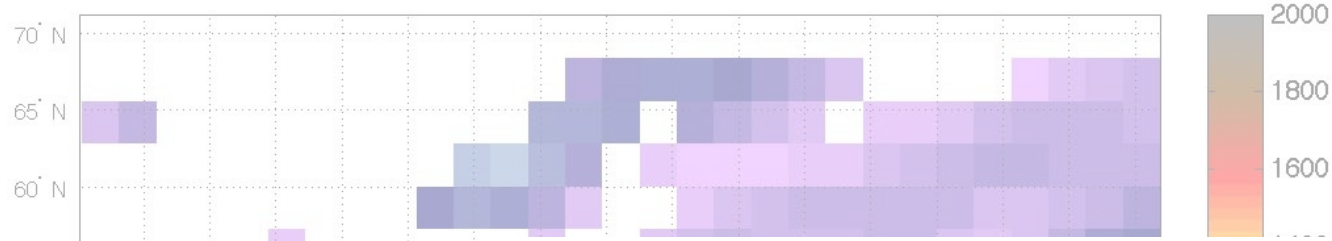
Sort of crowded
at the pole



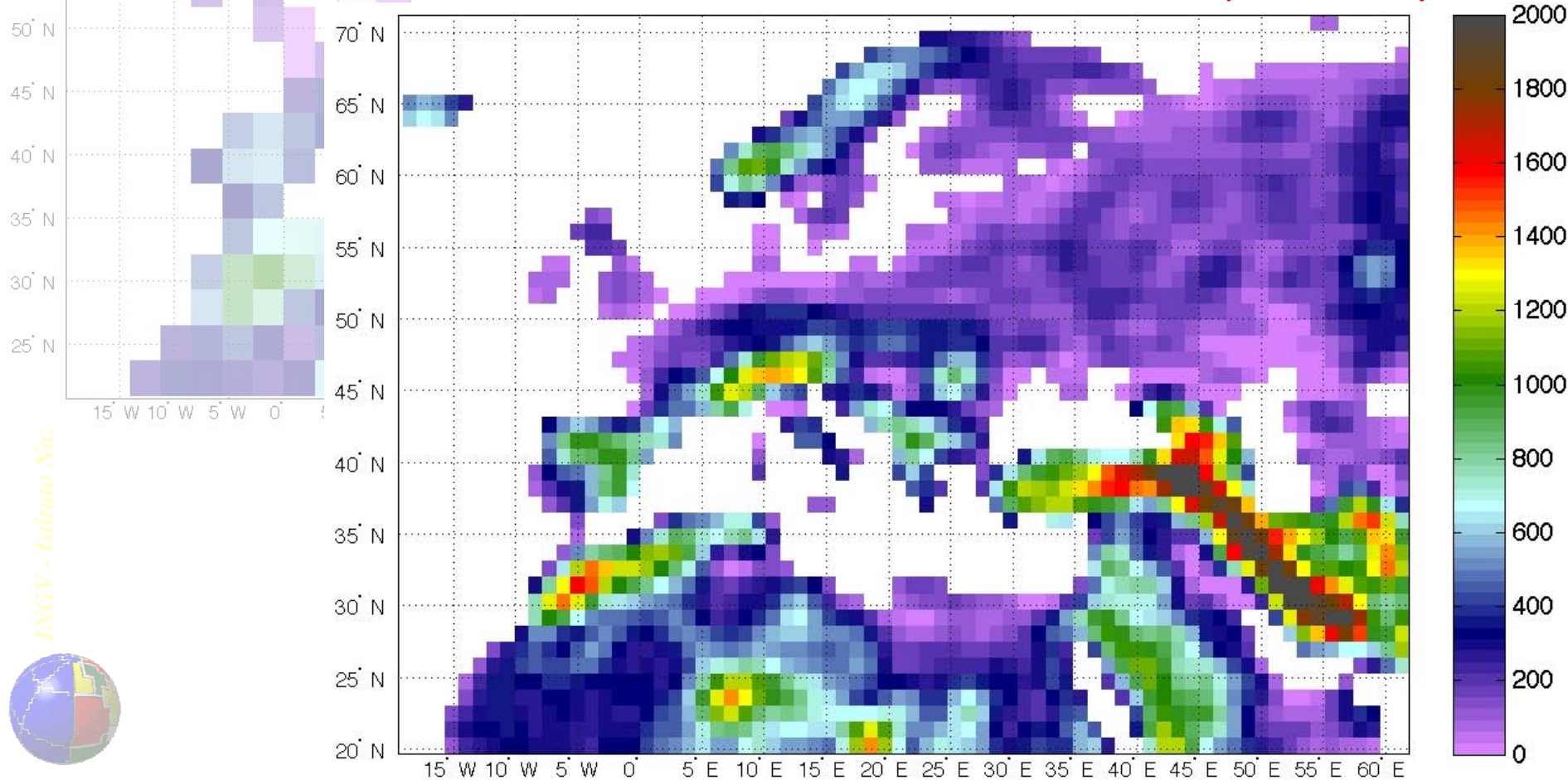
CGAM's climate models use vertical and horizontal grids to divide up the atmosphere and oceans.



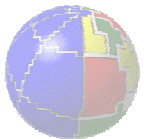
T42 IPCC standard resolution (~ 300Km)



T106 INGV-IPCC run resolution (~ 120Km)

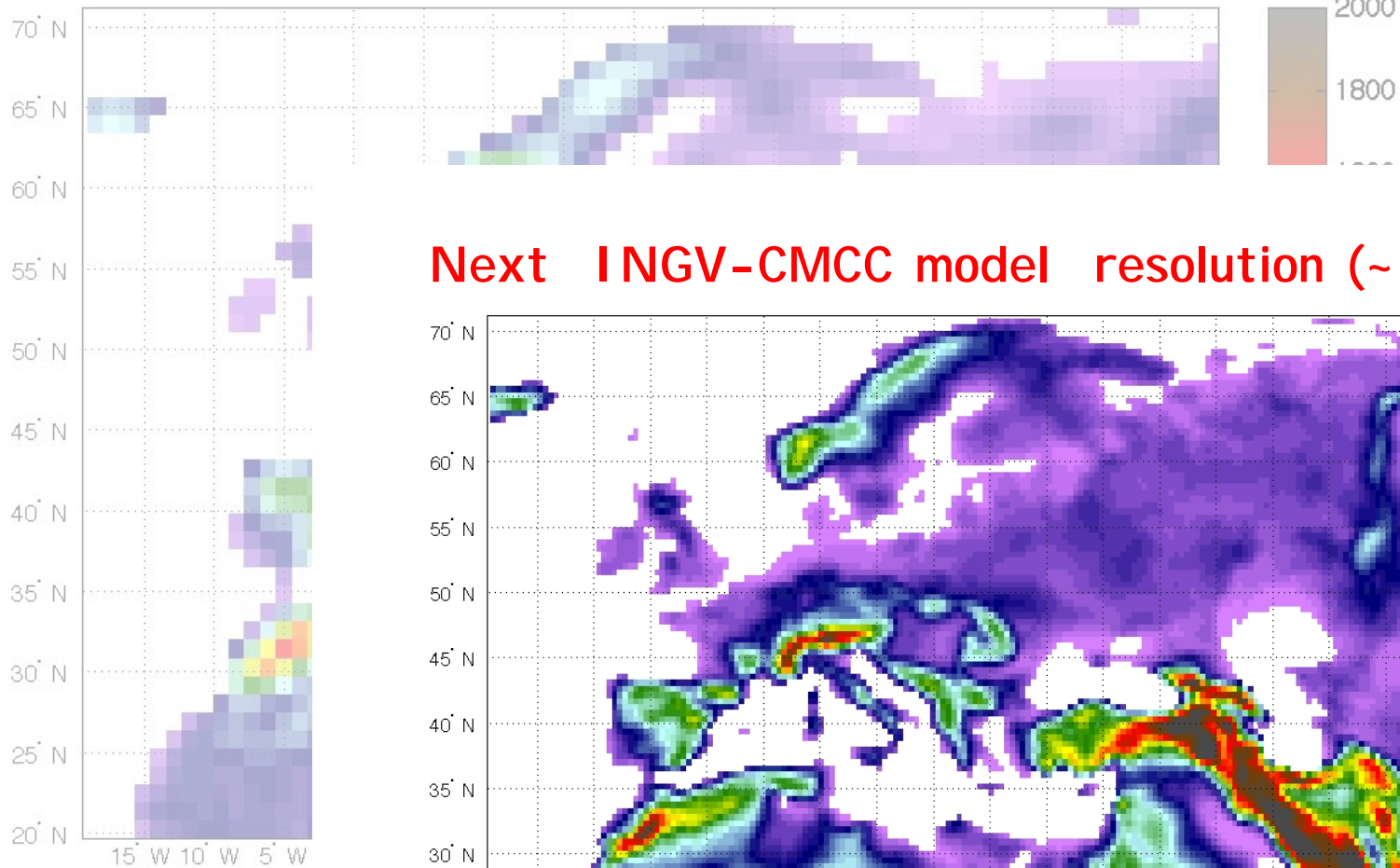


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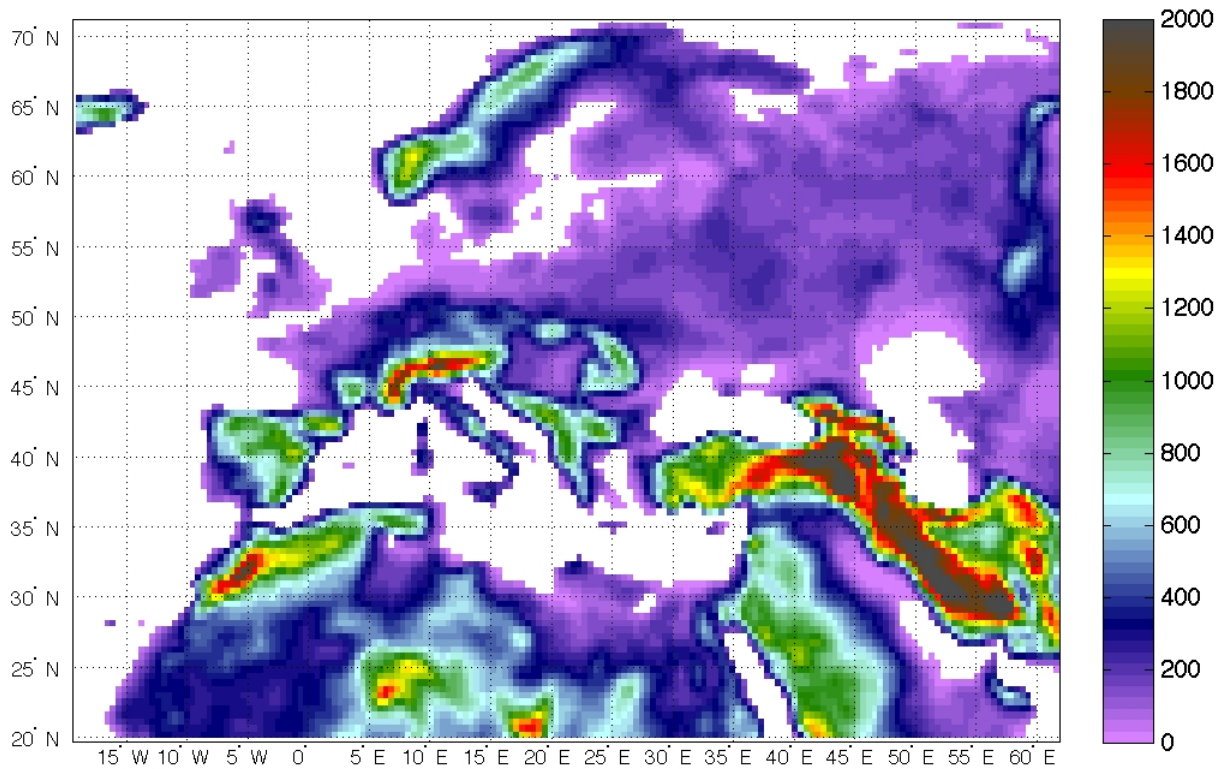




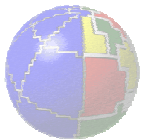
T106 INGV-IPCC run resolution (~ 120Km)



Next INGV-CMCC model resolution (~ 60Km)

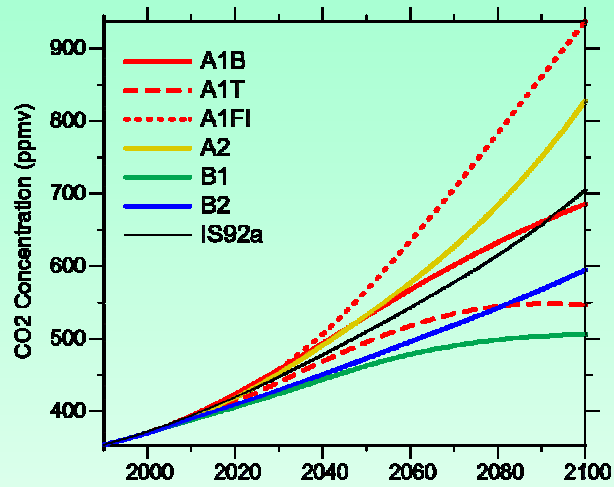


INGV - IRI

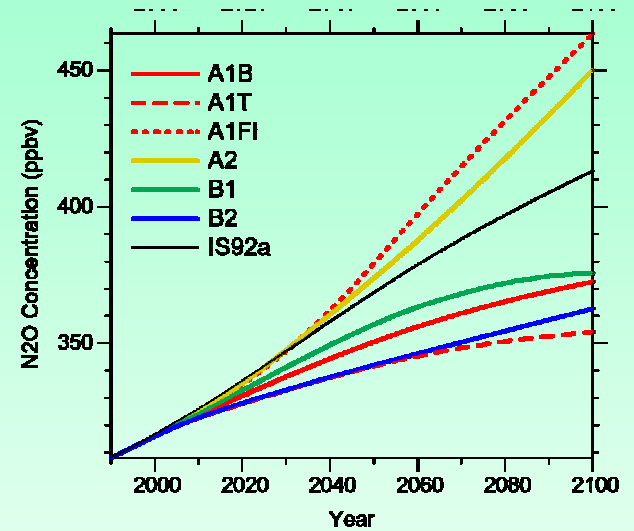


Scenarios

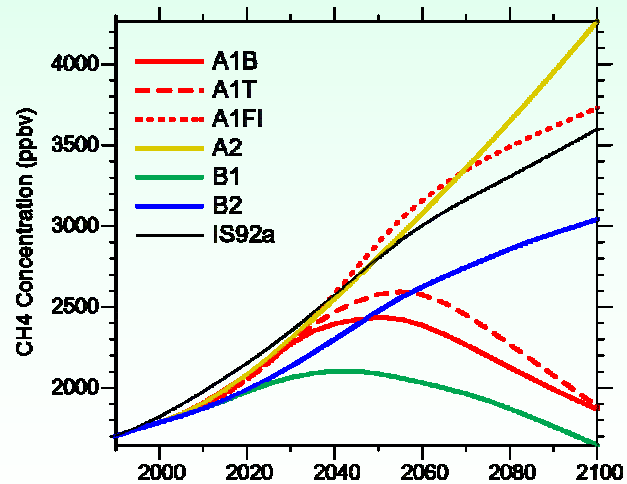
CO₂



N₂O

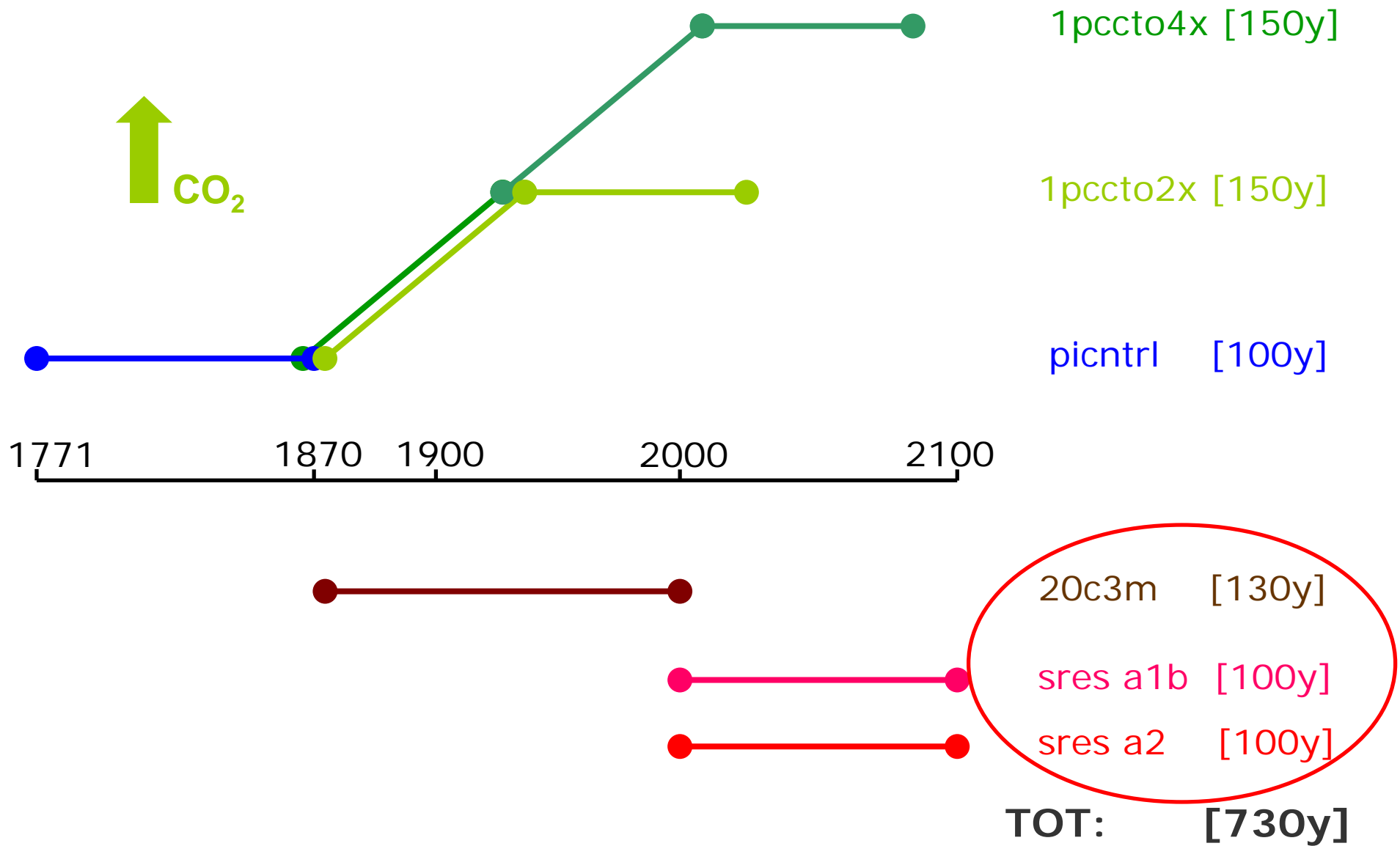


CH₄



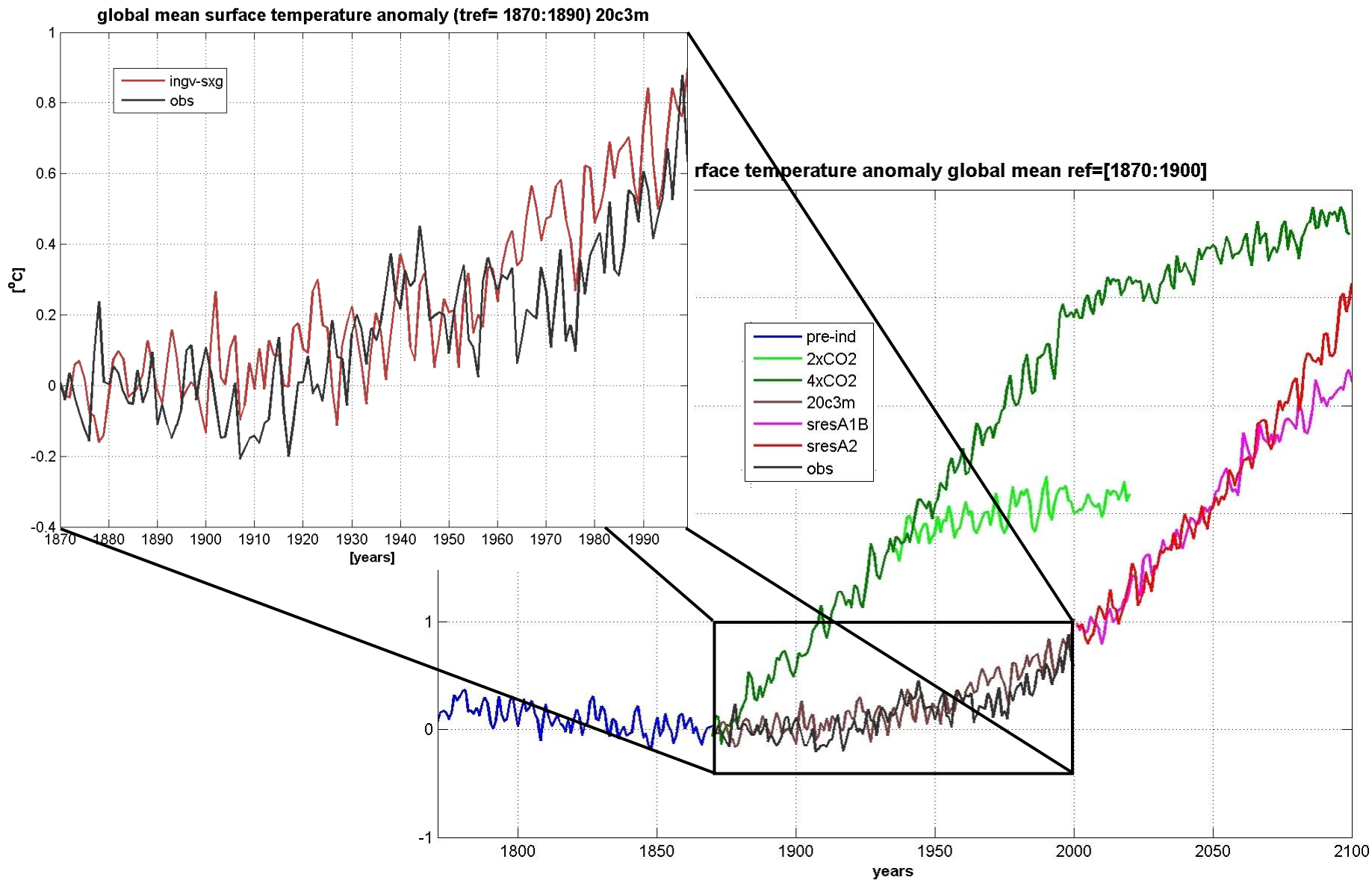
THE SCENARIO SIMULATIONS

INGV(CMCC) SXG IPCC Experiments:

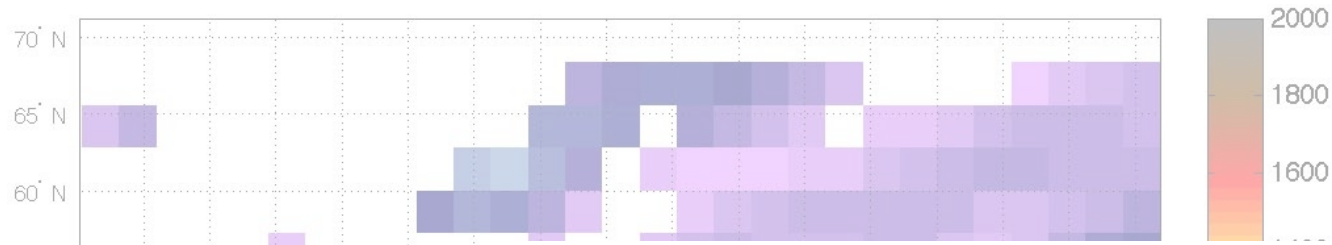


THE SCENARIO SIMULATIONS

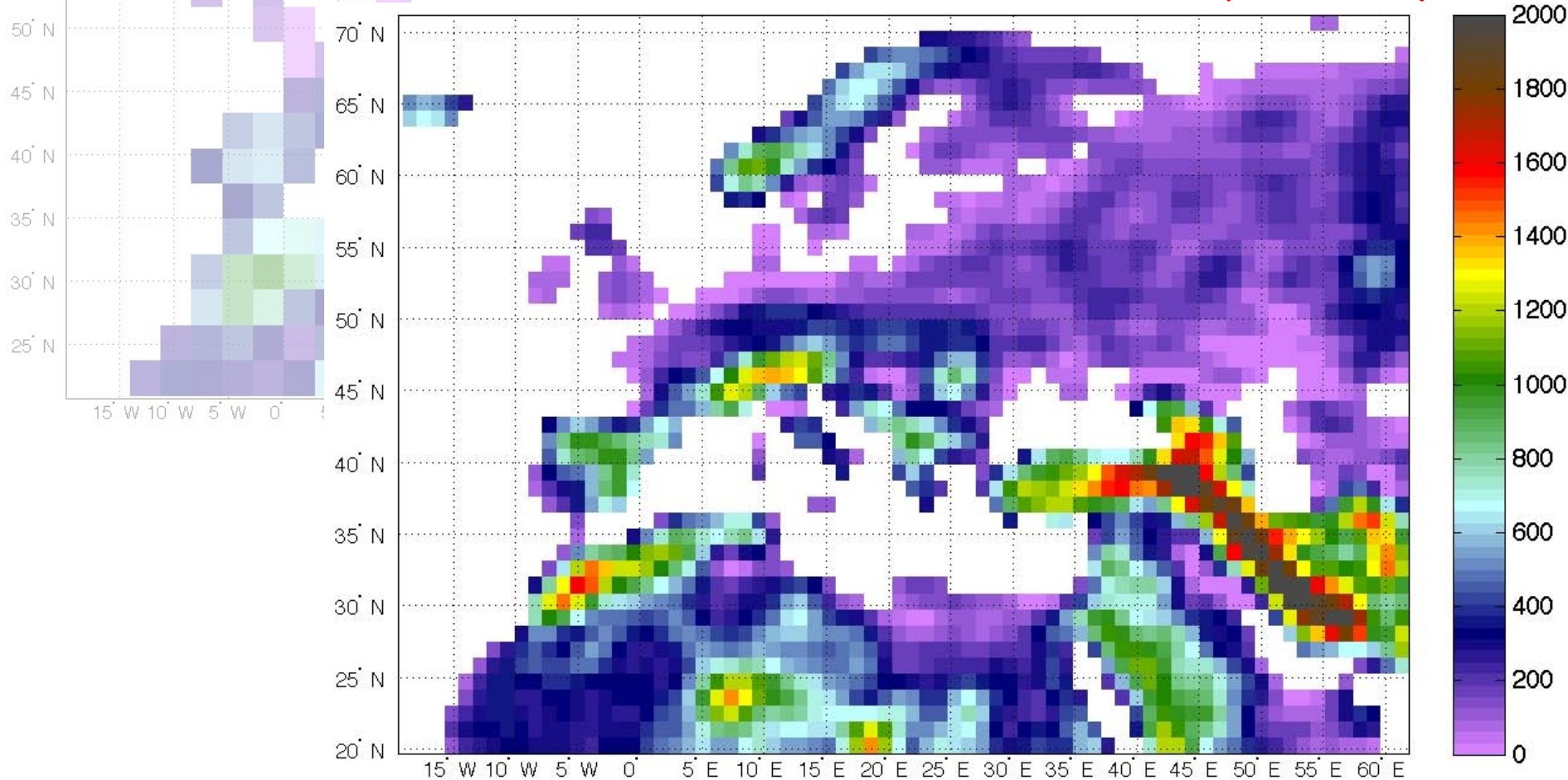
global mean surface temperature anomaly



T42 IPCC standard resolution (~ 300Km)

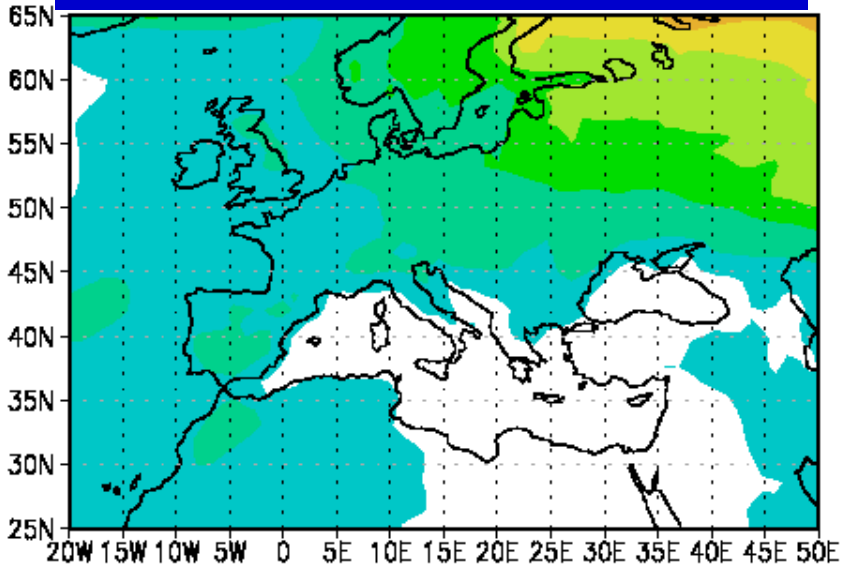


T106 INGV-IPCC run resolution (~ 120Km)

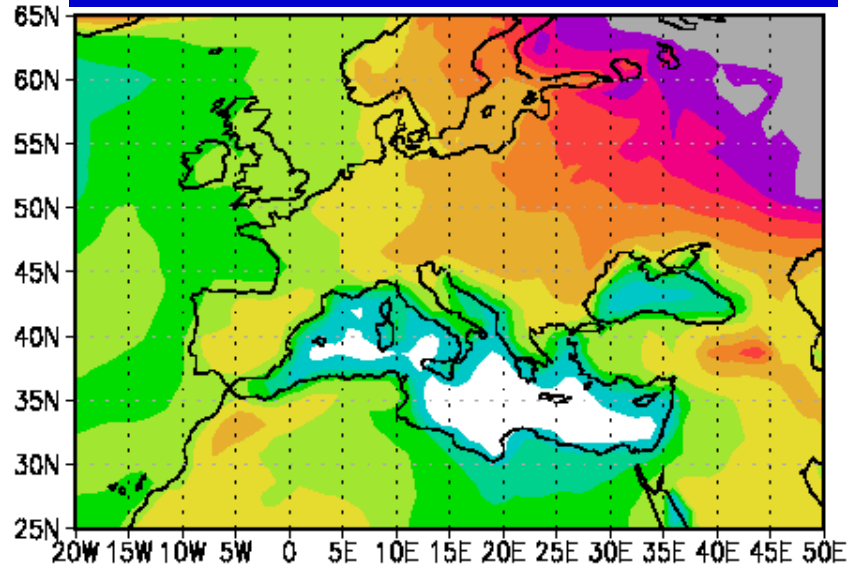


SCENARIO O: **A2 - 20C** 2m-Temperature

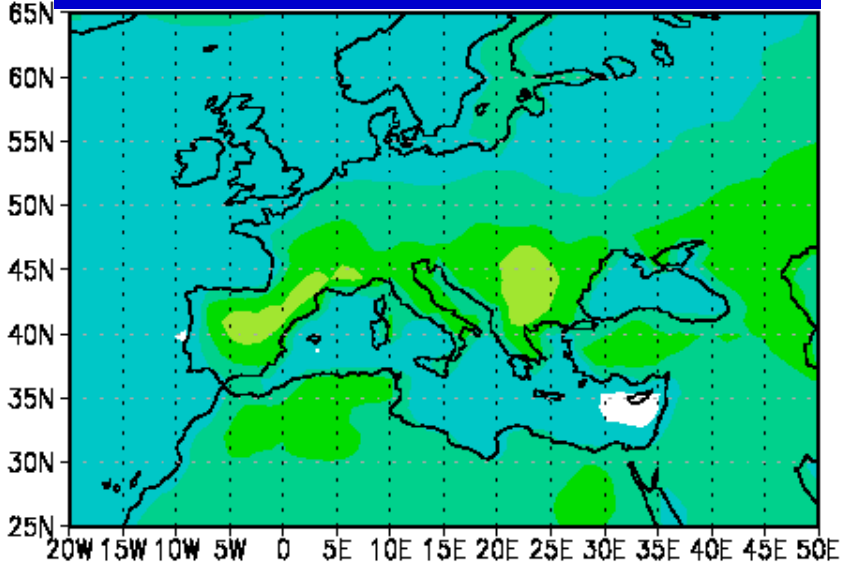
A2(2001-2050) - 20C(1951-2000) JFM



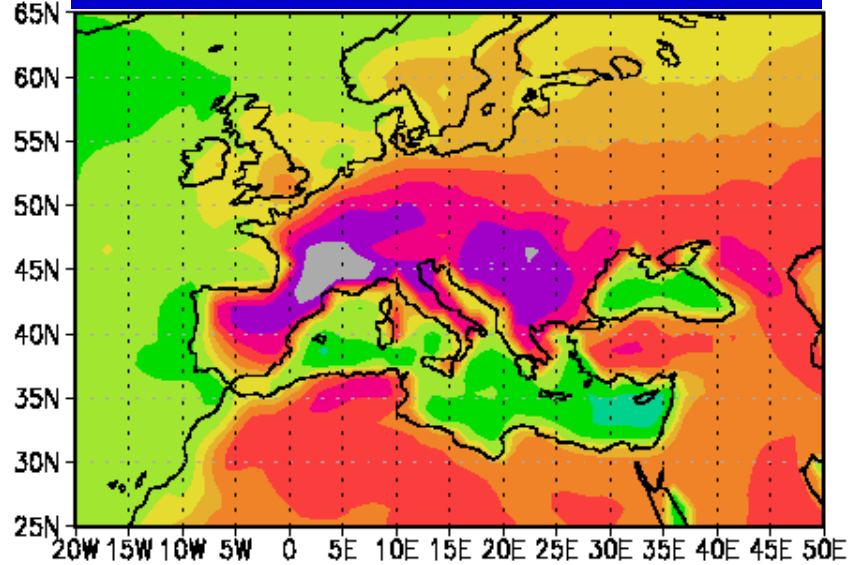
A2(2051-2100) - 20C(1951-2000) JFM



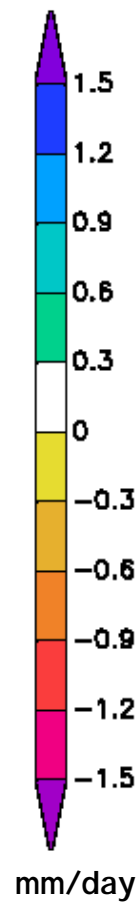
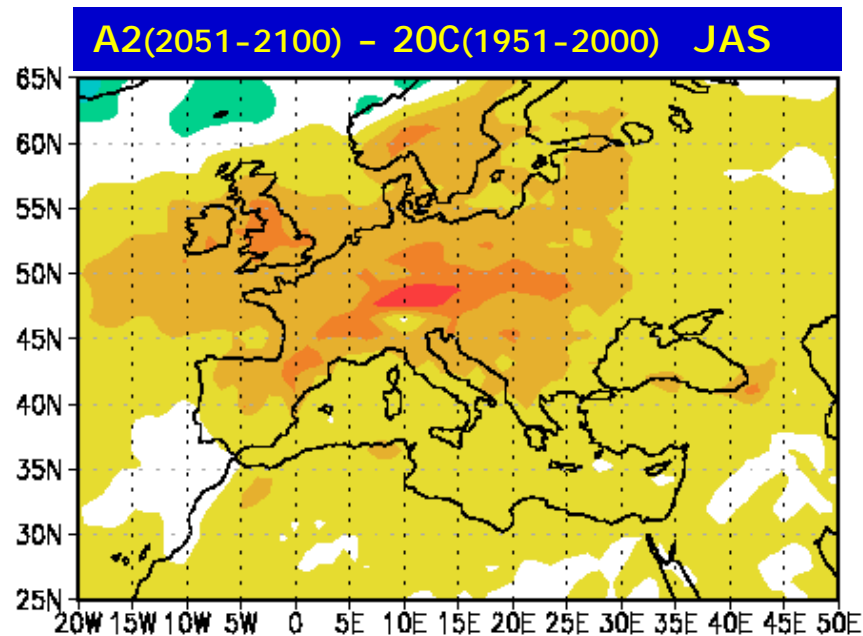
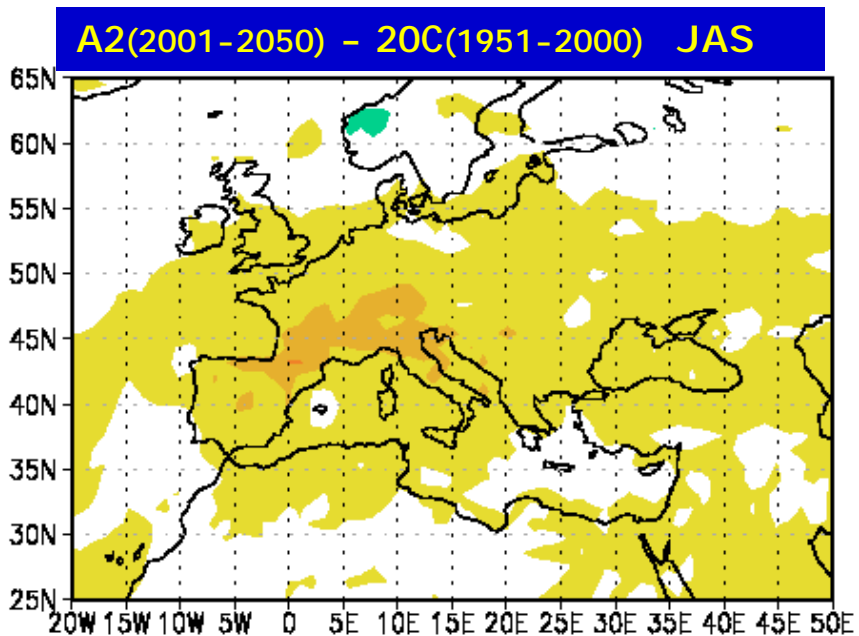
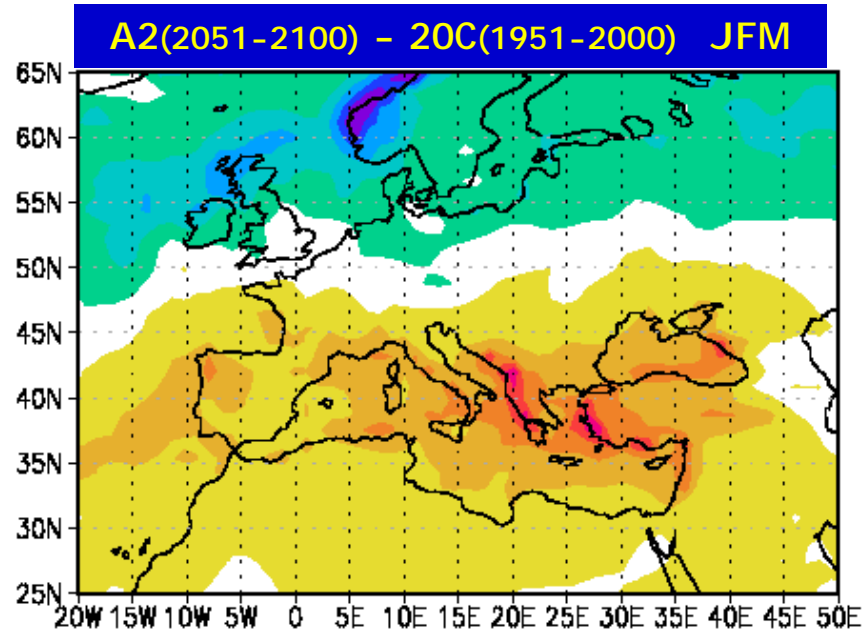
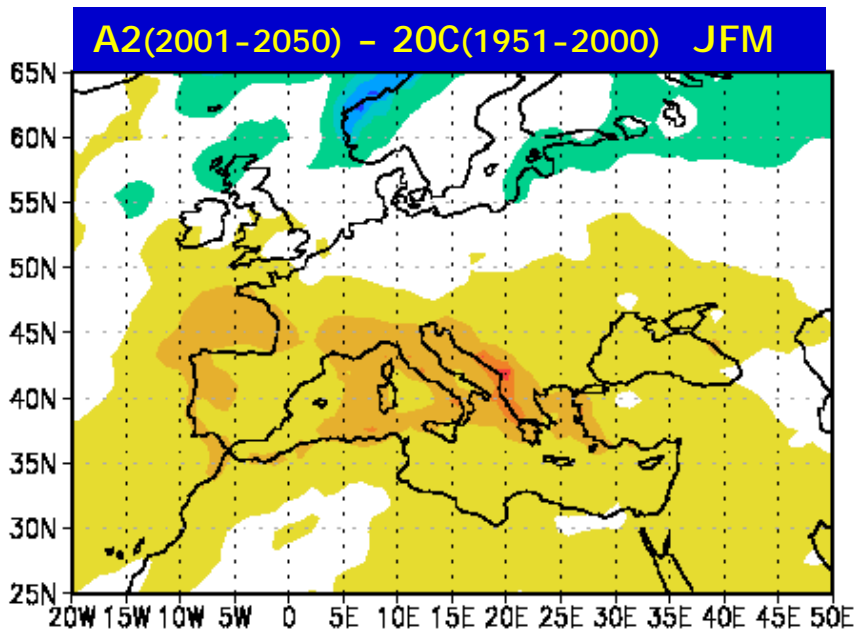
A2(2001-2050) - 20C(1951-2000) JAS



A2(2051-2100) - 20C(1951-2000) JAS



SCENARIO: A2 - 20C precipitation



Mitig
Both
Both



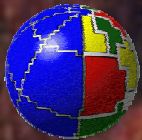
Dutch cows, after adaptation

CIRCE

*Climate Change and Impact ResearCh:
the Mediterranean Environment*

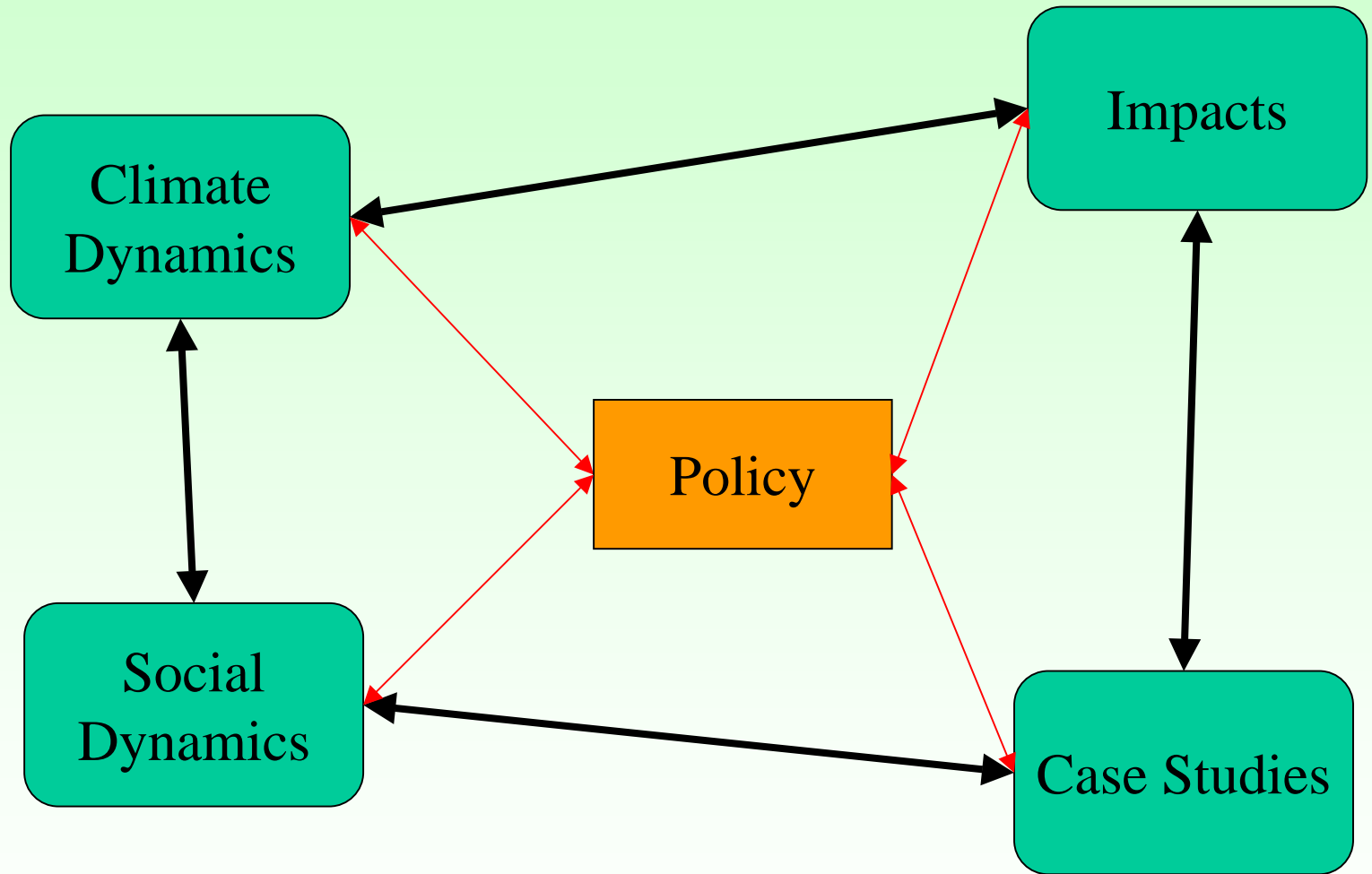
An FP6 Project of the European Union

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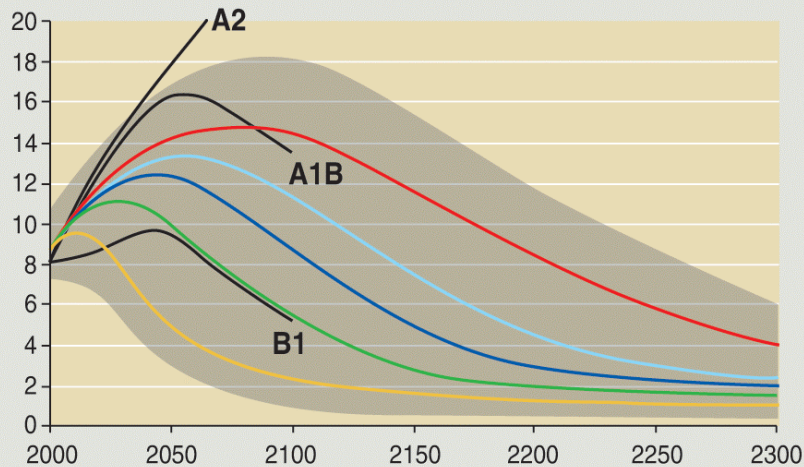
Chair: Antonio Navarra and Laurence Tubiana

La Strategia di CIRCE

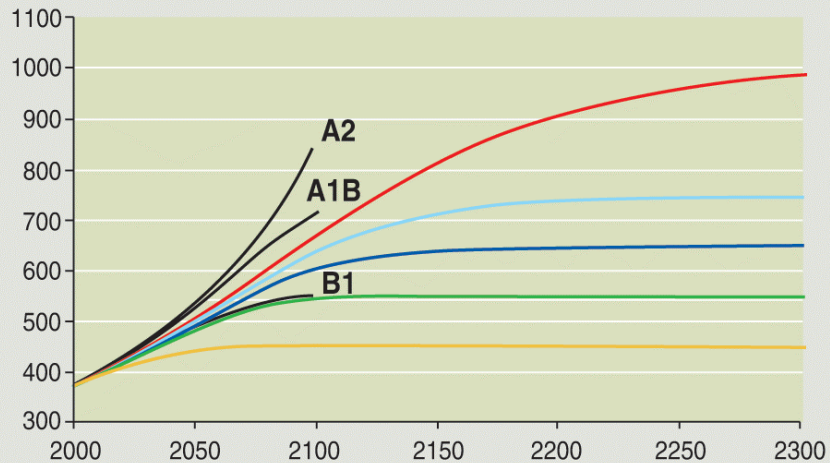


Emissions, concentrations, and temperature changes corresponding to different stabilization levels for CO₂ concentrations

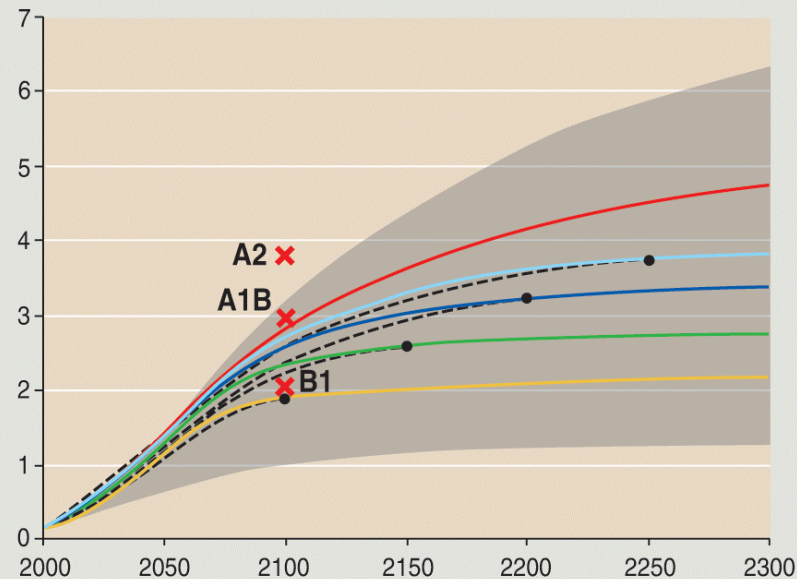
(a) CO₂ emissions (Gt C)



(b) CO₂ concentration (ppm)



(c) Global mean temperature change (°C)



WRE profiles

- WRE 1000
- WRE 750
- WRE 650
- WRE 550
- WRE 450

S profiles

- SRES scenarios
- SRES scenarios

General Social Survey USA

- 86% - Soddisfatti del proprio lavoro
- 76% - Soddisfatti del proprio reddito
- 62% - Si aspettano un miglioramento della propria posizione entro tre anni
- 65% - Complessivamente soddisfatto delle proprie vite.

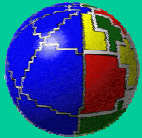
General Social Survey USA

- 25% - Non sono soddisfatti dello stato del paese
- 80% - Ritengono che il Congresso non combini nulla di utile
- 60% - Si aspettano che la prossima generazione sara' messa peggio

”Happiness Gap”

Gli americani (ma forse tipico di molte altre situazioni nei paesi avanzati) sono contenti delle loro vite, ma le sentono minacciate da fattori globali al di fuori del loro controllo (terrorismo, i cambiamenti climatici) e dubitano della capacità dei governi di saperli affrontare con saggezza.

C'e' un ***divario di felicità***
tra pubblico e privato



Costruire l'Alleanza

Elementi per un accordo Post-Kyoto

Efficace – Capace di realizzare significative riduzioni d'emissioni

Abilitante – Che permetta lo sviluppo dei paesi emergenti

Giusto – Riconosca le responsabilità delle economie mature

Condiviso – Che goda di un largo consenso sociale

