

Regional Climate downscaling, CORDEX

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A few spatial scales

AR4 mean grid size: 300 km

AR5 mean grid size: 150 km

50 km resolution: minimum to separate the regional climate-discriminating mountains

10 km resolution: minimum to resolve river basins

1 km resolution: extreme precipitation phenomena

Statistical methods

- **Provided you have long series of observation data**
- **Provided you are confident in the empirical Large-Scale Small-Scale relations**
- **Easy to implement, unexpensive to run**
- **Functional relations**
 - regression
 - neural networks
- **Non-functional relations**
 - weather regimes
 - analogs

Numerical methods

High resolution GCMs:

T719 - 20 km (Matsueda et al. 2009)

TL511- 40 km (Déqué 2010)

Other ...

Global modeling, but variable mesh

Limited area modelling

Stretched grids

Costly and Flexible approach

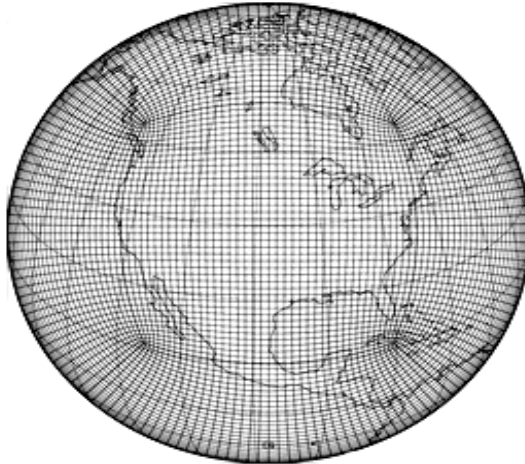
Standalone (no driving GCM)

Or GCM/Reanalysis driven (wide Davies zone)

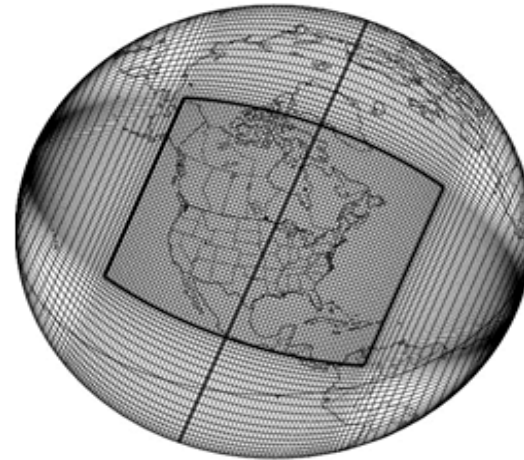
Two-way nesting possible

SGMIP Stretched Grids

C-CAM



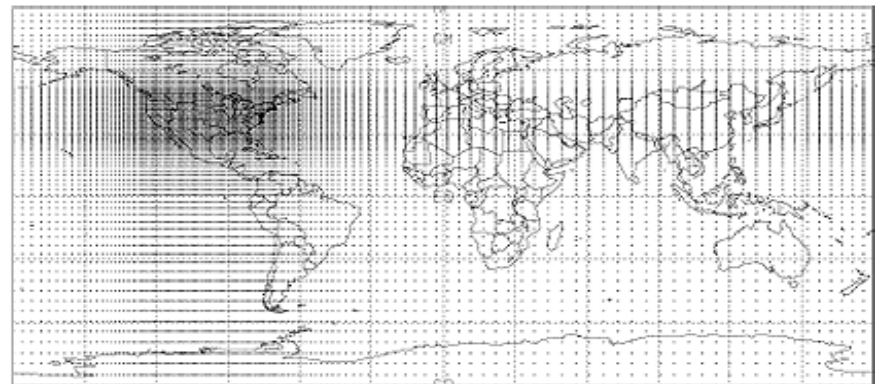
GEM



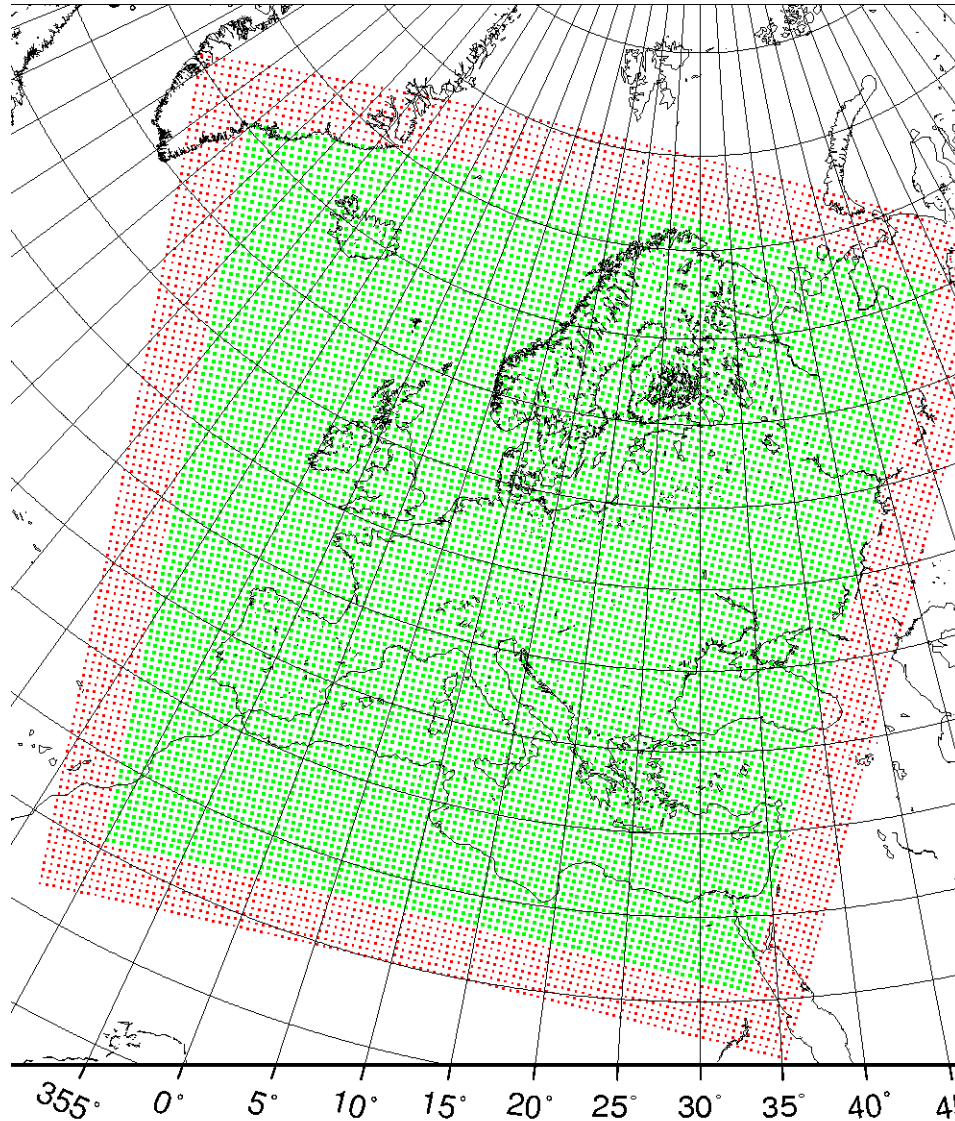
ARPEGE



GEOS

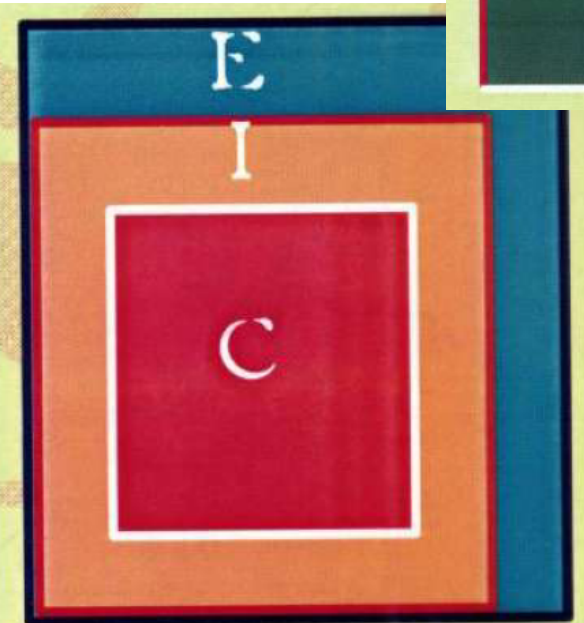
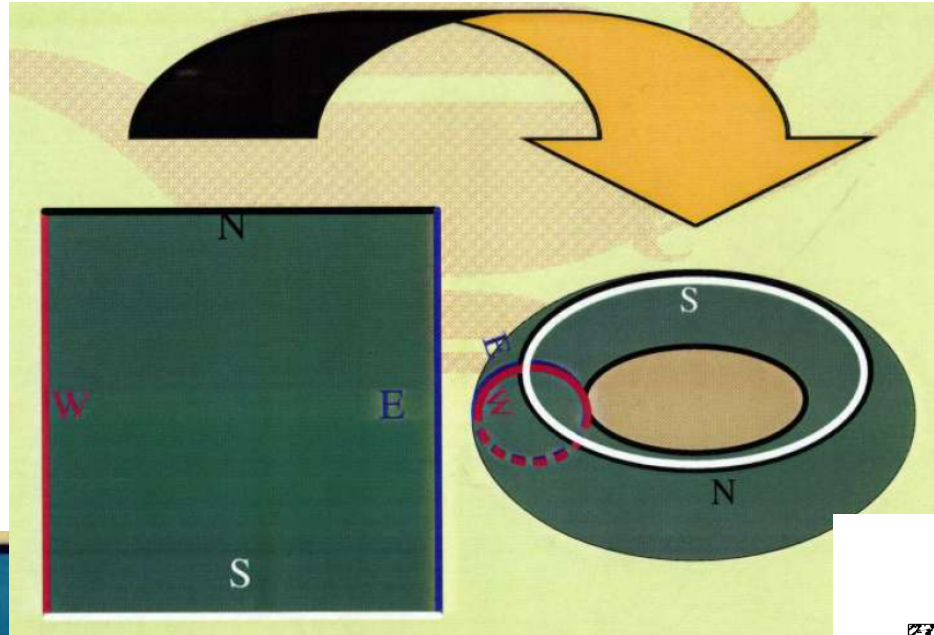


Limited area models

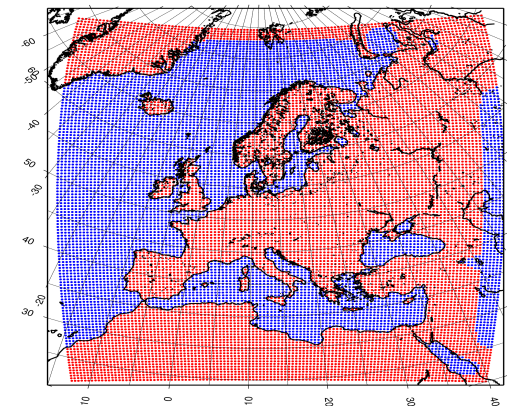


Buenos Aires, July 2010

ALADIN with a biperiodic grid allowing a spectral representation



Aladin-Climate
Land Sea Mask - Grid C+I+E



Applications of LAMs

EU-PRUDENCE (Scenarios for Europe)

NA-NARCCAP (Scenarios for North America)

WCRP-ICTS (Transferability)

EU-ENSEMBLES (Scenarios for Europe)

EU-CECILIA and CLAVIER (focus on Central and eastern Europe)

CLARIS (South America)

CORDEX

COordinated **R**egional climate **D**ownscaling **E**xperiment

WCRP coordination program

extension of CMIP (AR5 and AR6)

Statistical and Numerical methods welcome

Common database

CORDEX practical

Two experiments:

ERA int downscaling (1989-2008)

1950-2100 CMIP5 (RCP4.5 and 8.5) downscaled

50 km resolution

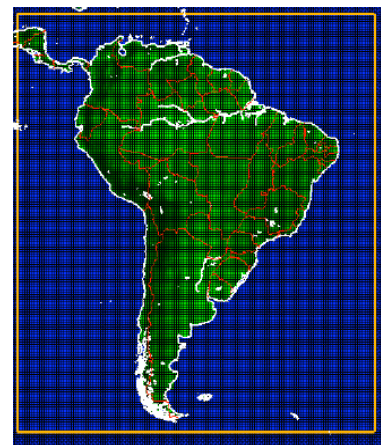
12 common domains

CORDEX domains

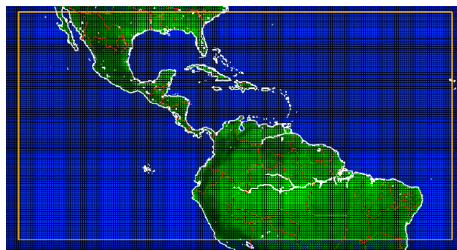
Africa (priority for AR5)



South America

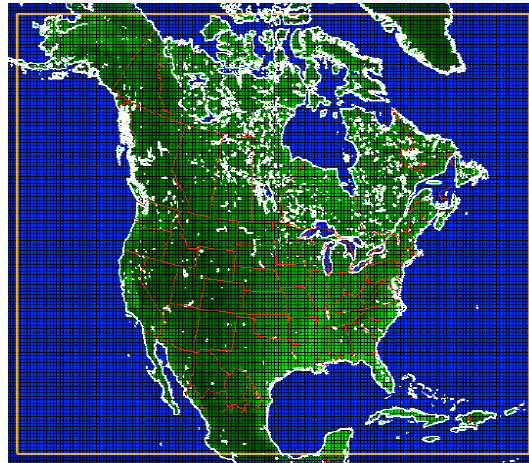


Central America

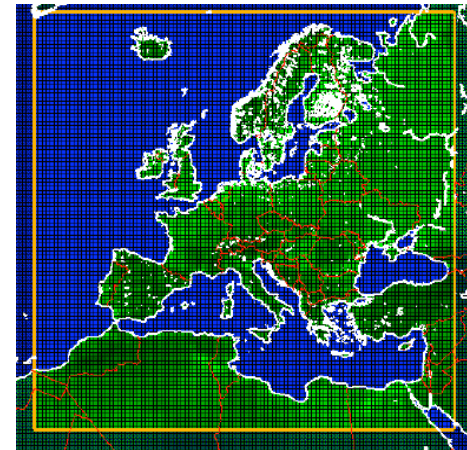


CORDEX domains

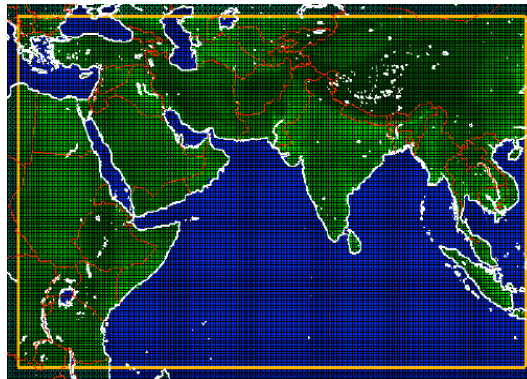
North America



Europe

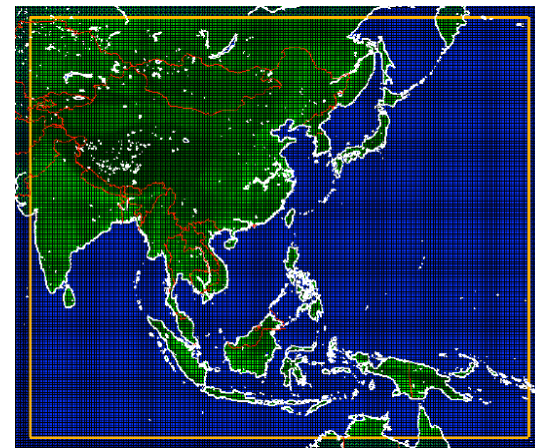


West Asia

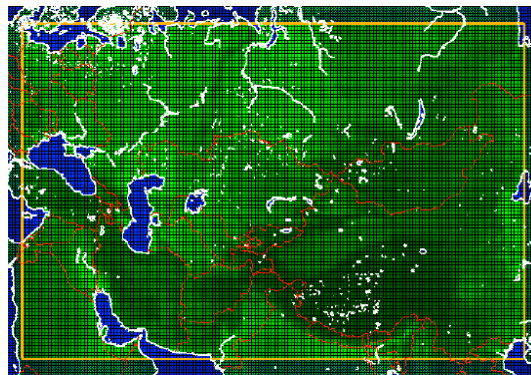


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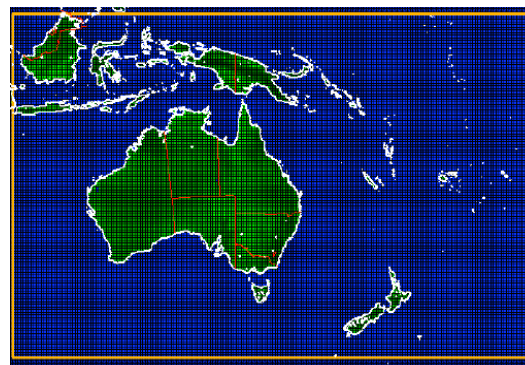
East Asia



Central Asia

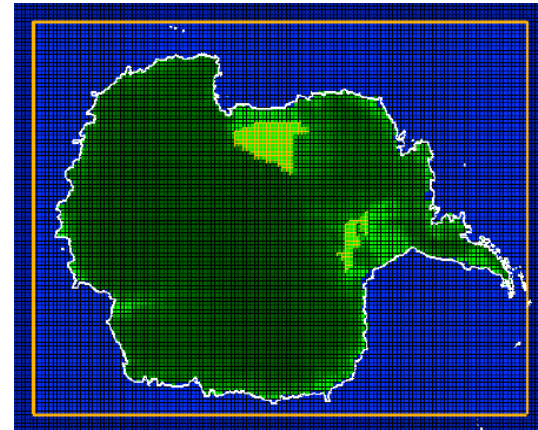


Australia

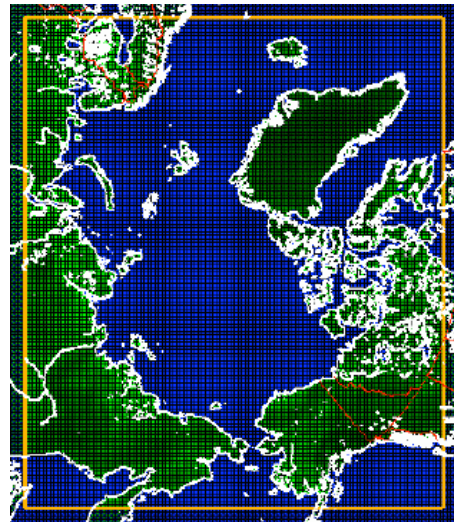


CORDEX domains

Antarctica



Arctic



Mediterranean

