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Abstract ID:2O4

CURRENT STATE AND FUTURE DEVELOPMENTS OF DATA MANAGEMENT SYSTEM FOR CLIMATE RESEARCH AND TAILORED INFORMATION SERVICES PURPOSES IN SEE-VCCC /RHMS

Amounts and diversity of data sets used by institutions involved in climate research, early warning and response systems for climate-related hazards and by institutions, which are end users of different climate information for the implementation of policies for vulnerability reduction and adaptation to climate variability and change, require continuous development and improvements of climate data management systems.

In accordance with its functions within WMO RA VI RCC Network ("RA VI Pilot RCC Node on Climate Data: Services and Providers"), the South East European Virtual Climate Change Center (SEE-VCCC) hosted by Republic Hydrometeorological Service of Serbia (RHMS), has started the construction of data management system.

At the present time, SEE-VCCC have gridded model datasets of dynamical downscaled, high resolution (25km), climate change experiments for South East Europe (SEE), performed by coupled regional climate model EBU-POM developed in SEEVCCC. Three time slices are covered by these integrations. One time slice covers base line integration 1961-1990, and two others are experiments of future climate for two different SRES/IPCC scenarios, A1B and A2. Period 2001-2030 is covered by A1B and 2071-2100 is covered by both, A1B and A2 scenarios.

With the aim of performing its functions pursuant to the implementation of South East European Climate Change Framework Action Plan for Adaptation for 2009-2015, developed in accordance with the UNFCCC Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change, the SEE-VCCC starts preparation to perform the comparison of EBU-POM model datasets with the results of the experiments carried out by RHMS using other climate models and methods of statistical downscaling.

SEE-VCCC based its future development in the field of climate data services on the partnership with National Meteorological and Hydrological Services from SEE region, particularly regarding the gridded model datasets and digitalization of historic climate related data. With reference to that, future SEE-VCCC database will contain subregional gridded climate, meteorological, hydrological data/products as well as model data, such as results from regional, high resolution, downscaling of different reanalysis, climate change experiments, seasonal forecasts atc, and will support EUROGRID Program development and implementation. Computer/comunication infrastructure of RHMS placed at disposal of the Center will be the core of future SEE-VCCC system for data storage and data access.

CURRENT STATE AND FUTURE DEVELOPMENTS OF DATA MANAGEMENT SYSTEM FOR CLIMATE RESEARCH AND TAILORED INFORMATION SERVICES PURPOSES IN SEE-VCCC /RHMS

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Copenhagen, November 2009

Profile of the Republic Hydrometeorological Service of Serbia (RHMSS) as the Host of the South East European Virtual Climate Change Centre (SEEVCCC)

www.hidmet.gov.rs
www.meteoalarm.rs

• RHMSS is the National Meteorological and Hydrological Service and as the independent governmental organization, RHMSS is the official representative of Serbia with the WMO, IPCC, ECMWF, EUMETSAT, EUMETNET, EMEP Program, and participate in the implementation of numerous other international conventions (UNFCCC, UNCCD, UNBD...),

• RHMSS is responsible for operational activities and research in the fields of meteorology, climatology, hydrology and air and water quality monitoring, and its basic functions are the following: development and maintaining early warning system to support safety of life and property in case of natural meteorological, hydrological and climate-related hazards and industrial accidents; coordination of the development and implementation of national multidisciplinary programmes on climate change impacts, vulnerability and adaptation; provision of special meteorological, climate and hydrological services over the country for governmental institutions, public and various economic sectors; database management and monitoring,

• **RHMSS** as a government authority **hosting the SEEVCCC** , contributes in-kind to the Centre with its communication, computational and technical infrastructure resources, including offices with the necessary office equipment.

RHMSS Data management and observing system
-non-real-time data from national observing networks-

Meteorological observation system

• 28 synoptic/principal climat./agrom.stations (all included in international data exchange);
• 90 ordinary climatological stations;
• 650 precipitation stations;
• 52 phenological stations;
• 1 upper-air station;
• 28 AWS;
• 13 meteorological radar centres;
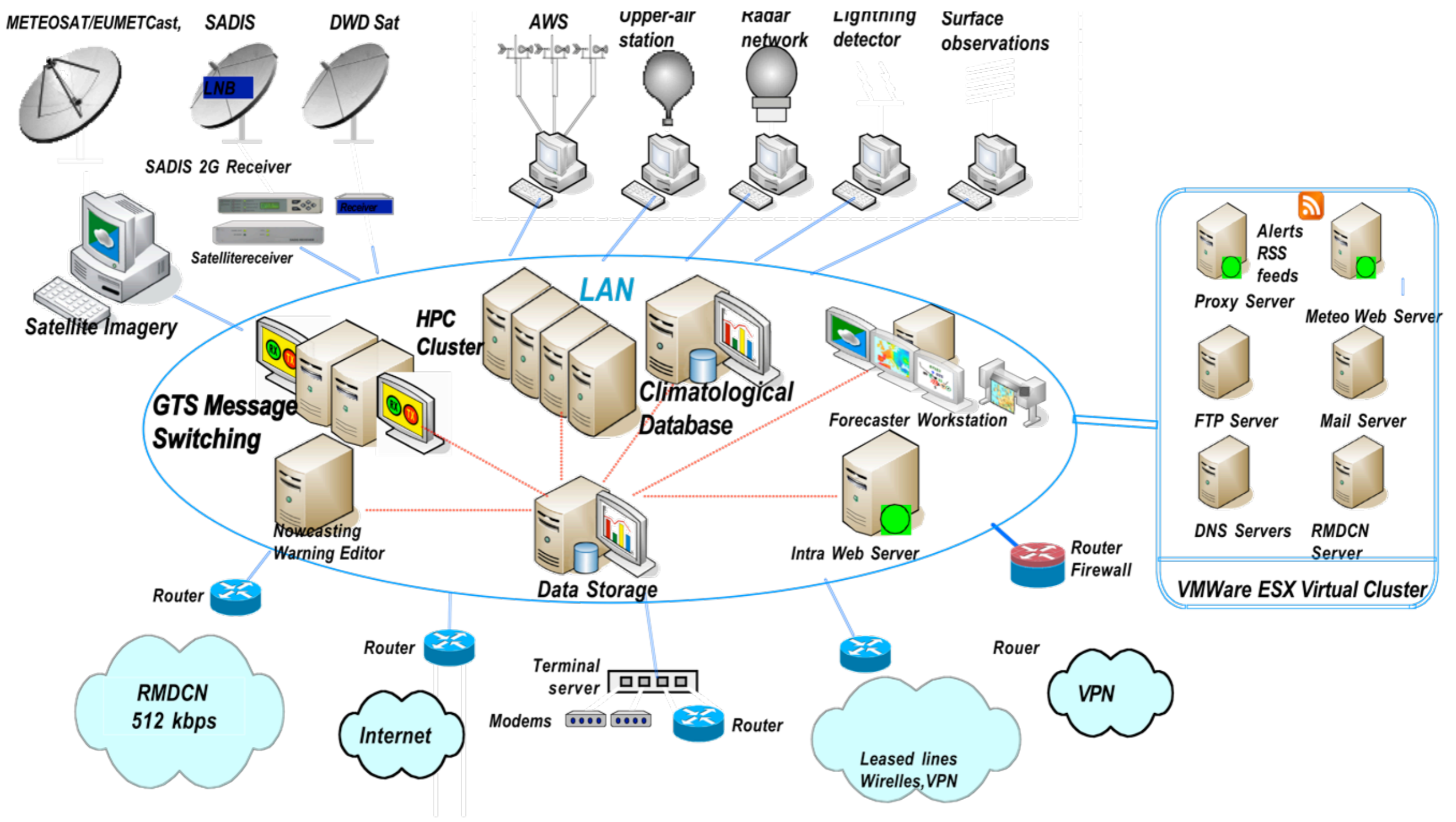• 26 air quality stations (1 GAW/EMEP)

Hydrological observation system

• 211 hydrological station for surface water;
• 455 stations for ground water;
• 159 stations for surface water quality.
• Data are operationally collected from 63 hydrological stations and 20 of them are included in international data exchange.
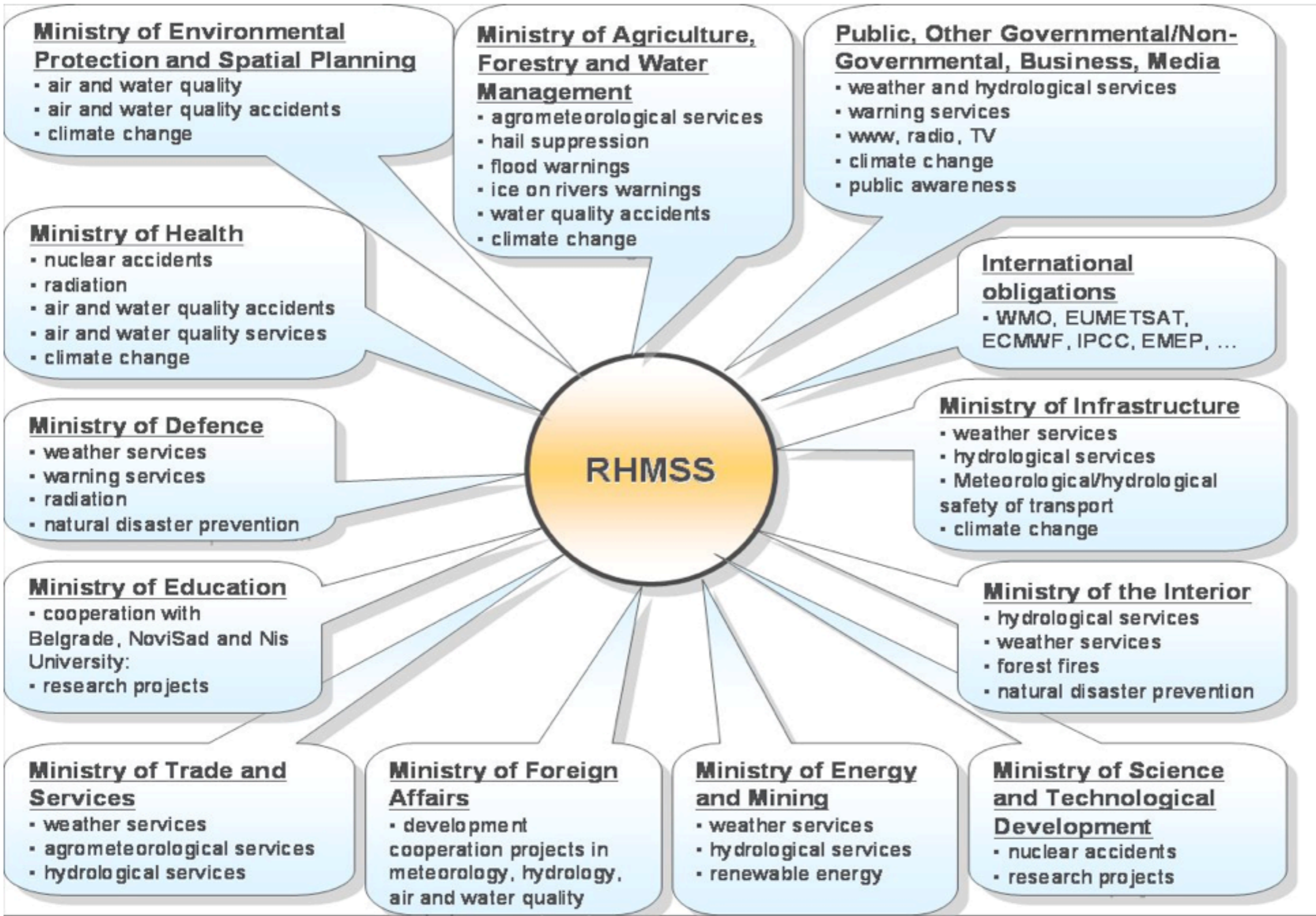
Data management system:

• GTS data Archive – SYNOP, TEMP, OPMET
• GTS data Data Base – SYNOP, TEMP
• TDCF Migration
• Building MARS archive in cooperation with ECMWF

Computer and Telecommunication system of the RHMS of Serbia

Users of the RHMSS Data and Information

Ministry of Environmental Protection and Spatial Planning
- air and water quality
- air and water quality accidents
- climate change

Ministry of Agriculture, Forestry and Water Management
- agrometeorological services
- hail suppression
- flood warnings
- ice on rivers warnings
- water quality accidents
- climate change

Public, Other Governmental/Non-Governmental, Business, Media
- weather and hydrological services
- warning services
- www, radio, TV
- climate change
- public awareness

Ministry of Health
- nuclear accidents
- radiation
- air and water quality accidents
- air and water quality services
- climate change

International obligations
- WMO, EUMETSAT, ECMWF, IPCC, EMEP, …

Ministry of Defence
- weather services
- warning services
- radiation
- natural disaster prevention

RHMSS

Ministry of Infrastructure
- weather services
- hydrological services
- Meteorological/hydrological safety of transport
- climate change

Ministry of Education
- cooperation with Belgrade, NoviSad and Nis University:
- research projects

Ministry of the Interior
- hydrological services
- weather services
- forest fires
- natural disaster prevention

Ministry of Trade and Services
- weather services
- agrometeorological services
- hydrological services

Ministry of Foreign Affairs
- development cooperation projects in meteorology, hydrology, air and water quality

Ministry of Energy and Mining
- weather services
- hydrological services
- renewable energy

Ministry of Science and Technological Development
- nuclear accidents
- research projects

Activities of RHMS of Serbia in database management / quality assessment (DBM / QA)

•Participation to COST Action ES0601 - Advances In Homogenisation Methods Of Climate Series: An Integrated Approach (HoMe),
   Main activities are focused to development of new method for detecting inhomogeneities, created at the Met Service of Serbia, along with its comparison to the existing methods. Action is still in progress, and it is due to end by May 2011.

•ECA&D Database, hosted by KNMI,
   Contribution to the European Climate Assessment and Dataset, hosted by the Dutch Met Service, has also returned good cooperation concerning exchange of daily datasets for European countries. It is mutually beneficial: while Europe gets important series from the station sparse region, Serbian Met Service has access to its region of interest, which is mostly southeast of Europe.

•Mediterranean climate Data Rescue (MEDARE), hosted by University Rovira I Virgilli, Tarragona,
   Data Rescue is also very important for Serbia. Therefore, the Met Service has joined the MEDARE project, hosted by University of Rovira I Virgili, Tarragona.

SEE-VCCC Objectives:

Within the Belgrade Initiative for enhancement of the Sub regional South East European (SEE) cooperation in the field of climate change adopted by the UNECE Sixth Ministerial Conference "Environment for Europe", held in Belgrade, Serbia, in 2007, the sub-regional South East European Virtual Climate Change Centre (SEE-VCCC) in Belgrade hosted by the Republic Hydrometeorological Service of Serbia was established.

SEEVCCC Objectives:
• To provide operational functions in climate monitoring and prediction, climate watch and data and information exchange,
• Climate research and advance scientific understanding of climate change impacts, vulnerabilities and adaptation opportunities,
• To provide training and make available the sharing of the best experience and practice in climate change,
• Link science and policy communities for adaptation planning and climate risk management.

The action in pursuing the set up SEE-VCCC above mentioned functions went simultaneously through WMO activities related to Establishment of a Regional Climate Centre-Network in RA VI (RA VI RCC-Network), and through the Belgrade initiative on climate change in implementation of the UNFCCC, and in particular its Nairobi Work Programme related to impacts, vulnerability and adaptation to climate change.

SEE-VCCC IN WMO RA VI RCC-NETWORK

WMO RA VI RCC-Network
Implementation Plan
Pilot RA VI RCC Network Nodes:

Climate Data
Lead: KNMI/Netherlands
 (….. SEEVCCC/RHMS-Serbia)

Climate Monitoring
Lead: DWD/Germany
 (….. SEEVCCC/RHMS-Serbia)

Long Range Forecast
**Lead: Météo-France &
ROSHYDROMET**
(….. SEEVCCC/RHMS-Serbia)

S E E - V C C C WMO R C C **m a n d a t o r y f u n c t i o n s**

 Operational Data Services (to support LRF and Climate Monitoring):
•Develop subregional climate datasets;
•Provide climate database and archiving services (at request);

 Operational Activities for Climate Monitoring:
•Perform climate diagnostics at subregional scales;
•Establish historical reference climatology for the subregion;
•Implement a subregional Climate Watch;

 Operational Activities for Long Range Forecasts:
•Interpret and assess LRF products from global centers;
•Generate sub-regional tailored products in accordance to user needs (NMHSs);
•Verifications of products;
•Generate 'consensus' statements on sub-regional forecasts;

Training in the use of RCC products and services:
• Info on methodologies and guidance on their use;
• Coordinate training for RCC users in interpretation and use of mandatory products.

SEE-VCCC WMO RCC functions
- highly recommended functions -

The Centre will perform mandatory functions as well as some highly recommended functions in order to meet members priority needs:

• Research and Development,

• Training and Capacity Building,

• Coordination Functions,

• <u>Non-operational data sets</u> (provision of gridded data sets on climate projections).

SEE-VCCC regional downscaled time slice climate change experiments data (girded data set)

SINTA Project: SEEVCCC – CMCC
Italy: Centro Euro-Mediterraneo per i Cambiamenti Climatici
Serbia: University of Belgrade+RHMSS

Approach: EBU-POM coupled regional climate model (Eta/NCEP atmos. + POM ocean)
(two models interactively coupled into one system without any flux correction)

Atmospheric model setup:

- 0.25 horizontal resolution (~30 km) / 32 vertical model levels/10 SPL
- 6h 3D upper atmosphere and surface fields,
- time slices:
    - present climate:1961-1990
    - A1B scenario: 2001-2030 and 2071-2100
    - A2 scenario: 2071-2100.

Ocean model setup:

- 0.2 horizontal resolution / 21 vertical levels
- Mediterranean se

light blue – Eta / dark blue – POM
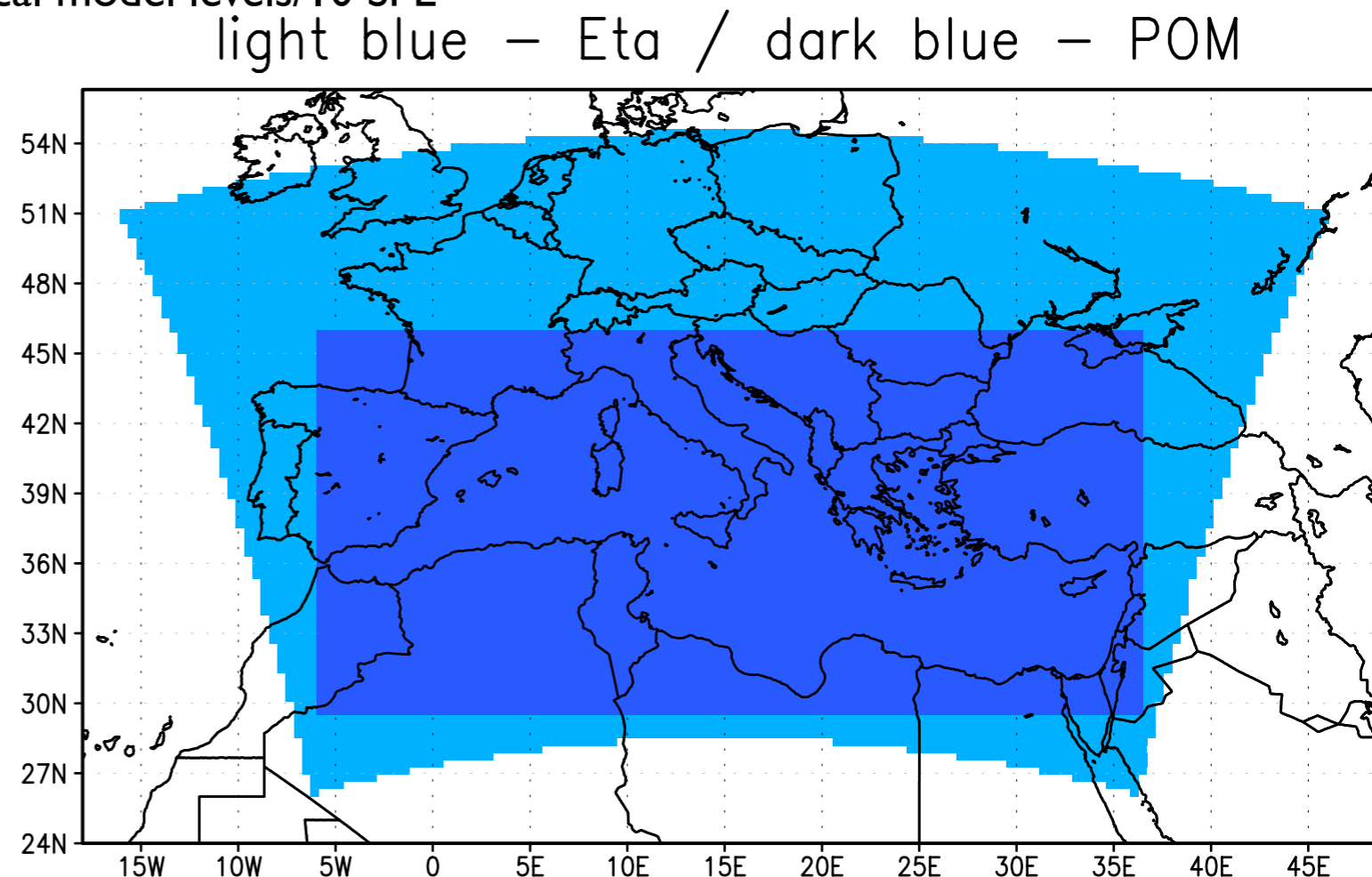
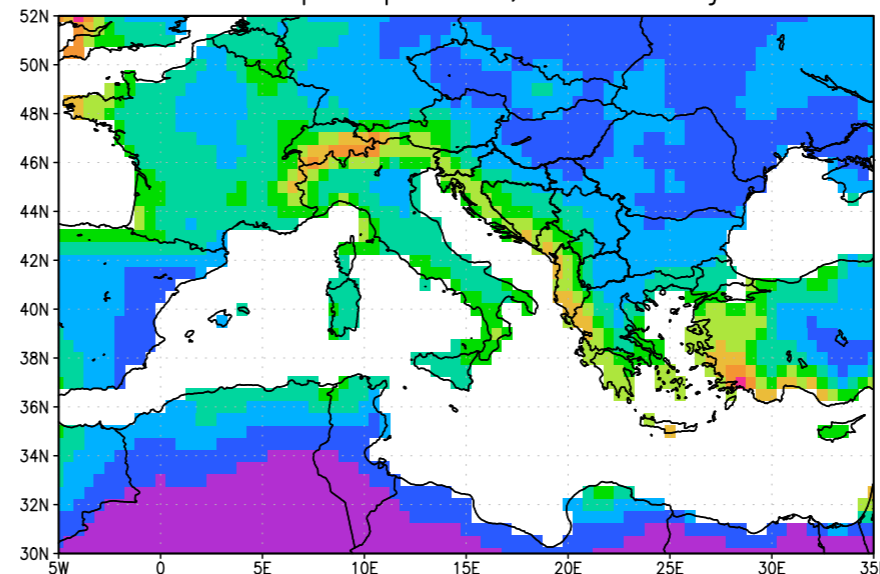# Atmosphere - Ocean Coupled Regional Climate Model (some results)

EBU_POM: temp 2m; season: djf
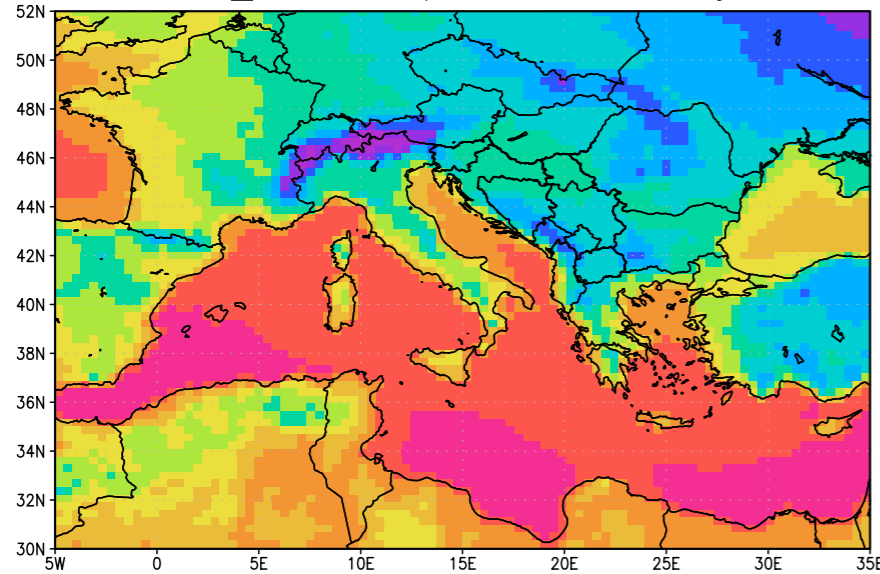
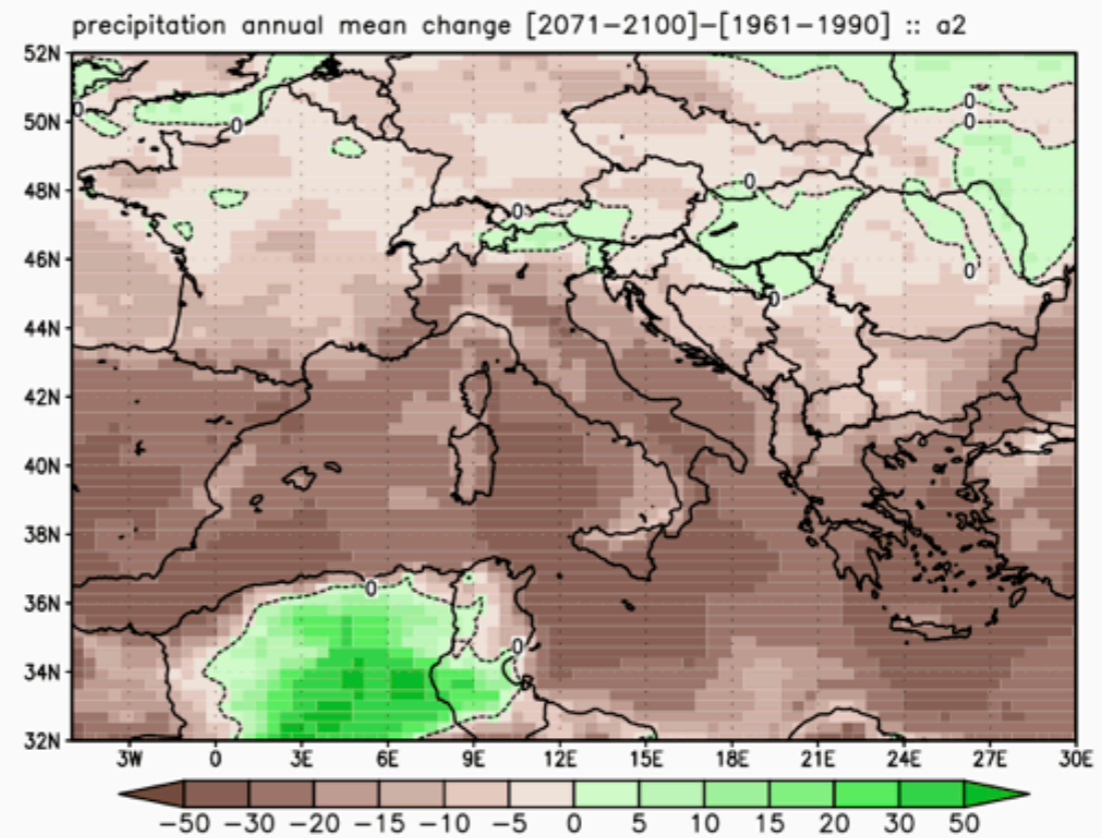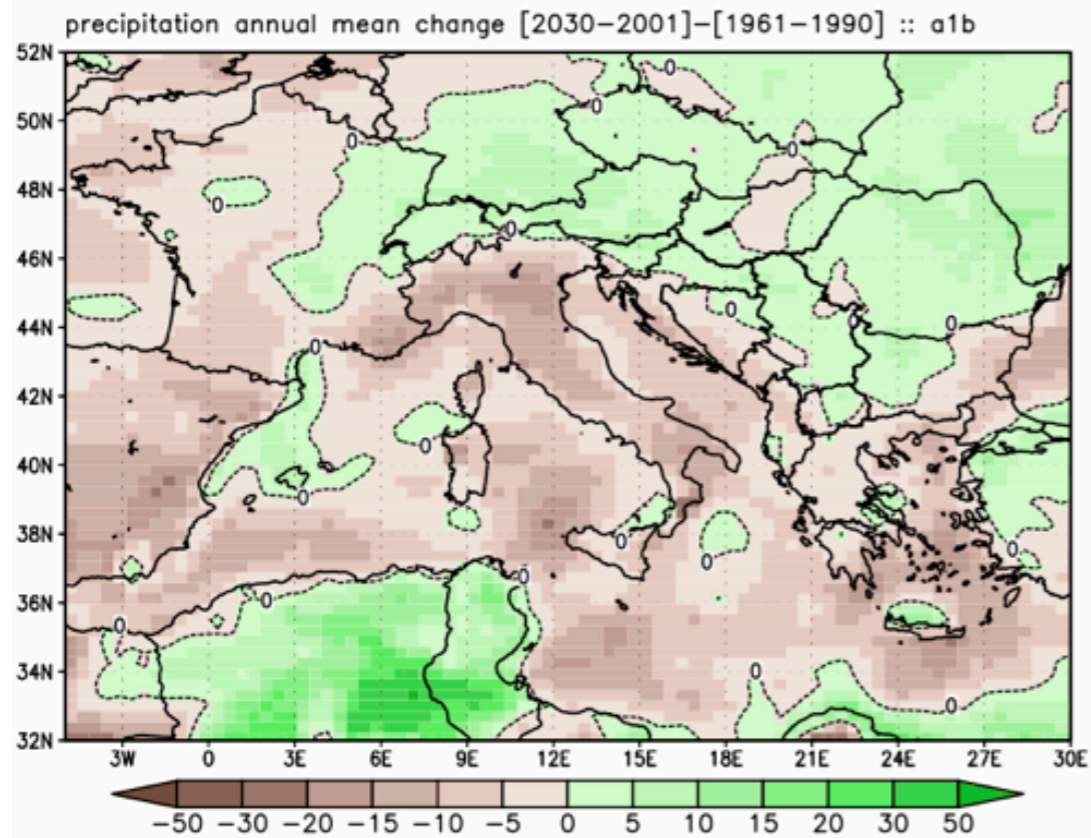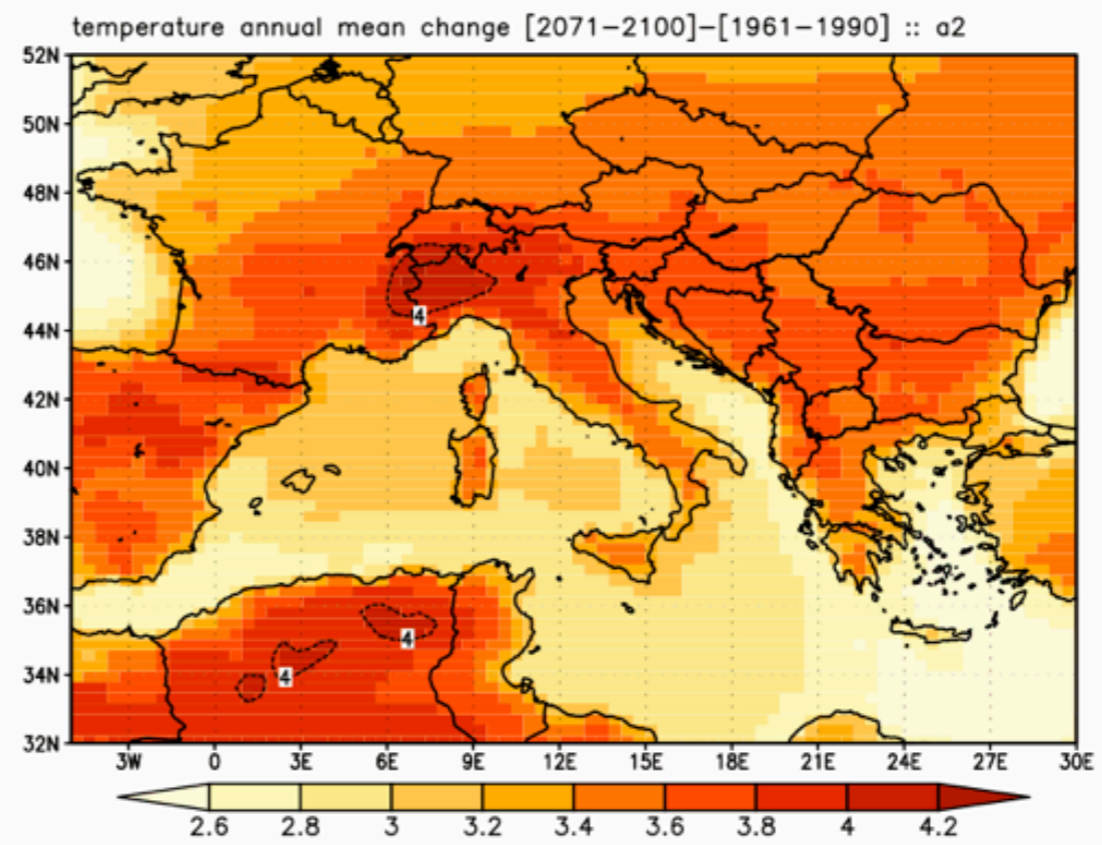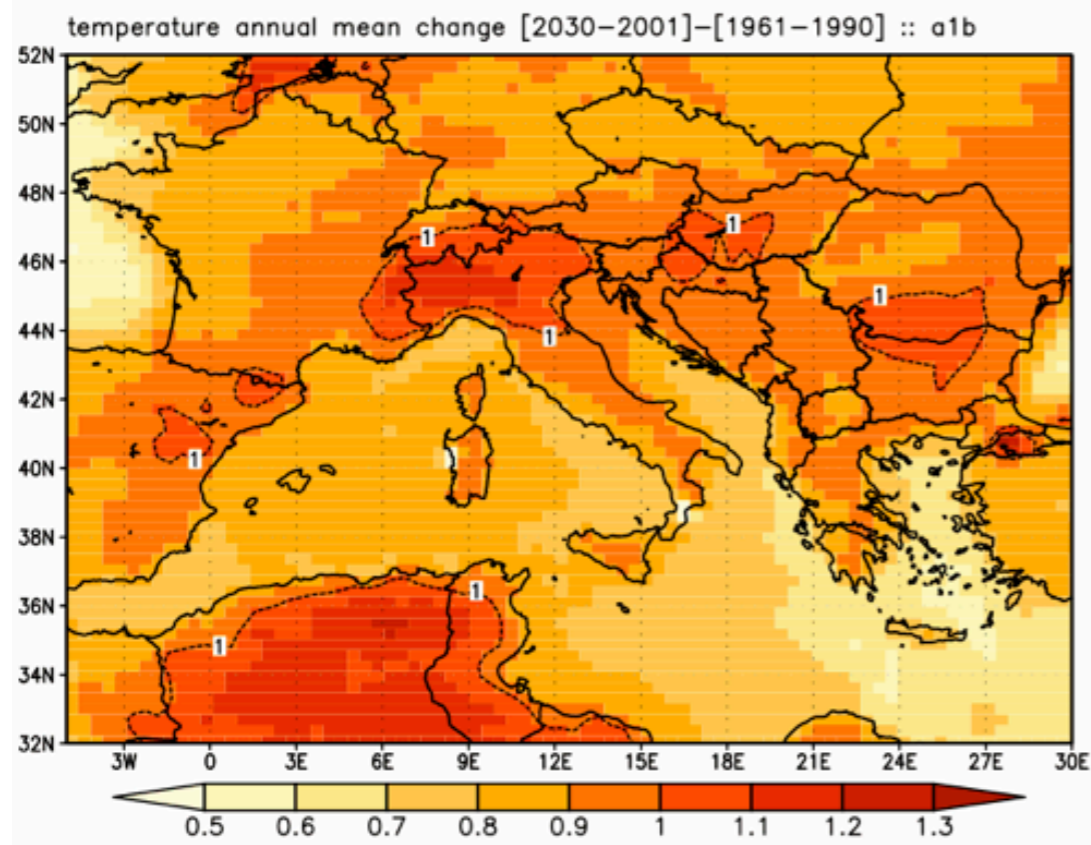CRU: temp 2m; season: djf
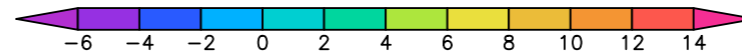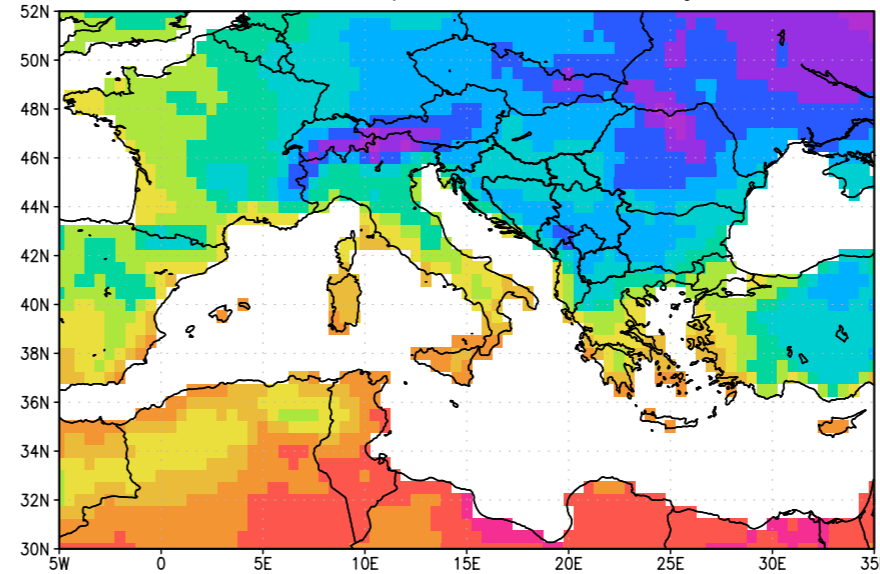
EBU_POM: precipitation; season: djf
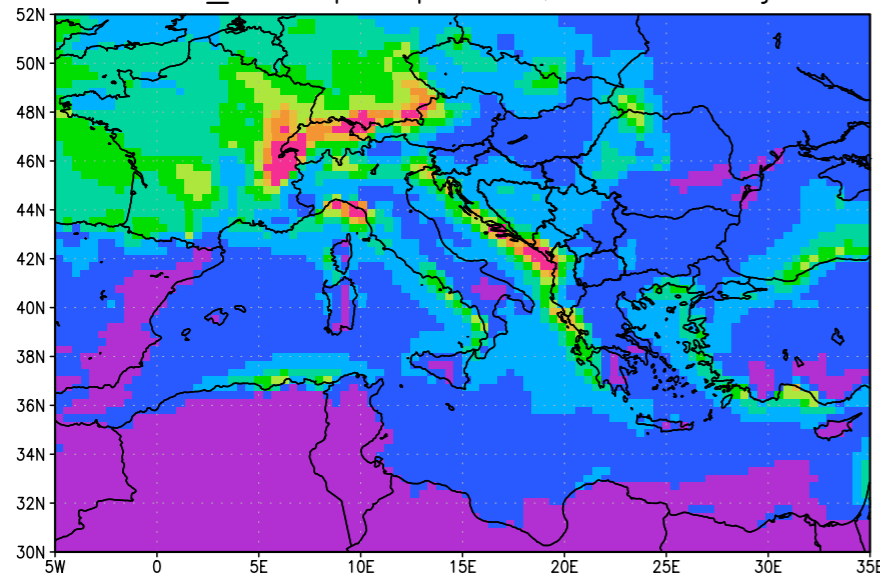
CRU: precipitation; season: djf
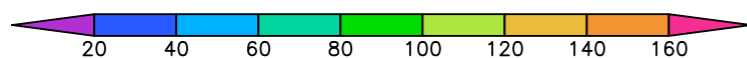
Scores for seasonal 2m temperature. Model vs. CRU data.

| EP/CRU	bias	mae	rmse
DJF	-0.21	1.88	2.15
MAM	1.03	1.59	1.84
JJA	2.63	2.96	3.42
SON	-0.87	1.38	1.83
ANNUAL	0.64	1.63	1.87

Atmosphere - Ocean Coupled Regional Climate Model (some results)

SEE-VCCC: Long range regional forecast (implementation phase)

Dynamical downscaling using hi-resolution regional model

Global and regional model scores for tropospheric winds

- 32 days ensemble (ctl.+25 members) ECMWF forecast
- seasonal ensemble ECMWF forecast
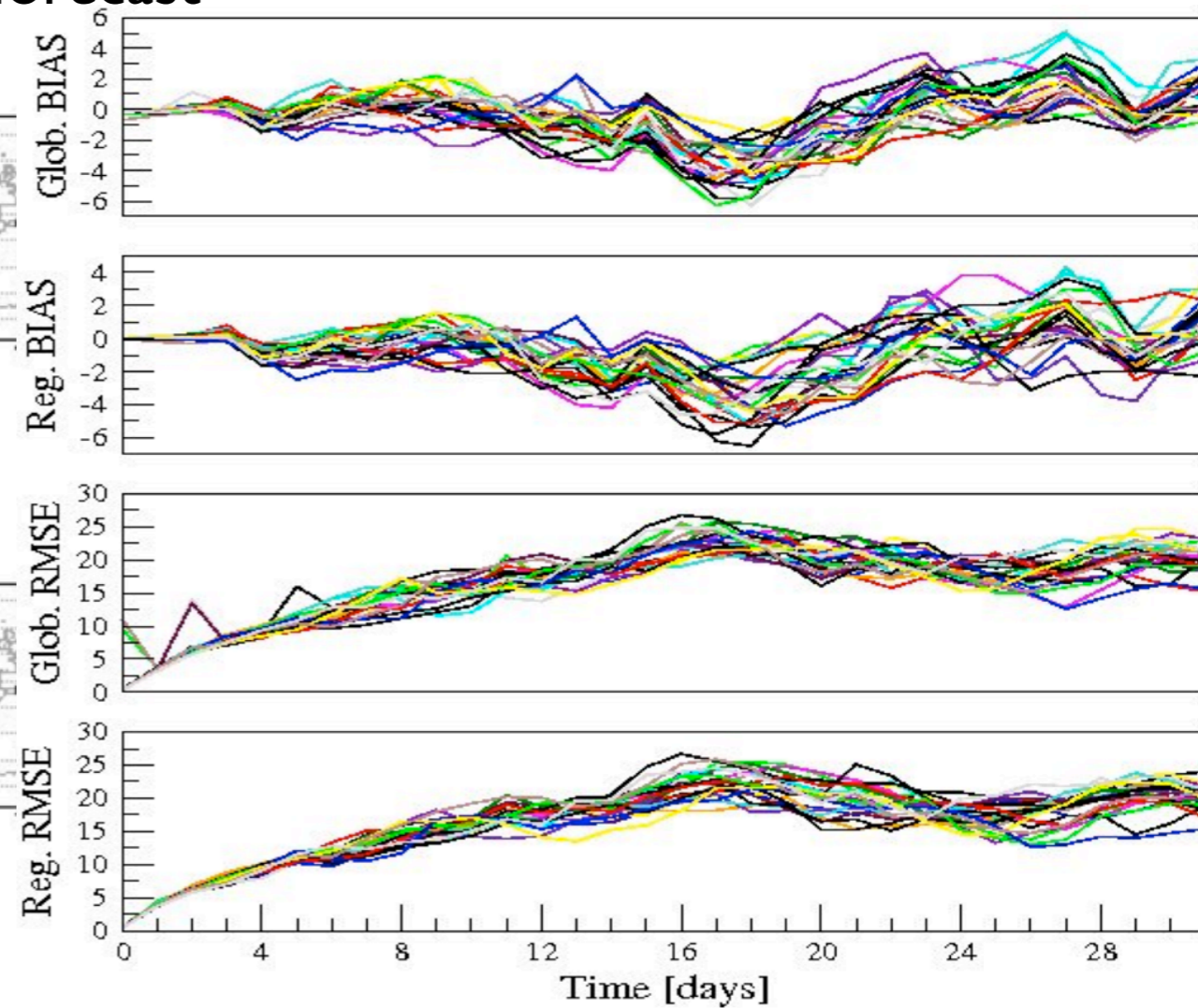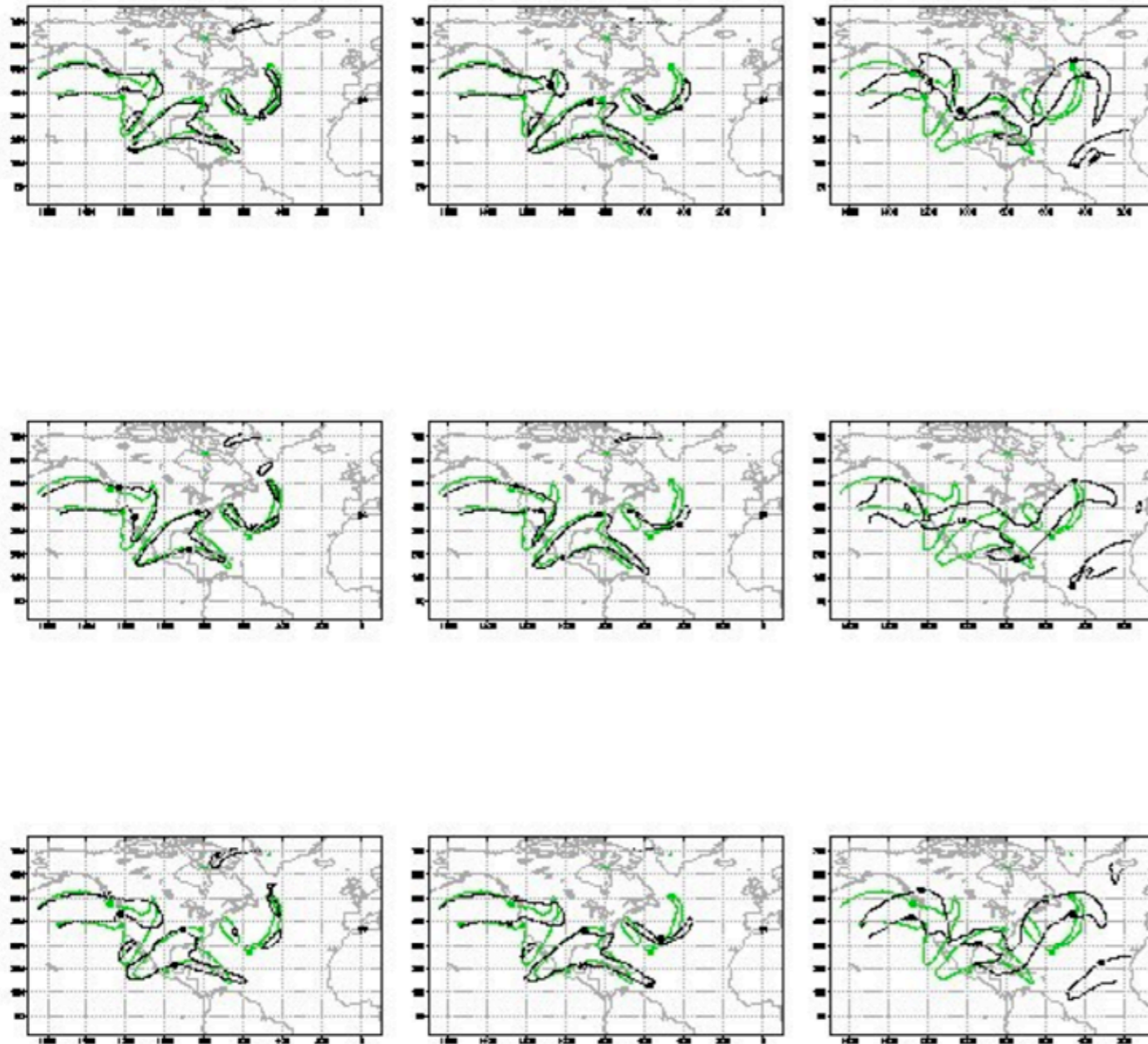
Jet stream position from global and regional model

SEE-VCCC other activities of research/development branch:

- Implementation of operational dust/aerosol model (DREAM model)
- CAPMED/SINTA-2 project, dynamical downscaling of 1965-2030 ensemble climate change scenarios
- Implementation of dynamical hydrological model (HYPROM)
- Development of global coupledmodel
    NMM-B global (UMO) model for atmosphere
    NEMO for ocean?

NPHM orography with river bed and meteorological station locations

UMO :: 500mb @ 00Z16DEC2008

DREAM: Dust Loading (g/m^2) and 3km Wind stream
Start at 23 MAY 2006 12 UTC (Tue)
Valid at 25 MAY 2006 00 UTC (Thu)