

# **REPORT on the Workshop HYMEX / Med-CORDEX 26-28<sup>th</sup> of May, 2014 Palaiseau, France**

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*This report summarizes the conclusion of the HyMeX-MedCORDEX workshop held in Palaiseau at Ecole Polytechnique in May 2014*

## version

28th May 2014: S. Somot

24th June 2014: S. Somot, A. Harzallah, M. Gaertner

18th July 2014: S. Somot, A. Harzallah, M. Gaertner, M. Vrac, P. Ruti

9<sup>th</sup> Sept 2014: S. Somot, A. Harzallah, M. Gaertner, M. Vrac, P. Ruti, E. Lombardi

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The 3<sup>rd</sup> international workshop of MedCORDEX was held in May 2014 in Palaiseau at the Ecole Polytechnique under the umbrella of HyMeX, WCRP-CORDEX and MEDCLIVAR and with the financial support of INSU-MISTRALS and ANR-REMEMBER. 35 participants from France, Germany, Italy, Spain and Tunisia were present for a 3-day workshop. Representatives from Med-CLIVAR (P. Lionello), the Charmex modelling workpackage leader (M. Mallet) and one of the co-leader of HyMeX (Ph. Drobinski) were there as well as the co-coordinators of Med-CORDEX (P. Ruti, S. Somot). The workshop scientific committee was composed by S. Bastin (LATMOS, France), Ph. Drobinski (LMD, France), M. Gaertner (UCLM, Spain), A. Harzallah (INSTM, Tunisia), M. Vrac (LSCE, France), P. Ruti (ENEA, France) and S. Somot (CNRM, France). We warmly thank the local organizing committee (Ph. Drobinski and S. Bastin) as well as M. Schaldembrand from INSU (Paris) for preparing the workshop and managing it on-line as well as all the discussion chairs (M. Gaertner, S. Somot, G. Jordà, Ph. Drobinski, A. Harzallah, S. Somot, P. Ruti, M. Vrac) and all the speakers.

## **The workshop web page :**

<http://www.hymex.org/?page=public/workshops/TTM3/2014/main>

(the list of the participants, the programme, the workshop main objectives and the talks can be found there)

or

The talks can also be found on the MEDCORDEX WORKSPACE (FTP SERVER):

ftp <ftp.climserv.ipsl.polytechnique.fr>

cd workspaces/MEDCORDEX/COORDINATION/MEETING\_PALAISEAU\_MAY2014/

## *Actions:*

- put the talks on the workspace and on the workshop web page [P. Drobinski, S. Bastin, L. Labatut]

- make public the workshop web page [S. Bastin, L. Labatut]: **DONE**

- put a news in the workshop page of HyMeX with the group photo [S. Bastin, P. Drobinski]

## The HyMeX / ST-MedCORDEX web page:

[http://www.hymex.org/?page=private/science\\_teams/show\\_science\\_team&scienceteam=ST-medcordex](http://www.hymex.org/?page=private/science_teams/show_science_team&scienceteam=ST-medcordex)

### Organisation:

Note that, after the HyMeX re-organisation, the Task Team Modelling #3 (TTM3) does not exist anymore in HyMeX and now, the official name of the HyMeX Regional Climate Modelling task is Med-CORDEX. To be complete, Med-CORDEX covers the former TTM3b, TTM3b, TTM3d HyMeX sub-tasks. We recall that Med-CORDEX is an HyMeX-born initiative and should serve the HyMeX scientific objectives. It is also endorsed by Med-CLIVAR.

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## **1. Reporting about the status of the Med-CORDEX modelling platforms and runs:**

We have now 23 modelling groups (ENEA, CNRM, LMD, MPI, IPSL, UCLM, ENSTA, MERCATOR, INSTM, GUF, ICTP, CMCC, Puertos de l'Estado, Univ. of Athens, Univ. Belgrade, UPM, KIT, ITU, UAH, Eotvos Lorand U, IC3, BSC, JRC) participating with 12 different Atmosphere-RCM, 10 regional ocean models, 4 regional land-surface-hydrology models and 12 fully-coupled RCSMs (including at least atmosphere, land and ocean).

A first version of all the platforms is developed (note that the rivers are fully coupled in only 3 RCSMs) and ready to be used. Nearly all evaluation runs have been done and largely archived and some of the scenarios runs have been produced and archived too.

See <http://www.medcordex.eu/simulations.php> for more details

### *Action:*

- update the list of runs [S. Somot, E. Lombardi]: ***DONE***

<http://www.medcordex.eu/simulations.php>

## **2. Report on the discussions about Med-CORDEX and the Climate Services**

### *Questions:*

- What are the priorities in terms of model's improvement and complexity to meet stakeholder/end-user's needs?
- Do we have/need to define stakeholder's needs in order to build-up targeted indicators (i.e. extremes)
- Are we prepared to provide bias-corrected input and expertise to impact's community?

### *Objectives :*

- We need to orient Med-CORDEX climate information with respect to the Med-CORDEX modelling specificities that is to say marine and related impacts (biodiversity, marine protected areas, marine transport, marine pollution, fish and fisheries, aquaculture), coastal activities such as tourism (coastal, islands, sea-related tourism), sustainable energy (solar energy, wave energy, wind farm, ...)
- We can include some chosen impact models into the MedCORDEX initiative following ISI-MIP example. Priorities: storm surge models, wave models – link with MedCLIVAR.
- In case of impact models, we must provide a complete evaluation of the modeling chain (from RCM to impact models)
- We must promote the bias correction of the Med-CORDEX simulations for impact studies

- We can use the Med-CORDEX models to perform sensitivity study following stakeholder requests (land-use, city management, irrigation, wind farm impact, geoenigienery, desalination, dam building)
- We must increase the reliability of the Med-CORDEX ensemble of runs by multi-model validation, scientific articles, model and run documentation
- We must understand that hindcast runs are as usable as scenario runs to provide actionable climate services

*Actions :*

- *To make the list of the Med-CORDEX-related impact community to be targeted in priority [who ?]*
- *To start to contact the impact communities: storm surge and waves [G. Jordà, P. Lionello], marine ecosystems [S. Somot, G. Sannino], ...*
- *To make the list of good examples of impact studies using Med-CORDEX data [who ? New page on [www.medcordex.eu](http://www.medcordex.eu)]*
- *To exploit hindcast and scenario simulations towards climate services. For example, we could add new impact-oriented layers/realms into the Med-CORDEX data-base such as tailored/sectoral variables or extreme indices [cf. E. Lombardi, wait for dedicated projects]*
- *To define test case for bias correction, which methods, which data [M. Vrac]*
- *To produce web-information on model's validation (+list of publications) in order to increase the reliability of the initiative [who ?]*
- *To test the direct use of Med-CORDEX data in a GIS (cf. Emanuele Lombardi) [who ?]*
- *To follow the possible ERA-Net call on renewable energy and water [P. Drobinski]*

### **3. Discussion about Statistical Downscaling within Med-CORDEX**

*Questions:*

- What is the added value of combining statistical downscaling and dynamical downscaling (atmosphere 10 km vs ocean 1-3 km, atmosphere vs river routing ...)?
- Provide the outputs of the statistical downscaling in netcdf format ?
- Gather the required high-resolution, high-quality observed/reference datasets and make them available: SAFRAN, Spanish gridded products, Alps, Euro4m, more ?

*Objectives:*

- We need to test some combinations of “dynamical + statistical” downscaling models to evaluate the gain (e.g., extremes? Variability? Rainfall persistence?)
- In terms of statistical downscaling, the downscaling from GCMs will provide the same simulations when applied to EURO- or MED-CORDEX regions. We must avoid duplications.
- We need to provide statistical simulations in netcdf format to be directly usable as RCM simulations are.

*Actions (contact; M. Vrac):*

- *To start with one or two RCMs and apply one statistical model to evaluate combinations.*
- *To statistically downscale over the EURO-CORDEX region extended to include the MED-CORDEX one in order not to duplicate databases.*
- *To generate netcdf files from statistical simulations.*

#### 4. Discussion about the Med-CORDEX database

##### *Objectives:*

- We have to clarify the data use conditions for the Med-CORDEX database users : (1) Med-CORDEX data are free for non-commercial usages, (2) it is strongly advised to contact the model PIs to inform and propose collaborations, (3) all the users are registered by E. Lombardi and can be contacted through the « news » (<http://www.medcordex.eu/news/>) or by email (ask E. Lombardi)
- We have to make our database more user friendly (easy understanding of the simulation list, of the variables list, simulation metadata, information on the simulation reliability, advises about the use of the data, use of the news, cdo/nco command on line)
- The data users are happy with the ftp system to download the data. However CORDEX officially decided that CORDEX data will be distributed through ESGF. Let's try to switch the Med-CORDEX database to ESGF standard.
- In addition to the official Med-CORDEX database ([www.medcordex.eu/database](http://www.medcordex.eu/database)), the Med-CORDEX participants can also exchange files and information using the Med-CORDEX work space (previously named TTM3 work space) provided by IPSL using their HyMeX password :  
<ftp.climserv.ipsl.polytechnique.fr>  
cd /workspaces/MEDCORDEX/  
You can find here the COORDINATION directory with plenty of informations and you can also create your own institute directory. Try to keep it organised.

##### *Actions:*

- Add the data use disclaimer in all the files [E. Lombardi]
- Make the data use disclaimer more visible on the web page and send it when a new user registers [E. Lombardi] **DONE**
- Adapt the registration form for asking more details on the users and planned data use [E. Lombardi] **DONE**
- Change all the netcdf3 files in netcdf4 files [E. Lombardi]
- Split the help section in user help and data provider help sections [E. Lombardi] **DONE**
- Add the “non-commercial usage” in all the files [S. Somot and P. Ruti write the sentence and send it to E. Lombardi to add it in the files in global attributes]
- Make the simulation list more easy to read and understand with specifications of the various kind of runs [S. Somot] **DONE**
- Update the simulation tables [S. Somot and E. Lombardi] **DONE**
- Create the links between the simulation tables in [www.medcordex.eu](http://www.medcordex.eu) and the metadata in the HyMeX database [E. Lombardi, K. Ramage, S. Bouffières-Cloch ] **DONE**
- Write one metadata files per run [all data producers + K. Ramage, S. Bouffières-Cloch ]. The modelling groups have to complete the run information sheets (on-line formulaire):  
<http://mistrals.sedoo.fr/HyMeX/Model-Data/>  
see examples here  
<http://mistrals.sedoo.fr/HyMeX/Plateform-search/?datsType=2>
- Data users/providers: we have to try the OpenDap /THREDDS option/cdo command on line set by E. Lombardi to test and send feedbacks to Emanuele [C. Dubois, G. Jord , All] **DONE**
- Make the Med-CORDEX database compliant with ESGF constraints [Lele can switch locally all the files in netcdf4 following request + run cdo/nco command to be ESGF compliant on voluntary basis (send your script and Emanuele can apply it) + help for E. Lombardi training from IS-ENES-2 (Sebastien Denvil, IPSL) to set the ESGF node at ENEA].

*The ftp data access will also be kept and the switch to ESGF compliant format (quality checker) will be based on a voluntary basis for the data providers.*

*- Solve the problem of the links between Med-CORDEX and HyMeX database (K. Ramage, S. Bouffières-Cloch , E. Lombardi) [HyMeX users access to THREDDS, to be solved] **DONE***

*- ENEA must apply to be able to give a DOI to the Med-CORDEX data.*

## **5. Evaluation issue: data available for model evaluation, case study**

### 5.1 Inventory of available data:

About the generation of an Inventory it has been proposed to create a Wiki to share expertise on products, give details about available useful datasets, ... The goal is that each group contribute with its experience on model validation and observational data processing. If the Wiki is really used and after some time we identify gaps in certain aspects we could involve experts in particular aspects to help. Also a “links” section to different data sources could be added to the wiki (include links to data products in the HyMeX database)

*Actions: E. Lombardi sets the wiki page on [www.medcordex.eu](http://www.medcordex.eu). All [G. Jord ] propose datasets for model evaluation [IMEDEA gridded products, sea level reconstruction, SAFRAN gridded products, ...]*

*The wiki page could be entitled “Climate-scale evaluation of Mediterranean regional models”*

*The wiki can include a list of missing data for model evaluation*

The Example of AMA has been presented where they have prepared “ready to use” files with data to be used for validation. It has been said that it is not easy as the needs should be defined first. Additionally, it has been mentioned that in HyMeX has the possibility to transform some datasets in netcdf format following user needs.

*Actions: [All] ask the HyMeX database [K. Ramage, S. Cloch -Bouffies] to prepare easy-to-handle files for the Med-CORDEX community when needed*

It has been recommended to strengthen the links with different Science Teams and participants on HyMeX in order to take profit of their expertise on the observational side. Also Med-CORDEX people should register into other teams to be aware of advances (others ST) and use the mailing list to ask for help or advise and also to find “partners” to develop sensitivity studies. The expertise gained in HyMeX on particular process, case studies would be also useful to validate the climate models through the case study approach.

*Actions: check the Science Team list ([http://www.hymex.org/?page=private/contents/working\\_groups](http://www.hymex.org/?page=private/contents/working_groups)) and register in sending an email to it (ex: ST-DWF@hymex.org)*

### 5.2 Model evaluation :

Concerning the model validation it has been highlighted that we should use observational products that are suitable for validating the process that are of interest. Also either the model outputs or the observational product should be processed in order to ensure that they are seeing the same “world” . In this sense, some of the participants are using “simulators” to mimic observations from model outputs so comparisons can be better done.

The model validation can be done using particular case studies, statistics (long term statistical quantities) or impact models. The statistical downscaling could also help in the model validation

We have to evaluate all the components (atmosphere, ocean, land, river) and the interfaces. Evaluation can address climate statistics but also key Mediterranean phenomena/process/synthetic indicators/impact-oriented indicators

### 5.3 Towards a common validation protocol :

The intercomparison studies or common validation protocol can help to define which are the key mechanisms that should be validated and the sensitivity of the system to uncertainties. It has been highlighted that at the end of the intercomparison studies, a “summary” of the different intercomparisons should be provided to guide the end-users in order to increase the reliability and confidence in the Med-CORDEX initiative (see also the discussion on Climate Services above). This can allow to identify which model performs well/bad in certain aspects so the end-users have elements to decide which model is appropriate for their needs.

A discussion went on concerning the idea to adopt or not a common validation protocol. The conclusions are not clear. If multi-model intercomparison and evaluation is mandatory in such coordinated initiative, what should be the form of it is another issue. We encourage the researchers who perform a specific evaluation for their model to enlarge it to the other Med-CORDEX models either using the database outputs or through peer-to-peer exchanges. The Med-CORDEX special issue in which multi-model papers are encouraged would be another opportunity for common evaluation. However any group motivated to define and apply a common validation protocol is welcome. We have to be careful not to define a common validation protocol if nobody is willing to follow it (lack of time). Examples of evaluation protocol is also available in the already-published literature on Mediterranean model evaluation specifically the recent literature on RCM (Somot et al. 2008, Artale et al. 2010, L'heveder et al. 2013, ...).

We also have to explore the potentiality of the RCMES automatic evaluation software (<http://rcmes.jpl.nasa.gov/about/overview>) that could be very useful.

### 5.4 Using sensitivity experiments and multimodel comparisons.

We are all convinced that multi-model comparison can help the Med-CORDEX community in :

- showing the existence of the community
- learning from the other model behaviour
- strengthen the modeller discussions in order to exchange good practices and experimental set-up

Sensitivity runs are mandatory to improve the models and often to understand their behaviour. For sure, not every group can perform all the sensitivity tests. However, Med-CORDEX should work as a « club of modellers » here. It means that any group can propose to the others a protocol of sensitivity study if it considers it as useful to be done with different models. The groups are then free to answer yes or not depending on their resources, opportunities and own interest. This may also help to define the CORDEX-2 common protocol. Remember that some sensitivity study are already available within the Med-CORDEX community and can be exploited by more than the producing group :

- resolution tests : mainly pairs at 50km and 12km (ICTP, GUF, CNRM) + ocean resolution tests (ENSTA, ENEA)
- coupling tests : coupled vs atmosphere-RCM (all)
- spectral nudging : with/without (available at CNRM)
- internal variability : CNRM performed a 10-member ensemble for the ERA-interim driven run
- GCM choice : ICTP performed a large ensemble of scenario
- physics choice : ICTP performed a large ensemble of scenario
- aerosol forcing tests : performed at least at CMCC, CNRM and GUF
- atlantic forcing tests : performed at CNRM with different Atlantic setting
- atmosphere LBC : some groups ran ERA40-driven and ERA-Int-driven runs
- domain size tests : CMCC

The Actions that have been proposed are

- *To prepare the Wiki on data for model evaluation and get the commitment that people will fill it!!. Emanuele will set it up and the contents will be decided on small committee*
- *To decide a list of indicators that can serve as a first guidance for model validation. This will be lead by Piero Lionello (for the atmosphere) and Gianmaria Sannino (for the ocean)*
- *A list of intercomparison studies that are done or planned will be generated (Samuel Somot will keep the list updated) so everybody can be aware of what is expected for the near-future. This list can serve as the base for a Med-CORDEX special issue. [see below] **DONE ... to be updated regularly***

## **6. Coordinated analysis, model inter-comparaison**

It has been stated that the number of scenario runs using RCSMs is still poor (5 runs with 3 models, ENEA, LMD and CNRM) is not enough for an evaluation of the climate change related uncertainties.

However the evaluation/hindcast run ensembles (ocean, atmosphere, coupled) are rich and must be extensively used. We must even precise the ensembles of the regional ocean models and of the RCSMs is unique to our knowledge.

Don't forget to try to continue your hindcast simulations over the recent years for which more observations are available (HyMeX SOPs in 2012 and 2013 e.g.)

Below is the list of the current 22 coordinated intercomparison actions with the person leading the analysis.

- 1. Philippe Drobinski** : multi-model approach on the relation between temperature and extreme precipitation
- 2. Philippe Drobinski, Ségolène Berthou** : atmosphere-ocean interaction on heavy precipitation with nudged simulations , coupled and uncoupled.
- 3. Miguel Gartner** : medicane studies, effect of resolution and effect of coupling
- 4. Samuel Somot** : Deep water formation in the NW-Mediterranean Sea during the HyMeX year 2012-2013, role of the air-sea fluxes with relation to initial conditions in autumn with coupled models but possibly with hindcasts.
- 5. Gianmaria Sannino** : Deep Water Formation in eastern Med. EMT
- 6. Sophie Bastin** : The synergy of observations. Comparison at the SIRTA site, GPS water

vapor evaluation

7. **Bodo Ahrens**: wind system + moisture flux studies
8. **Clotilde Dubois**: Coupled vs uncoupled simulations in climate change scenarios
9. **Yves Trambly** : Hydrodynamical impact model forced by uncoupled RCM (need for 12-km runs)
10. **Gabriel Jordà** : Indirect evaluation of the sea wind using a wave/storm surges model, validation by altimetry data for example.
11. **C. Dubois, S. Somot** : basic intercomparison at the air-sea interface in RCM: SST, SSS, air-sea fluxes from different models (multi-model figures to be completed)
12. **Marc Stéfanon** : Impacts on forestry (submitted)
13. **Ali Harzallah** : heat content and Salt content using ORCM and RCM
14. **TBC (P. Lionello, E. Sanchez-Gomez, E. Flaounas)** : Mediterranean cyclone tracking in RCMs
15. **Laurent Li (+E. Sanchez-Gomez ?)** : link between Mediterranean climate variability and weather regimes using a multi-model approach.
16. **Stéphanie Froidurot** : multi-model study of precipitation in SE France
17. **Samuel Somot**: why are RCM not able to reproduce the trends of SST in hindcast.
18. **Bodo Ahrens + CNRM**: interested in diurnal cycle over land and over sea, boundary layer, ...
19. **Gabriel Jordà**: how do (ocean) models distribute the heat on the water column ?
20. **Diego Maciàs**: ocean scenario runs and impact on the Mediterranean Sea biogeochemistry [no multi-model study planned]
21. **Fanny Adloff, Gabriel Jordà** : sea level model evaluation
22. **Maria-Vittoria Struglia**: river evaluation

**Missing multi-model studies (any volunteer ?)**: ocean straits, ocean surface circulation, aerosol-climate interaction, extreme precipitation outside South-East of France, Adriatic ocean convection, regional climate change impact studies, heat waves, droughts, rain over the sea, intense air-sea fluxes, Mediterranean Sea Water Budget Closure, ...

*Actions:*

- keep the list updated [S. Somot]
  - share the list in order to aggregate the scientists interested in the same topics [this report]
- DONE**
- see which studies are mature enough to become a paper in a Med-CORDEX special issue
  - promote volunteers for the missing multi-model studies

## **7. Valorisation and communication**

- The Med-CORDEX BAMS paper is on its way to be resubmitted [P. Ruti]. The co-authors list include 2 participants per modelling center + database managers + co-coordinators + SAT representative + figure contributors. The fact that the reviewers ask for results before publication explains the long delay before re-submission

- A Special issue for the Med-CORDEX results has been discussed:

Clim Dynamics could be a good target (contact has been taken with S. Corti, editor)

We have to write a presentation of the special issue + send a list of possible papers [to be done by S. Somot, P. Ruti during Summer]

The time period for submission could be: Fall 2014 ; Spring 2015

Write the introductory paper

Check if papers can appear on-line before the completion of the special issue

Do we want to coordinate with the Med-CLIVAR special issue to be proposed in the Ankara meeting ? A priori, no, we have enough papers for a dedicated Med-CORDEX special issue

- Up to now (2011, 2012, 2013, 2014), 31 articles have been published using the Med-CORDEX framework (send your reference to S. Somot and E. Lombardi). Add a sentence acknowledging the Med-CORDEX and HyMeX initiative in the acknowledgments. ***DONE with an updated list for 2014***
- We try to publish news of Med-CORDEX in all the CORDEX newsletters and some Med-CLIVAR newsletters (anybody to help S. Somot ?). ***DONE in the last newsletter***
- We recall that generic posters and talks are available to present the Med-CORDEX initiative (see the workspaces/MEDCORDEX/COORDINATION). Any member of Med-CORDEX can use them to present Med-CORDEX in any conference. Just try to inform in advance by email for coordination purposes.  
***DONE ... last talks by S. Somot available***
- The need for media communication (as Euro-CORDEX) was discussed without clear conclusions
- The idea to design a Med-CORDEX logo has been discussed. Good idea. Any volunteer !
- Any other communication idea is welcome.
- The Med-CORDEX emailing list problem should be solved (some users did not received all the emails) [L. Labatut] ***DONE***

*Actions:*

- collect proposition for the Med-CORDEX logo
- keep the publication list updated [S. Somot, E. Lombardi]
- submit the BAMS paper [P. Ruti, S. Somot] ***DONE***
- launch the special issue [P. Ruti, S. Somot]
- send a Med-CORDEX contribution for the CORDEX newsletter [S. Somot] ***DONE***

## **8 Financial aspects**

- Spanish, Italian and French groups (not all of them) participating in Med-CORDEX succeeded to get funds at the national level using the Med-CORDEX framework and supporting their Med-CORDEX contribution (project on climate change impact on maritime activities for IMEDEA, submitted project MARCO for UCLM, NextData project on environmental database for ENEA, Ritmare project on high-resolution ocean and biogeochemistry for ENEA, REMEMBER projects on RCSM for IPSL, LMD and CNRM, ASICS-MED project for ocean convection for CNRM, submitted ANR CliCoMed project on impact of climate change on marine biodiversity). No national project for the German groups. We encourage all the groups to look for national funding using the Med-CORDEX framework. Letter of support from HyMeX and Med-CORDEX can be issued.

- An H2020 project called IMPROVE on an ocean processes oriented call (led by M. Meier from SMHI) has been submitted in 2013 including MPI, ENEA, CNRM for the Med-CORDEX participants without success after passing the first round.

- An H2020 project called TEMPEST in the Water call (led by P. Drobinski) has been submitted in 2014 (it passes the first round). The RCM workpackage includes IPSL, ENEA, ICTP, CNRM, DHMZ, CMCC

- At the European level, some opportunities will arrive for possible Med-CORDEX funding. The question of the consortium leadership will be an issue but will also depend on the call. Med-CORDEX could for example become a modelling WP in an impact-oriented European consortium. Below the list of opportunities to look at:

1. H2020: ERA-Net call on Climate Services [contact: P. Drobinski]
2. Water2b: Food security and sustainable development at regional and local scale (Open in July 2014, 1st deadline in Autumn 2014, 2nd deadline in March 2015).
3. Blue Growth call on fisheries and aquaculture including climate change impact (consortium are starting in the fisheries community) [contact: S. Somot, try to enter as a modelling WP]
4. ERC: for Young Researchers [contact: P. Ruti]
5. ERA-Net Med: First call in Autumn 2014 with probably water topic in 2014 and sustainable energy in 2015 (be ready) [contact: P. Drobinski]
6. ENVI-MED: small call but less competitive on networking (20 keuros per project with at least one French partner, deadline: 15 sept 2014. Foreign partners can lead. This can be used for Med-CORDEX meeting organisation) [contact: HyMeX, P. Drobinski, V. Ducrocq]
7. COST action also for networking
8. ITN training in Med

## **9. Organisation**

- We thank Paolo Ruti for his excellent contribution to Med-CORDEX. We acknowledge that Med-CORDEX would not have existed without its first push and his long-lasting effort. He will leave ENEA and consequently the Med-CORDEX coordination in Summer 2014.

- The ENEA database is secured for some years for the Med-CORDEX phase 1. To be revisited if Med-CORDEX phase 2

- As Paolo is leaving and as Med-CORDEX is growing, we need a small executive committee (1) to work on the daily management of Med-CORDEX and (2) to drive long-term Med-CORDEX actions (database, reliability, climate service, evaluation, Med-CORDEX-2, communication, ...). The topics to be covered by the committee members are :

- Ocean
- Atmosphere
- Land surface
- Impacts and Climate Services
- Data-base
- Evaluation
- Links with HyMeX
- Processes
- Observations

The principle has been accepted but the list of the participants is not yet determined.

*Action:*

- set the Med-CORDEX executive committee

## **10. Land-river exercise and data**

- Up to now, the stand-alone land-surface-hydrology modelling in Med-CORDEX mainly relies on the work by 2 groups: CNRM using SURFEX-ISBA (J.C. Calvet) and LMD using ORCHIDEE (J. Polcher). Other groups were willing to participate at the beginning (CEFREM, ECMWF, ENEA) but we have no news since a long time.
- We recall that forced hindcast simulations using stand-alone components of the RCSM is part of the Med-CORDEX experimental protocol and must help to understand the RCSM biases and also help to provide forcing for other models (e.g. River discharges from land-hydrology models for the ocean models).
- The hindcast land-hydrology protocol is based on a common forcing: WATCH forcing based on corrected ERA-Interim data at 50 km as well as the ALMA convention for the outputs
- The results from ISBA and ORCHIDEE has been uploaded on the HyMeX database <http://mistrals.sedoo.fr/HyMeX/Plateform-search/?dataType=2>
- The GUF (B. Ahrens) proposed to join the intercomparison using Terra, the new land scheme in COSMO-CLM. The participation of ICTP and ENEA could also be strengthened
- The links with the IMPACT2C FP7 project and the ISI-MIP initiative should be encouraged.

*Actions:*

- The common protocol and common forcings have to be shared on the [medcordex@hymex.org](mailto:medcordex@hymex.org) emailing list and the table of runs to be updated [J. Polcher, JC Calvet]
- An updated version of the ALMA convention for land surface model is on-going [J. Polcher] and must become closer to CORDEX and CMIP convention allowing to upload those data in the Med-CORDEX database under the realm "land" as we already have "atmosphere" and "ocean"

## **11. Ocean exercise and data**

- To our knowledge, organising a coordinated regional ocean model intercomparison with common data output format is a unique initiative explaining part of our delays. However there is a common will to go on.
- Coordination with the Baltic and Arctic areas must be enhanced.
- A common protocol has been prepared for the ocean model output specifications. The file name is based on CORDEX rules and the variables names are the CMIP ocean variables. First upload in the Med-CORDEX database has been done by INSTM and CNRM

*Actions:*

- The model output specifications must be re-checked and shared on the Med-CORDEX emailing list [A. Harzallah, S. Somot, G. Sannino] ***DONE***
- Ocean groups must start to upload their data in order to test the procedures. Priority to the key variables (SST, MLD, SSS, Sea level, heat and salt content, ...) and to the hindcast runs (ocean stand-alone and coupled) [some variables from INSTM and CNRM]
- Coordination with other RCSM domain: Baltic, Arctic [a discussion started with the Baltic Earth regional climate modelling WP at the Lund workshop] ***STARTED***

## **12. Med-CORDEX-2**

A long discussion was dedicated to the future of the Med-CORDEX initiative. Indeed most of the simulations have been completed (even if some scenario runs are still on-going), the analysis of the runs is on-going and the WGRC (Working Group on Regional Climate) and the CORDEX-SAT (Science Advisory Team, <http://wcrp-cordex.ipsl.jussieu.fr/index.php/about-cordex/cordex-people>) are preparing the phase 2 of CORDEX.

E. Coppola (ICTP) gave an introductory talk on this issues on behalf of F. Giorgi, member of the SAT and WGRC. Even if the discussions are still on-going in the SAT and WGRC, it is likely that CORDEX phase 2 will rely on labelled Flagship Pilot Study (FPS) defined as a geographical areas in which defined Regional Climate key questions are addressed. Among the likely FPS selection criteria, we can note :

- the links with WCRP programs (GEWEX, CLIVAR) and grand challenges
- links with observation community
- being an hotspot in climate change and/or in VIA
- Coordination and financial support
- Specificities and excellence of the proposed key questions to be addressed.

First, the strengths of the Med-CORDEX community have been listed :

- Existing and coordinated community
- Links with the HyMeX field campaign and HyMeX community (observations, process knowledge) and possibly the other MISTRALS programs (Charmex, MERMEX) allowing model-observation combined studies
- A large family of models with Ocean-Atmosphere-Land-Hydrology regional coupling and a common protocol for intercomparison
- Existing Med-CLIVAR community
- Convincing tests to go towards Regional Earth System Models including aerosols, interactive vegetation, land-use, rivers, human influence
- The Mediterranean area is full of interesting regional climate phenomena justifying a coupled regional climate modelling approach
- Financial supports may arrive through national and european fundings
- We developed modelling specificities (high-resolution RCM, coupled models, human-climate interaction) that can fit some of the unsolved requests from the impact community and for Mediterranean climate services

We also recognised that the Med-CORDEX initiative was less efficient than Euro-CORDEX to tackle the high-resolution RCM added-value in a coordinated way (going to 12 km) despite the fact that the Mediterranean is one of the best areas to demonstrate this added-value. The number of RCP climate change scenarios produced by Med-CORDEX also remain too weak to address climate change uncertainty. This is probably due to a lack of funding. The river coupling which was defined as one of the priority for Med-CORDEX (regional water budget closure) has not been achieved yet by all the groups.

Following the discussions, the Med-CORDEX workshop participants have decided to continue the Med-CORDEX initiative in the frame of the CORDEX phase 2 and to apply to become a Flagship Pilot Study.

The main axes of Med-CORDEX Flagship Pilot Study will be :

1. **Promote, develop, evaluate and exploit Mediterranean Regional Earth System Models (RESM).** This means to explore the coupled regional climate interactions in past and future climate by adding complexity levels to the current Med-CORDEX Regional Climate System Models. This may include natural and anthropogenic aerosols, ocean biogeochemistry, river, interactive vegetation, human influence such as dam, irrigation, land-use, adaptation or regional/local geoengineering. This also includes the test of eddy-resolving ocean models and convection resolving atmosphere models in the RCM and RESM. This axis is and will remain our main originality among the other CORDEX domains. Proving the added-value of the new RCM and RESM tools with respect to Atmosphere-RCM, regional ocean models and GCM must remain one of the key objectives.
2. **Contribute to characterize the impacts of the Mediterranean climate variability and to develop actionable Mediterranean climate services.** We will orientate our efforts towards the topics which are specific to the Mediterranean area and for which our modelling activity will bring added-value : maritime activity (biodiversity, marine protected areas, marine transport, marine pollution, fish and fisheries, aquaculture), coastal activities such as tourism (coastal, islands, sea-related tourism), sustainable energy (solar energy, wave energy, wind farm, ...), water resources (combining human and climate influence), regional/local geoengineering. This axis will allow a strong interaction with the Med-CLIVAR community and a participation of the Med-CORDEX regional climate modelling community to the next IPCC report.
3. **Improve, study and understand the regional climate phenomena in climate models.** On one hand, the on-going Med-CORDEX multi-model intercomparison is underlining the limitations of the current generation of the Mediterranean regional climate models (radiative flux biases, SST trend underestimation, SST diurnal cycle misrepresentation, misrepresentation of the precipitation frequency distribution) and on the other hand, the Mediterranean climate is full of scientifically interesting climate phenomena that can be qualified, improved and studied by a Mediterranean regional climate system model approach in collaboration with the observation community (heavy precipitation events, strong local wind, strong air-sea fluxes, regional thermohaline circulation, cyclogenesis and cyclone, medicanes, heat wave, severe drought, aerosol-climate interaction, ocean-biogeochemistry interaction ...). This axis will strengthen the collaborations with the observation and process communities (e.g. HyMeX, Charmex, MerMex) and with the global climate model developing community as RCM and GCM share common deficiencies in reproducing some of the key regional climate processes.

In addition to the Med-CORDEX main axis described above, we think that the Mediterranean area gathers many qualities to become an excellent CORDEX Flagship Pilot Study :

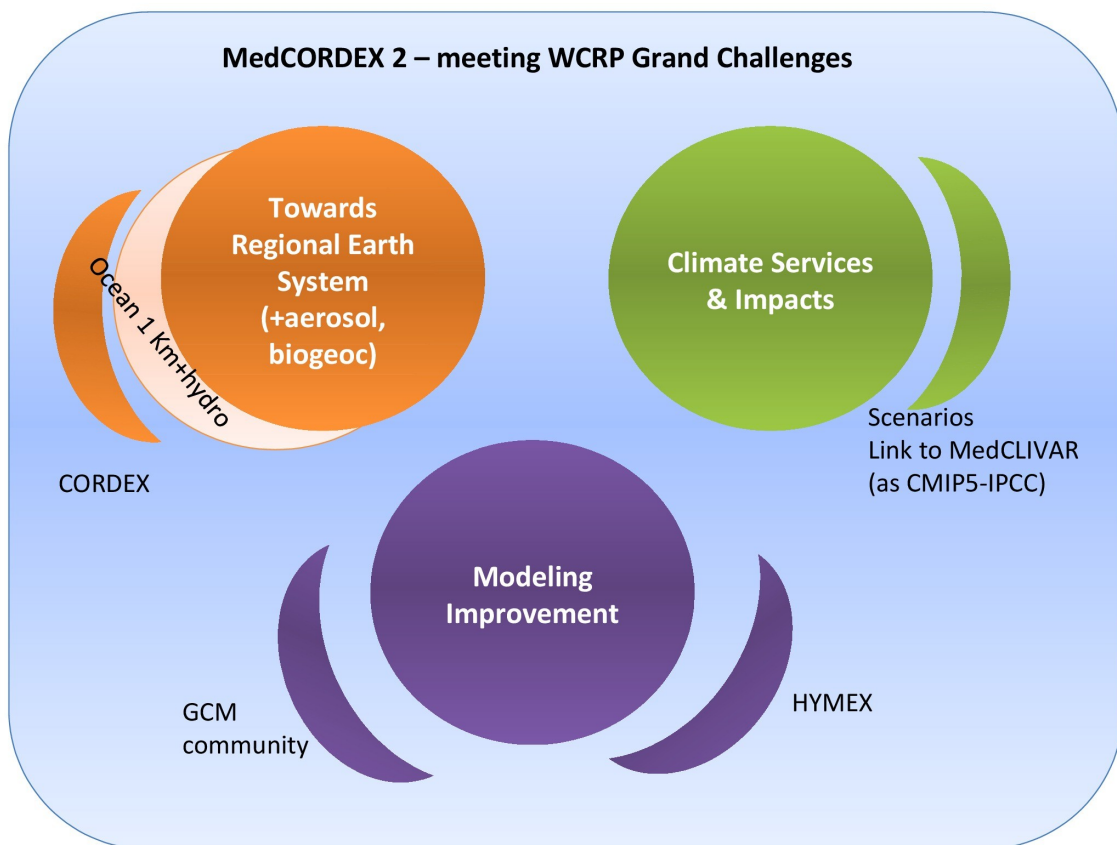
- The Mediterranean has been recognised as an hotspot for climate change, vulnerability-impact and adaptation issues, biodiversity loss
- The Mediterranean is a GEWEX region (HyMeX)
- The Mediterranean is a CLIVAR region (Med-CLIVAR)
- The contact between the regional climate modelling community and the observation and process community is already very strong in particular thanks to HyMeX and Med-CLIVAR long term initiative
- All the WGRP Grand Challenges can be addressed in the Mediterranean area with coupled Regional Climate/Earth System Models :
  - (1) Skilful regional climate information
  - (2) Regional Sea-Level Rise

- (3) Cryosphere in a Changing Climate with the Mediterranean glaciers
- (4) Past and Future Changes in Water Availability
- (5) Improved Understanding of the Interactions of Clouds, Aerosols, Precipitation and Radiation and their Contributions to Climate Sensitivity
- (6) Prediction and Attribution of Extreme Events

Coordination of the Med-CORDEX Flagship Pilot Study with the other CORDEX FPS should be encouraged, for example with the follow-up of CORDEX Africa (aerosols, geographical overlap), Euro-CORDEX (high-resolution added-value, geographical overlap), MENA domain (water resources issue, geographical overlap), Arctic CORDEX (coupled RCM) and the Baltic community (coupled RCM).

*Action :*

*- propose the Med-CORDEX Flagship Pilot Study to CORDEX SAT [P. Ruti, S. Somot]  
**DONE by an email sent to F. Giorgi***



*Figure : Proposition of a schematic view of Med-CORDEX-2 (still to be discussed)*