MINUTES :
SIDE EVENT ON THE USE OF COUPLED RCMs IN CORDEX (FPS)

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The side event was organized at the ICRC CORDEX conference, 19th May 2016
Co-organisation : S. Somot (Meteo-France/CNRM), M. Meier (IOW, SMHI), A. Rinke (AWI)
Participation : 26 persons

Introduction's talks :
1. Presentation of the CORDEX challenge : « coordination of the regional coupled modelling » by D. Jacob.
This challenge is one of the challenge decided after the Lund-2013 meeting by the CORDEX SAT. There is a will to write a white paper on the CORDEX challenges in the coming months. This would allow the coupled RCM community to define (1) the common scientific challenges in regional coupled modelling and (2) the future climate services using these models. D. Jacob clarifies the difference between FPS and CORDEX challenges.
2. The use of coupled RCMs in Arctic CORDEX : A. Rinke
5 groups are using coupled RESM with evaluation runs completed and various scenarios runs by 2 different models. 2 more groups work on the development of coupled model. Scientific challenges are clearly identified with focus on Arctic related issues. Arctic polar uses the term RESM to define these models. A. Rinke gives a list of what could be common questions for the coupled RCMs in CORDEX :
- How to initialize ocean and sea ice ?
- What are the appropriate lateral boundary conditions ?
- What is the best coupling frequency ?
- Which components/feedbacks/processes should we include first ?
- What is a good strategy or appropriate metrics to evaluate coupled models ?
3. The use of coupled RCMs in Baltic Earth (Euro-CORDEX domain), synthesis of the Roma meeting : M. Meier
- 8 groups are using coupled RCSMs including many components (ocean-atmosphere at least and sometimes sea ice, vegetation, wave, biogeochemistry, chemistry). A lot of modelling efforts and runs but difficulties for establishing a strong coordination despite the achievement of the BACC and BACC-II report.
- M. Meier presents the outcomes of the Roma workshop co-organized by HyMeX and Baltic Earth on coupled RCSM for the European Seas (November 2015)
4. The use of coupled RCMs in Med-CORDEX and proposed Med-CORDEX FPS : S. Somot.
The use of RCSM was planned in Med-CORDEX since the beginning to close the Mediterranean Sea Water Budget and study key regional climate phenomena (HyMeX science objectives). 12 RCSMs have been developed in Med-CORDEX with 9 evaluation runs completed and 7 scenario runs. A large number of scientific articles using RCSM have been produced in Med-CORDEX (incl. multi-model studies). Coordination is considered as a success but the number of scenario runs remain too low to assess the uncertainty. Data including some ocean outputs are available on a centralized database. Presentation of the Med-CORDEX baseline runs and of the 2 Med-CORDEX accepted FPS based on coupled RCSMs.

Open discussion with the room : list of domains using coupled RCMs and related FPS
1. CORDEX Africa → planned FPS for June 2016 or Sept 2016 over the SE Atlantic area (Namibia - Benguela upwelling – Strato-Cumulus cloud – 3-year field campaign by NASA and MetOffice) focusing on atmosphere-ocean-aerosol(biomass burning)-vegetation coupling → potential CS : wind farm / nuclear. 4 groups could participate to the coupled modelling initiative
2. Arctic FPS : to be discussed at meeting in November 2016

3. Central America CORDEX region. One initiative (1 group) on Guadeloupe-Martinique islands planning ocean-vegetation-aerosols-chemistry coupling at CPM scale. Another initiative using ocean-atmosphere coupling. Coordination with Central America CORDEX to be investigated
4. CORDEX Australasia : 2 initiatives : one on coastal current, ocean-biogeo and one of ocean-atmosphere. Coordination/FPS not decided yet
5. Med-CORDEX : One FPS accepted on the role of the aerosols on the regional climate and another one accepted on the role of the ocean and air-sea coupling representation on the regional climate
6. Baltic RCSMs often use Euro-CORDEX domain

Open discussion about « What is required level of coordination between domains for coupled RCMs ? »
1. The common will is to use coupled RCMs to contribute to improve scientific knowledge and in particular to answer WCRP Grand Challenges when those models are relevant.
2. Long discussion on the possibility or not to converge on common scientific challenges across the domains. Some ideas about possible common challenges :
- See A. Rinke's list above on technical and evaluation challenges
- Contribute to understand and to project coastal processes (poor GCM behavior), including coastal circulation and regional sea level.
- Understand differences between coupled/uncoupled models
- Study of Cyclones/Tropical Cyclones/medicanes/polar lows using ocean-atmosphere RCM
- Influence of ocean representation on regional climate variability and change (e.g. see Med-CORDEX FPS). Or more generally, how does coupled processes (not only ocean-atmosphere) impact the regional climate variability and change ?
3. How to achieve the coordination ?
- Need for exchanges of expertise on coupled RCMs
- Side events at the CORDEX meeting for coupled RCMs
- Do we have to gather the coupled RCMs in common FPS or to propose separated FPS and look for an other coordination way ? The 2nd option seems to have the room preference.
- Set a coupled RCM working group with specific CORDEX emailing list, web page, regular meetings, contact points
4. Debate on the choice of the good acronym : Regional Climate System Model or Regional Earth System Model. Important issue for community visibility. Did we yet reach the level of the global Earth System Models in terms of complexity. Are the RCSM a step towards future RESM ? Does RESM require human-related components ?
5. Community visibility issue : we have to make something together in addition to the FPS. In particular to have more impact on the funding agency
6. We need standardized file and variable naming

List of messages for CORDEX SAT
1. We want to exist as a community inside CORDEX
2. We need to find the best way to organise the exchanges of expertise required when setting and using RCSM/RESM (science, technical)
3. RCSM/RESM tools have the capacity to contribute to improve knowledge on regional climate variability and change (multi-components), to understand regional processes and to contribute to WCRP grand challenges. They can also contribute to improve the representation of regional coupled processes/phenomena in GCM
4. We can try to define the community overarching scientific challenges common to all domains but this will not be easy due to the already very large perimeter of the community and the long list of already domain-specifc scientific challenges
5. This community can contribute to expand the impact studies, to serve new users, to propose new

climate services
6. No clear answer concerning the white paper or positioning paper (review the literature, knowledge improvement thanks to RCSM, open challenges, future research). What is the right perimeter : land-surface, ocean, aerosols, cryosphere, city … very large community ? What is the SAT vision of the white paper ?

Future Actions
1. Send the minutes of the side event and the talk to the participants, wait for feedbacks and then send the above messages to the SAT and POC
2. Set a coupled RCM working group in CORDEX (emailing list, web page section for exchange of information and visibility, identifiy contact points in each domain/FPS)
3. Meet regularly. Ideas : meeting on a 2-year frequency, organize a « Roma-2 » conference with enlarged audience. use CORDEX conference with dedicated sessions, informal exchange on technical points, regular phone/skype calls on specific topics (short 1h, information exchange)
4. Work a standardized file naming and lists of variables : definitively, yes (following G. Nikulin's initiative with Baltic, Arctic, Mediterranean inputs)
5. Take a decision about the white/positioning paper. Need to clarify the perimeter
6. Clarify the SAT point of view about having more FPS based on coupled RCMs

Information collected during the side event :

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