

Report of the 2017 Session of the CORDEX Science Advisory Team (CORDEX-SAT)

9-12 October 2017, UK Met Office, Exeter, United Kingdom



Bibliographic information

This report should be cited as:

Lake, I: Report of the 2017 Session of the CORDEX Science Advisory Team (CORDEX-SAT). WCRP Report 17/2017, World Climate Research Programme (WCRP): Geneva, Switzerland, 30 pp.

Contact information

All enquiries regarding this report should be directed to wcrp@wmo.int or:

World Climate Research Programme
c/o World Meteorological Organization
7 bis, Avenue de la Paix
Case Postale 2300
CH-1211 Geneva 2
Switzerland

Cover image credit

Photo of attendants of the 2017 Session of the CORDEX Science Advisory Team (CORDEX-SAT) taken by Irène Lake (also see p.4).

Copyright notice

This report is published by the World Climate Research Programme (WCRP) under a Creative Commons Attribution 3.0 IGO License (CC BY 3.0 IGO, www.creativecommons.org/licenses/by/3.0/igo) and thereunder made available for reuse for any purpose, subject to the license's terms, including proper attribution.

Authorship and publisher's notice

This report was authored by Irène Lake for the International Project Office for CORDEX (IPOC) with contributions from the CORDEX Science Advisory Team.

The Coordinated Regional Climate Downscaling Experiment (CORDEX) is a WCRP project with the vision to advance and coordinate the science and application of regional climate downscaling through global partnerships.

WCRP is co-sponsored by the World Meteorological Organization (WMO), the Intergovernmental Oceanographic Commission (IOC) of UNESCO and the International Science Council (ISC), see www.wmo.int , www.ioc-unesco.org and council.science.

Disclaimer

The designations employed in WCRP publications and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of neither the World Climate Research Programme (WCRP) nor its Sponsor Organizations – the World Meteorological Organization (WMO), the Intergovernmental Oceanographic Commission (IOC) of UNESCO and the International Science Council (ISC) – concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The findings, interpretations and conclusions expressed in WCRP publications with named authors are those of the authors alone and do not necessarily reflect those of WCRP, of its Sponsor Organizations – the World Meteorological Organization (WMO), the Intergovernmental Oceanographic Commission (IOC) of UNESCO and the International Science Council (ISC) – or of their Members.

Recommendations of WCRP working groups and panels shall have no status within WCRP and its Sponsor Organizations until they have been approved by the Joint Scientific Committee (JSC) of WCRP. The recommendations must be concurred with by the Chair of the JSC before being submitted to the designated constituent body or bodies.

This document is not an official publication of the World Meteorological Organization (WMO) and has been issued without formal editing. The views expressed herein do not necessarily have the endorsement of WMO or its Members.

Any potential mention of specific companies or products does not imply that they are endorsed or recommended by WMO in preference to others of a similar nature which are not mentioned or advertised.



Back row (left to right): Tannecia Stephenson, Bertrand Timbal, Sanjay Jayanarayanan, Hyun-Suk Kang, Silvina Solman, Bill Gutowski, Daniela Jacob, Filippo Giorgi, Fredolin Tangang

Front row (left to right): Iréne Lake, Chris Lennard, Grigory Nikulin, Anne Frigon

Apologies: Michel Rixen

Presentations

In the text of this report there are hyperlinks to the relevant presentations; however; you can also find the presentations [here](#).

Contents

<i>1. Executive Summary</i>	<i>7</i>
<i>2. Welcome and Introduction</i>	<i>7</i>
<i>3. Session 1: General Update and CORDEX Issues</i>	<i>7</i>
<i>3.1. The three-leg regional scoping document and the roel of CORDEX within the WCRP structure</i>	<i>7</i>
<i>3.2. CORDEX CORE Simulations Status</i>	<i>8</i>
<i>3.3. FPS Update</i>	<i>9</i>
<i>4. Session 2: Updates from the CORDEX domains, scientific scope and future</i>	<i>9</i>
<i>4.1. Domain Updates</i>	<i>9</i>
<i>4.1.1. CORDEX South-East Asia</i>	<i>9</i>
<i>4.1.2. CORDEX South Asia</i>	<i>10</i>
<i>4.1.3. CORDEX Central Asia and MENA-CORDEX</i>	<i>10</i>
<i>4.1.4. CORDEX East Asia</i>	<i>10</i>
<i>4.1.5. CORDEX Australasia</i>	<i>11</i>
<i>4.1.6. CORDEX Africa</i>	<i>11</i>
<i>4.1.7. CORDEX Arctic/Antarctica</i>	<i>11</i>
<i>4.1.8. CORDEX North America</i>	<i>12</i>
<i>4.1.9. CORDEX Central America</i>	<i>12</i>
<i>4.1.10 CORDEX South America</i>	<i>12</i>
<i>4.1.11 MED-CORDEX</i>	<i>13</i>
<i>4.1.12 EURO-CORDEX</i>	<i>13</i>
<i>4.1.13 Empirical Statistical Downscaling (ESD) Update</i>	<i>14</i>
<i>4.2. Convection Permitting Modelling</i>	<i>15</i>
<i>4.3. CORDEX Issues</i>	<i>15</i>
<i>4.3.1. CORDEX SAT Membership</i>	<i>15</i>
<i>4.3.2. Contribution to IPCC</i>	<i>15</i>
<i>4.3.3. Next ICRC-CORDEX conference</i>	<i>15</i>
<i>4.4 Joint Session with WGCM</i>	<i>16</i>
<i>4.4.1. Regional Downscaling for CMIP6/CORDEX-CORE</i>	<i>16</i>
<i>4.4.2. Links from WGI to WGII</i>	<i>17</i>
<i>4.4.3. The Added Value of Downscaling</i>	<i>17</i>

<i>5. Session 3: CORDEX Scope and Future Direction</i>	<i>17</i>
<i>5.1. Specific Added Value Action</i>	<i>17</i>
<i>5.2. Scientific Challenges</i>	<i>18</i>
<i>5.3. The Action Plan and Strategy for the coming years</i>	<i>19</i>
<i>6. Wrap-up</i>	<i>20</i>
<i>6.1. Take-home from this Pan-WCRP Meeting</i>	<i>20</i>
<i>6.2. Interaction with other WCRP Activities</i>	<i>20</i>
<i>6.3. The Close Future</i>	<i>20</i>
<i>Annex 1: List of participants</i>	<i>22</i>
<i>Annex 2: Agenda</i>	<i>23</i>
<i>Annex 3: Action List</i>	<i>25</i>
<i>Annex 4: Acronyms and other Abbreviations</i>	<i>27</i>

1. Executive Summary

In Exeter the 2017 face-to-face CORDEX SAT-meeting occurred, all SAT-members were present.

It was acknowledged that the identity of CORDEX is in need of reconsideration where the aim is to do basic research inspired by user needs to be relevant to the broader community. This is further underlined by WCRP being in a time of possible transition and with a newly developed scoping framework for regional issues with a three-leg concept with the foundational science, application-inspired science and transdisciplinary engagement. The SAT-meeting being part of the Pan-WCRP Modelling Meeting enabled close interaction with other modelling groups and a mutual desire to establish closer connection to The Working Group on Coupled Modelling (WGCM) was expressed.

2. Welcome and Introduction

Co-chair Bill Gutowski welcomed all the SAT-members to the Pan-WCRP Modelling Meeting in Exeter, and especially so the CORDEX-SAT session.

3. Session 1: General update and CORDEX issues

3.1. The three-leg regional scoping document and the role of CORDEX within the WCRP structure

Leg 1: Foundational Climate Science

- CORDEX will be an integral part of developing WCRPs portfolio on regional studies but who else will be contributing and how will it be coordinated?

Leg 2: Application-inspired Climate Science

- Advance climate-system understanding relevant to regional socio-ecological challenges.
- Working Group on Information for Regions instead of WGRC? Who will provide input on where it should go?
- There has been a call for a regional coordination office, the question on a possible WGIR is still pending. CORDEX needs to address this and decide on how to act, what input to provide.
- WGIR would need to include members from all groups. Vital to see what the review of WCRP will say on regional issues.
- Need to connect to WWRP since info for regions is independent of time scales.

Leg 3: Trans-disciplinary Engagement

- Dialogue with high level boundary organizations on climate info needs, how should WCRP engage with multi-disciplinary organizations/groups and who are they?
- Guy Brasseur started discussions, for instance with Future Earth. This leg is very important for the IPCC Special Report on 1.5°C.
- CORDEX needs to establish links with obs4mips and the Vulnerability,

Impacts and Adaptation Community.

- The carbon free city 'movement' is very strong and there is a gap in info to them which CORDEX could fill. Could possibly be addressed by more prominent science challenges. Opportunity for involvement is in cities adaptation to climate change, for instance the C40 (40 'megacities' that want to be carbon free) conference in March. Specifically the ESD component could potentially produce valuable information for cities.
- To document and spread CORDEX results and progress a discussion on papers took place. Papers on metrics for CORDEX and the added value of CORDEX were suggested.
- Need to address the quality of observations. The obs4MIPs mainly use global coverage datasets, whereas the CORDEX community need regional/national data sets and should push for use of these regional datasets. Work on systematic evaluation of CORDEX towards obs4MIPs and other observations would be valuable.

3.2. CORDEX CORE (Coordinated Output for Regional Evaluations) Simulations – status

- Minimum two RCPs; 2.6 and 8.5.
- Resolution at least - 25 km (0,22 degrees). Personnel and computer resources limit the ability to go further for many modelling groups.
- 1.5 degree SR will highlight hot spot regions where CORDEX could do higher resolution in smaller regions/subdomains, this is already done in some small areas.
- The CORE Atlas will be based on 25 km.
- Some CMIP6 results may be available from next summer.
- WGI –report is due in April 2021; submission January 2020, acceptance Oct15 2020. Gives in best case 1.5 years to do runs, analyses and get publications together.
- Boundary conditions from 5 CMIP5 GCMs will be recommended for both 8.5 and 2.6. These GCMs are NorESM, MIROC5, MPI ESM, EC-Earth, HADGEM2ES, GFDL ESM. Daniela, Grisha, Claas and Bill will suggest the best three of these for each domain to the modelling groups that will make simulations for all domains.
- Need for some sort of all-regions comparative analysis performed by a dedicated group which could be compared with the analysis of the HighResMIP.
 - Could be carried out by regional teams but coordinated so that it is comparable.
 - A task force consisting of Filippo, Silvina, Claas, Grisha and Fred will start a discussion on this issue. A user oriented analysis was suggested as well as inclusion of extreme events. Some first thoughts preferably before the end of the year. Domains to start with; Africa, South America, Central America, South Asia, East Asia, Australasia. Filippo to ask for a list of simulations from Claas to start with.
- There is a big demand on information on the lower end scenarios even if the climate will not stabilize there.
- Output variables for CORE as indicated in the list in the CORE document;
 - First table minimum and the second desired;
 - Add u,v, t at 200 and u,v,t,q at 850 hPa, every 6 hours to the second table;
 - Change to every 6 hours for 500 hPa;
 - Could also save additional model level winds.

ACTION: RCP 8.5 and 2.6, ERA-interim 25 km, minimum from 1970-2100.

ACTION: Five CMIP5-models to choose from; NorESM (low T-increase for RCP 2.6), MPI ESM (Medium), EC-EARTH (medium), HADGEM2ES (high 2.6), GFDL ESM (low).

ACTION: First table output variables mandatory. Second table - highly recommended.

3.3. FPS (Flagship Pilot Studies) update

- Protocols of simulation within the context of ChArMEX WP4/WP7 and Med-CORDEX FPS AEROSOL activities on the way.
- Convection-permitting FPS has a lot of activities and simulations are done. Data are sent for analysis.
- LUCAS FPS also well underway.
- Change to only one FPS call a year, in February.

ACTION: Change to only one FPS call a year, in February.

4. Session 2: Updates from the CORDEX domains, scientific scope and future

4.1. Domain Updates

SAT members were asked to provide an update on recently performed Activities, future plans and what the contributions to CORE.

4.1.1. CORDEX South-East Asia (Fredolin Tanganag)

[See presentation](#)

- 25X25 runs completed from a number of groups, domain expanded slightly eastward, nothing on 2.6 yet.
- Completed analysis, papers in progress.
- Priority - 2.6 in next runs.
- Established the ESGF node (hosted in Thailand) and uploaded some data. Data will be shipped to Thailand where the post-processing will be done. More data to be uploaded.
- By using TRMM and ERA-interim driven simulations the more realistic ensemble members could be singled out. The models IPSL and GFDL not performing very well in this region. GFDL has a large deviation from the GCM which could be due to interfacing of boundary conditions.
- SE Asia finally choose 7 GCMs and 3 RCMs and compared ensemble means. Despite some differences between RCMS and GCMS they all projected changes in rainfall in food basket region consistent with results from runs in Singapore. Contrasts between land and ocean not captured by the GCMs in general.
- Calculated when the region will reach +1,5 and +2,0 degrees.
- Several workshops performed.
- Will carry out additional 25 km runs, possibly for RCP 2.6, (models WRF, REGCM and RCA ?) which together with existing runs will contribute to CORE.

4.1.2. CORDEX South Asia (Sanjay Jayanarayanan)

[See presentation](#)

- Available simulations on ESGF; 17 datasets (runs) on ESGF (0,44 degrees) for 8.5 and 4.5 performed with the models REGCM4, RCA4 and REMO.
- Future climate change assessment report over India available on the web (<http://cccr.tropmet.res.in/home/reports.jsp>).
- CORDEX data useful for Monitoring and Assessment Programme for Hindu Kush Himalaya.
- In the future the plan is to apply bias-correction to outputs and publish on the CCCR-IITM ESGF data node as CORDEX adjusted data sets.
- A global high resolution atmospheric model under development - can be used for downscaling activities.
- Will contribute to CORE with existing 50 km runs.

4.1.3. CORDEX Central Asia and MENA-CORDEX (Grigory Nikulin)

[See presentation](#)

Central Asia

- A number of simulations with the models REGCM for RCP 4.5 and 8.5 performed.
- Many requests for CORDEX simulations in the region.

MENA

- 7 groups running simulations, only SMHI on ESGF.
- Problem with the post-processing according to the CORDEX rules which is a problem, it is very costly. Something needs to be changed to make the data available in a coordinated manner since there is nothing in this for the data producers.
- MENA website with contacts, matrix of simulations etc.
- One meeting in 2014, ESCWA-SATRICCARDO, with a CORDEX-presentation.
- Reports for the Arab region based on SMHI CORDEX simulations produced (only SMHI-data were uploaded) - projections/extreme climate indices and climate change assessment report. Other CORDEX-groups were contacted but no response really. Another process needed when something like this is ongoing so modelling groups make data available.

4.1.4. CORDEX East Asia (Hyun-Suk Kang)

[See presentation](#)

- 9 institutes participating
- Evaluations and historical runs were finished.
- Pan-Asia ESD established (lead by Koji Dairaku).
 - Workshop in Japan performed beginning of October.
 - Need to focus on big cities near rivers for agricultural purposes etc.
- Future;
 - scenario runs ongoing,
 - Set-up of ESGF node by APCC with help of KMA. Will be launched next year.
 - ESD group considering proposal for FPS.
- Most groups are interested in contributing to CORE but only for this

domain and use CMIP6 and DECK (the part prescribed in the CORDEX CORE document) when forcing is ready. Would probably use these GCMs; HADGEM2ES, GFDL and one more, perhaps EC-Earth.

4.1.5. CORDEX Australasia (no presentation)

- For the moment no representative for this domain in SAT so Irène will ask the POCs for an update on activities.
- Bertrand Timbal informed that at CSIRO only one person is now engaged in regional modelling.

4.1.6. CORDEX Africa (Christopher Lennard)

[See presentation](#)

- First analysis workshop in August with four regional groups (responsible for analysis of data and producing papers) targeting the 1.5 (IPCC Special Report) and 2 degrees warming
 - long list of titles (including extremes, effect on cattle farming, when does each GCM hit the 1.5 and hydrological climate response)
- In December 2nd workshop to understand processes and third in February with focus on writing papers.
- VIA workshops -agriculture, health, agriculture etc in November.
- Impact Atlas; Climate Atlas/Agriculture Atlas – indices and the response (to agriculture and later also health, biodiversity etc) of different degrees of warming.
 - Should be visible on the CORDEX web. CORDEX IPCC contribution?
 - China is developing a similar concept for China, Taiwan might do so. GFCS has been informed.
 - There will be maps and downloadable data, GIS-layers...
 - Small region first to get feed-back, redo if needed before expanding.
 - Web Hosting and visualization will be at CSAG.

4.1.7. CORDEX Arctic/Antarctica (No presentation)

- Meeting coming up soon some sim with ice-sea-interactions.
- For Antarctica 5 groups in CliC (Gerhard Krinner) but no projections planned.
- Important to have contact now with regards to the cryosphere IPCC report coming up.
- Summary of CORDEX as a special issue in a journal? For instance in the climate service journal, link to services/twist towards users needed.
- Some general template for the domains to follow. Co-chairs as guest editors for instance. Some analysis on impact or similar, what has the region already done with the simulations.

4.1.8. CORDEX North America (William Gutowski)

[See presentation](#)

- 7 modelling groups
- Runs at 50 km for RCP 8.5 and 4.5, one for 2.6 with the RCMS RCA4, on ESGF.
- For EC-Earth - different versions used for RCA4 and HIRHAM5.
- Ready to put more on ESGF, waiting for an ftp-link.
Challenging to put stuff on the ESGF grid so something needs to be done.
- Bias correction of temperature and precipitation done.
- Using perfect-model analysis
- Have performed statistical downscaling (LOCA) of CMIP5.
- CORDEX-NA used in VIA projects at Ouranos.;
 - Tourism, impact on flora and fauna, maritime transport etc
- Future;
 - Combining NA CORDEX and Arctic CORDEX to span the Canadian Arctic, get maps without real jumps.
 - DOE FACETS program;
 - Redoing some runs to get the Arctic Sea Surface Temperature proper.
 - Doing 12 km with WRF and REGCM but a bit smaller than NA domain.
 - ESD and hybrid RCM-ESD downscaling, maybe some 2.6 sim also
 - purpose with the programme is among others to do cross-evaluation.
- Will contribute to CORE with runs that represent the Great Lakes and potential for more to CORE in the DOE FACETS program.
- A lot of sim has to be rejected since the lakes are not included. Some available at ESGF.

4.1.9. CORDEX Central America (Tannecia Stephenson)

[See presentation](#)

- New simulations for CAM; 0.44 degrees (RCA4, Ouranos also preparing simulations for CAM), 25 km ERA-interim with WRF and 50 km RCA for all RCPs.
- 2nd workshop on Climate Change, Variability and Modelling over Central America in Mexico last year.
- Paper on Intercomparison of regional climate models and climatic trends presented at UGM (Union Geofisica Mexicana), October 2017.
- Future;
 - Host two CORDEX EGU sessions 2018
 - Downscaling workshop across CAM/SAM proposed early 2018
- Could participate in CORE with evaluation of skills for GCMs in reproducing large-scale features for CAM.

4.1.10. CORDEX South America (Silvina Solman)

[See presentation](#)

- After workshop in Lima/Peru in 2013 a mail-list exists, no web page because no one who can host it.
- A number of simulations available.
- Recently found out about a group in Chile doing RCM simulations, maybe exactly the same simulations has been done in different institutions.
- Other simulations done in Brazil but apparently not CORDEX protocol runs - why?

- All other simulations done outside the domain.
- Simulations performed on specific demand from the government but on smaller regions.
- Communication between national contact points not working. Need to send out ToRs for POC to all POCs and also put it up on the web.
- Connections between South and Central American groups need to be enhanced.
- According to Daniela there are national CORDEX contact points but communication with neighbouring contacts and official CORDEX domain POCs is not working. How can we get in contact with them and do they really exist? Does anyone want to be an official POC? IPOC and SAT should have all those contacts. Daniela will try to find out more about this.
- Iréne or co-chairs will contact all POCs.
- Future;
 - Development of ESD products for SAM
 - Workshop in Bolivia in February.
- Contribution to CORE not clear, will any simulations be performed in the domain? Normally high-res sim for smaller areas are performed which is not really CORDEX.

4.1.11. MED – CORDEX (No presentation)

- No more standard runs.
- Focus on coupled models and the FPSs. Some domains have more on coupled models.

4.1.12. EURO – CORDEX (Daniela Jacob)

[See presentation](#)

- Many modelling groups contributing with simulations.
- Structure, three pillars;
 - Dynamical downscaling (simulations, RCM development, evaluation of convection permitting runs, 2 FPSs on convective phenomena and land use changes, participate in CORE with existing 0,22 degree runs).
 - Climate information distillation (EURO-CORDEX guidelines - where contributions for the generic parts are very welcome, bias adjustment, COST action on climate information distillation will involve experts from impact community and global modelling community and users)
 - ESD - good-practice and reference document on the way, how to connect ESD and dynamical downscaling? UKMO also working with this. Collaboration with CORDEX Bias-Adjust on when to use corrected data etc.
- Contribution to CORE on transferability, reanalysis limitations in the tropics, observational data.
- Strategic partnerships with VIACS, GCM communities and data centers.

ACTION: Need to do something about the problems in getting simulation results in CORDEX 'format' onto ESGF.

ACTION: Summary of CORDEX simulations/info in special journal issue, for instance the climate service journal (some link to services/twist towards users needed, eg analysis impact, what has the region already done with the simulations...). Some general template for the domains to follow.

ACTION: Post terms of reference for POCs on the web and send to all POCs.

ACTION: Connections between South and Central American groups need to be enhanced. National CORDEX contact points? Daniela will try to find out more about this.

GENERAL COMMENT: Could be valuable to add information on the use of the domain simulations on the CORDEX web

4.1.13. Empirical statistical downscaling (ESD) update

[See presentation](#)

- Series of 3 workshops for the central ESD group and teleconferences with the five 'core' members.
- Reference document; CORDEX ESD Mid-term Plans.
- Might send a concept note to EOS.
- Experiment 1 hung up on post-processing.
- Tried to come up with a complementary CORE program from a sub-set of CORDEX-ESD methods consistently implemented for all continental regions. This would enable to;
 - Evolve the understanding of ESD.
 - Provide new information on methods and data for impacts models.
 - Publish papers relevant to AR6 and the Special Reports.
- Want formal recognition by CORDEX SAT with mandate to seek funding as a formal CORDEX activity.
- Two 'different' CORE experiments or incorporate the ESD somehow in the framework for the dynamical downscaling? Needs to be settled/executed soon and the consistency between statistical and dynamical should be investigated.
- Statistical methods compared in COST action for small regions.
- Some ESD methods can be used for complete CORDEX domains.
- Some constraint comparison of the methods needed and then perform downscaling for some priority areas.
- So – wants to develop coordinated methods/activities within a coordinated ESD research community including cross-comparisons with RCMs and GCMS and communicating with WCRP developments on regions.
- Some groups/methods to contribute to CORE for IPCC.
- RCP 8.5 planned for ESD Euro-CORDEX.
- Local methods work well locally but can not be transferred directly to other areas so hard to find methods that work reasonably well everywhere although well needed.

ACTION: Summary of CORDEX simulations/info in special journal issue.

ACTION: The existing ESD group to continue as a task force under CORDEX.

ACTION: Task force to decide how ESD would go into CORE for IPCC recognizing. Motivation could be that dynamical downscaling is really time/resource consuming and ESD is cheaper.

4.2. Convection Permitting Modelling

- FPS on convection permitting modelling the only official activity on convection permitting modelling in CORDEX.
- The next step the regional modelling should take - how will CORDEX approach this? Needs to be a long-term 'commitment', SAT will explore the possibility to set up some recommendations for this.
 - Mich suggests to assign a few people to develop some a framework.
 - UKMO does a lot of convection permitting modelling, are interested in what is ongoing in CORDEX, connect models and information.
 - UKMO/CORDEX could advise users on how to go about this, what kind of information (and from what producer) to use for different purposes.
 - 10 ensemble members across the UK, one single member Europe-wide.
- FPS could be more focused/precise on what CORDEX wants to achieve.
 - Task force to come up with a strategy for this - may be part of the review of the Scientific Challenges.
 - Not all is CORDEX - plan to answer fundamental questions regarding time slices etc.

ACTION: *Further discussed under Scientific Challenges.*

4.3. CORDEX Issues

4.3.1. CORDEX SAT Membership

- Chairs to be rotated 2018 and 2019 respectively. Potential new chairs?
 - IPCC wants a visible contribution from CORDEX with an actual CORDEX stamp. The CORDEX Atlas for instance is directly linked to WGI chapters.
 - Need someone dedicated as chair.

4.3.2. Contribution to IPCC

- The regional Atlas building on CORE.
- More literature gathering, duty of POCs to gather list and inform IPOC.

4.3.3. Next ICRC – CORDEX conference

- Second half of September 2019 in China, Gau et al in Beijing willing to host it.
- Irene to have further contact with Gau.
- Face-to face SAT meeting in 2018. An option is in connection with ICTP workshop in May/June in Trieste.
- More regular teleconferences with more focus needed plus face-to-face

once a year.

ACTION: Next ICRC-CORDEX in China second half of September 2019.

ACTION: Face-to-face SAT-meeting 2018.

ACTION: Regular SAT teleconferences from now on.

4.4. Joint session with WGCM

4.4.1. Regional downscaling for CMIP6/CORDEX CORE-CMIP6

- Ensure modelling groups commitments to producing data for CORDEX - 8.5 and 2.6.
- How can we better join up on modelling of regional climate, especially when global HighResMIP approaches regional scales;
 - What to prioritize?
 - Can CORDEX members access data etc?
 - Essential Climate Variables sensitivity of GCMs?
 - What GCMs to choose?
 - Regarding BCs for certain regions of the GCMs, systematic biases will remain similar to CMIP5, not change drastically.
 - 1950-2014 onto 2040?
 - Simplified aerosol.
 - Resolution from CMIP6 (100-150 for some GCMs) to 25 km.
 - Real improvement with the high res compared to the low res?
 - What in the HighRes analyses could be useful for CORDEX, could CORDEX give some metric code they could run?
 - HighResMIP Saving all 6-hourly data, some 3-hourly and some hourly.
 - Useful to compare with CORDEX.
 - Metrics calculated in HighRes MIP could possibly be extended by some demands from CORDEX.
 - PRIMAVERA - all data in one place where analysis/metrics will be done. JASMINE is the platform, software could be put there. Can bring packages (from CORDEX) rather than actual data to JASMINE.
 - HighResMIP will probably not do sub-setting but maybe CORDEX and HighResMIP could do this in collaboration. HighResMIP will meet in a month with CLIVAR where this can be discussed.
- What GCMs (CMIP5 and CMIP6) are best for a specific region, in what regions do they have the largest biases? Each model has a set of documents on what the biases/problems are.
- We can send info/questions to Veronica for forwarding to all groups.
- Most GCM groups starting historical (pre-industrial) runs (DECK) now, 3-6 months later scenarios, some done 2018 some 2019.
 - Most groups will provide driving data for downscaling but probably not save data globally.
- GCMs doing both high and low res should be encouraged to supply data for downscaling to enable some domains/regions comparison.
- CMIP6 data will eventually be on ESGF. With the problems to upload to ESGF this may be a bottleneck for access to the data.
- How can we join forces to get info from the regions? Suggested to put Malcolm and CORDEX POCs in contact?

4.4.2. *Links from WGI to WGII*

- More ambitious in what we provide for the impact community. Workshop scoping this around Mid- May in Argentina. Some authors of WGI and WGII will be there + other experts.
- No real vision of what the Atlas entails? Only results or extend to assessment/quality of the regional info?
- No survey of the usefulness of the former Atlas? Could TG CIA or WGI do this before May? This would help a lot to design the next Atlas.
- To which extent could CORDEX be proactive in identifying measures of quality for the Atlas?
- Good plan needed to obtain a homogeneous Atlas using both GCMs and RCMs. Will partly be addressed by the CORDEX CORE. Timing crucial since the GCM CMIP6 not available for quite some time yet but the Atlas will not only contain CMIP6 products.
- New in CMIP6 is the HighResMIP which could be targeted by CORDEX - info on what GCMs that have more systematic errors in several regions very useful. Evaluation tools for the GCMs developed to do this.
- CORDEX would like more information from the GCM side who in turn need to know what we want to focus on, what is more important for CORDEX.

4.4.3. *The added value of downscaling*

- How can GCM community work towards facilitating this?
- Involve obs4MIPs and Ana4MIPs in order to look at processes rather than just values.
- When, where and how do we get added value? CORDEX will have a group on this and have a contact person towards WMAC.

ACTION: *Contact Veronica for further communication with all relevant CMIP6-groups.*

ACTION: *More communication/contact between the groups, contact person from CORDEX towards WMAC.*

5. Session 3: CORDEX Scope and Future direction

General comments:

- Julia from the WCRP review committee said that one of the big focuses for CORDEX is/should be Capacity Building.
- Filippo awarded the Alexander von Humboldt medal for 2018 from the EGU.
- New logo officially adopted, old logo also to be kept.

5.1. Specific Added Value Action

- Someone to compare what is on ESGF? Look at historic and

projections, global/regional for some parameters (temperature/precipitation?).

- Where and for what parameters does CORDEX add value?
- Synthesis/systematic approach needed.

ACTION: *Synthesis/systematic approach on Added Value needed.*

5.2. Scientific Challenges

- How do we proceed? The white paper? The convection permitting modelling as a new Challenge?
- Specific focus areas with task force(s); SAT-members, maybe POCs.
- Cross-cuts:
 - Added value
 - Human factor/element or the VIA issues
 - Convective permitting modelling
 - Coupled models
 - Capacity Building
- Specific focus areas:
 - Cities
 - High mountains (include glaciers, snow..)
 - Wind energy
 - Inland waters (big lakes which are important for North America, some African etc) Regional seas very important for SEA. No real definition on what big lakes are, maybe CORDEX can contribute here
 - Organized convective systems (could include tropical storms). There is a Cross-cut in GEWEX on this.
 - Small Islands
 - Other possible topics here?
- Need to show that existing simulations have some sort of added value. Common belief that global is enough, that the regional is not needed.
- The existing CORDEX challenges are very 'large' and encompassing a bit too much.
- How we go from the sub-continental scale towards finer km-scale, there we need to focus on some topics. One goal to make the high-resolution modelling more coordinated, to exchange knowledge/experience and take advantage of what is already done.
- The new Challenge Matrix represents some of where we want to go.
- We want people working in the CORDEX community/with regional modelling etc to consider the challenges and focus areas when they plan their work.
- Reverse flagship projects with topics we want people to work on?
- Why should we/the CORDEX community address these topics and what is the benefit for others?
 - Cities – with existing information analysis of the effects of climate change is possible. Could then add a number of new model runs on fine scale to see the effects on heat Islands etc.
 - The above list - suggestions/recommendations of what to focus on when you do an FPS for instance.
 - Add recommendations on the time scale?
- How will the message reach the community?

- Presentations at conferences.
 - Task forces on these topics to do inventories.
 - POCs/domains could spread it.
 - Communicate on the website and through POCs.
 - Develop a strategy/marketing plan for the communication of challenges and CORDEX as a whole, also including connections to other WCRP programs as well as VIA links.
- Clear direction on where we are going also necessary for funding etc.
 - POCs could suggest what is more important for the specific area and thereby choose a topic for their focus.
 - Need to prioritize some of the topics to help the community?
 - Need to be inclusive and welcome other initiatives as well.
 - Finish the white paper on the scientific challenges where the new topics will be included.
 - May need to, as CORDEX leads, lobby towards the national agencies/funders.
 - Mich - will see if CORDEX can enter into GCF programs.
 - Mich - WGRC/WGIR is in limbo, not clear what will happen.

ACTION: Start completion of the Matrix.

ACTION: Telecon to decide on how to promote it.

5.3. The action plan and strategy for the coming years

- CORDEX scope/future direction, telecon soon solely on this subject soon
- Find other sources of funding than WCRP. Link to Future Earth?
- Comments from last telecon:
 - CORDEX phase 2 paper on the science questions (BAMS...)?
 - Future of CORDEX – scientific paper, report?
- Review/document the added value of FPS in due time. Already a very positive net-working effect from the FPS-studies plus attracting experts to the community that has not been in the community before.

6. Wrap-up

6.1. Take-home from this Pan-WCRP meeting

Produced a ppt with the main points from CORDEX side:

[See presentation](#)

- CORDEX SAT discussions and Action Items
 - Coordinated Output for Regional Evaluations (CORE):
 - Planned contribution to AR6; simulation framework finalized
 - CORDEX Scientific Challenges:
 - Identified specific focus areas, within the five existing challenges, for example Cities, Lakes and Islands.
 - Discussed cross-cutting issues such as Added Value and Convection Permitting Simulations.
 - Discussed the mechanisms to implement and promote these
 - Two new Flagship Pilot Studies approved
 - CORDEX ESD Task Force formally approved
- Organizing for IPCC:
 - Compilation of publications and information
 - Special issue of accomplishments of CORDEX regions
 - Data dissemination

6.2. Interaction with other WCRP activities

- WGCM and HighResMIP; dialogue started on:
 - Task force to promote further dialogue with areas of focus such as added value, opportunities and limitations in comparisons, high resolution observations...
 - Complementing/benefitting from each other
- In multiple sessions:
 - CORDEX to work with the other groups to provide more detailed information on the evaluation of GCMs for Boundary Conditions: weather climatology, teleconnection patterns
 - The need to discuss how to combine information from different sources into a "coherent Regional Atlas for AR6"
 - Explore the usefulness of common metrics (weather, regional, global)
- General issues directly relevant to CORDEX:
 - Capacity Development
 - Interfacing with VIACS communities
- Format of this Pan-WCRP Modelling meeting very stimulating and useful!

6.3. Close future

- Teleconference in a month;
 - All to collect publication with something to do on added value in their respective domains?

- More frequent teleconferences, maybe once a month. IPOC to fix dates.
- IPOC to find a date with Gau for the next conference.
- IPOC to send reminder about CORDEX publications from 2010.

Topics not covered during the meeting

- **The strategy itself**
- **Interactions with other WCRP programs**
- **Possible cooperation with World Bank**
- **Budget for 2018 – priorities, possible sponsors**
- **Use of CORDEX info/link to VIACS+others**
- **IPOC contract runs out end of 2019, start discussing renewal**
- **Collect information on the use of CORDEX information**

Annex 1: List of Participants

SAT-members

FRIGON, Anne
Consortium Ouranos sur les
changements climatiques
Canada
E-mail: frigon.anne@ouranos.ca

GIORGI, Filippo, co-chair
The Abdus Salam International Centre
for Theoretical Physics
Italy
E-mail: giorgi@ictp.it

GUTOWSKI, William, co-chair
Iowa State University
USA
E-mail: gutowski@iastate.edu

JACOB, Daniela
Climate Service Center Germany
Germany
E-mail: daniela.jacob@hzg.de

JAYANARAYANAN, Sanjay
Indian Institute of Tropical Meteorology
India
E-mail: sanjay@tropmet.res.in

KANG, Hyun-Suk
National Institute of Meteorological
Research
Republic of Korea
E-mail: hyunsuk kang@korea.kr

LENNARD, Christopher
University of Cape Town
South Africa
E-mail: lennard@csag.ac.za

NIKULIN, Grigory
Swedish Meteorological and Hydrological
Institution
Sweden
E-mail: grigory.nikul in@smhi.se

SOLMAN, Silvina
Centro de Investigaciones del Mar y la
Atmósfera
Argentina
E-mail: solman@cima.fcen.uba.ar

STEPHENSON, Tannecia
University of West Indies
Jamaica
E-mail:
tannecia.stephenson02@uwimona.edu.jm

TANGANG, Fredolin
Faculty of Science and Technology
Universiti Kebangsaan Malaysia
Malaysia
E-mail: ftangang@gmail.com

TIMBAL, Bertrand
Centre for Climate Research Singapore
Singapore
E-mail: Bertrand_Timbal@nea.gov.sg

IPOC Director

LAKE, Iréne
Swedish Meteorological and Hydrological
Institution
Sweden
E-mail: irene.lake@smhi.se

Annex 2: Agenda

Monday 09 October	
13.00 - 13.15	Welcome and Introduction (CORDEX co-chairs)
13.00 - 15.00	General CORDEX updates <ul style="list-style-type: none"> • WCRP Strategy and regional scoping document (Bill) <ul style="list-style-type: none"> - The regional scoping document and CORDEX role within the WCRP structure (co-chairs)
15.00 – 15.30	Coffee break and group photo
15.00 – 16.30	CORDEX new simulations <ul style="list-style-type: none"> • CORE simulations status (Filippo)
16.30 – 17.00	FPS Status (Irène)
17.00 -	Pan-WCRP drinks reception with UK Met Office posters
Tuesday 10 October	
09.00 – 10.000	Updates from CORDEX domains incl ESD (Sat-members)
10.00 – 10.30	Specific Added Value Action (Irène)
10.30 – 11.00	Coffee Break
11.00 – 12.00	Scientific Challenges (co-chairs)
12.00 – 12.30	Convection Permitting Modelling (Filippo)
12.30 – 13.30	Lunch
13.30 – 15.00	CORDEX Scope/Future Direction <ul style="list-style-type: none"> • The Action Plan/strategy (co-chairs/Irène) • Contribution to IPCC • Interaction with other WCRP programs
15.00 – 15.30	Coffee Break

15.30 – 17.00	Joint Session with WGCM <ul style="list-style-type: none"> • Regional downscaling for CMIP6/CORDEX CORE-CMIP6 • Links from WGI to WGII, Contribution to AR6
19.00	CORDEX SAT dinner (self-funded)
Thursday 12 October	
09.00 – 10.30	CORDEX Scope/future direction continued <ul style="list-style-type: none"> • Possible cooperation with WB (Bill) • Budget/priorities for 2018/possible sponsors (Irène) • Next ICRC-CORDEX conference – funders, timing etc (Irène/co-chairs)
10.30 – 11.00	Coffee Break
11.00 – 12.00	CORDEX issues <ul style="list-style-type: none"> • SAT Membership (Bill) • Use of CORDEX info/link to VIA+others • Topic and location of next meeting (telecom and the strategy)
12.00	Lunch and end of SAT meeting

Annex 3: Action List

CORDEX CORE

1. *RCP 8.5 and 2.6, ERA-interim 25 km, minimum from 1970-2100.*
2. *Five CMIP5-models to choose from; NorESM (low T-increase for RCP 2.6), MPI ESM (Medium), EC-EARTH (medium), HADGEM2ES (high 2.6), GFDL ESM (low).*
3. *First table output variables mandatory! Second table - highly recommended.*

FPS

4. *Change to only one FPS call a year, in February.*

Domain Updates

5. *Need to do something about the problems in getting simulation results in CORDEX 'format' onto ESGF.*
6. *Summary of CORDEX simulations/info in special journal issue, for instance the climate service journal (some link to services/twist towards users needed, eg analysis impact, what has the region already done with the simulations...). Some general template for the domains to follow.*
7. *Post terms of reference for POCs on the web and send to all POCs.*
8. *Connections between South and Central American groups need to be enhanced. National CORDEX contact points? Daniela will try to find out more about this.*

ESD Update

9. *Summary of CORDEX simulations/info in special journal issue.*
10. *The existing ESD group to continue as a task force under CORDEX.*
11. *Task force to decide how ESD would go into CORE for IPCC recognizing. Motivation could be that dynamical downscaling is really time/resource consuming and ESD is cheaper.*

CORDEX Issues

12. *Next ICRC-CORDEX in China second half of September 2019.*
13. *Face-to-face SAT-meeting 2018.*
14. *Regular SAT teleconferences from now on.*

Joint session with WGCM

15. Contact Veronica for further communication with all relevant CMIP6-groups.

*16. More communication/contact between the groups, contact person from
CORDEX towards WMAC.*

Specific Added Value Action

17. Synthesis/systematic approach on Added Value needed.

Scientific Challenges

18. Start completion of the Matrix.

19. Telecon to decide on how to promote the challenge matrix.

Annex 4: Acronyms and Other Abbreviations

Ana4MIPs	Reanalysis for Model Intercomparison Projects
CLIVAR	Climate and Ocean – Variability, Predictability and Change
CMIP	Coupled Model Intercomparison Project (WCRP)
CORDEX	Coordinated Regional Climate Downscaling Experiment (WCRP)
CORE	Coordinated Output for Regional Evaluation
EGU	European Geophysical Union
EOS	Earth Observation System
ESD	Empirical Statistical Downscaling
ESGF	Earth System Grid Federation
FE	Future Earth
FPS	Flagship Pilot Study (FPS)
GCM	Global Climate Model
GEWEX	Global Energy and Water Cycle Exchanges (WCRP Core-Project)
GFCS	Global Framework for Climate Services
ICSU	International Council for Science
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IPCC	Intergovernmental Panel on Climate Change (WMO, UNEP)
IPOC	International Project Office for CORDEX
HighResMIP	High Resolution Model Intercomparison Project
JSC	Joint Scientific Committee (WCRP)

obs4MIPs	Observations for Model Intercomparison Projects
POC	Point of Contact
RCM	Regional Climate Model
RCP	Representative Concentration Pathway
SAT	Science Advisory Team
SMHI	Swedish Meteorological and Hydrological Institute
TGICA	Task Group on Data and Scenario Support for Impact and Climate Analysis
ToR	Terms of Reference
VIAC	Vulnerability, Impact and Adaptation Community
WGI	IPCC Working Group I
WGII	IPCC Working Group II
WGCM	Working Group on Coupled Modelling
WCRP	World Climate Research Programme (WMO, IOC and ICSU)
WGIR	Working Group on Information for Regions (WCRP, to be approved)
WGRC	Working Group on Regional Climate (WCRP)
WMO	World Meteorological Organization

**The
World Climate
Research Programme
(WCRP)**

*facilitates analysis and
prediction of Earth system change
for use in a range of practical
applications of direct relevance,
benefit and value to society.*

