

**Polar CORDEX breakout session during the ICRC-CORDEX 2016 conference  
Stockholm, 19 May 2016**

**Attendees**

Annette Rinke (Annette.Rinke@awi.de)  
John Cassano (john.cassano@Colorado.EDU)  
Julien Beaumet (Julien.Beaumet@univ-grenoble-alfes.fr)  
Heidrun Matthes (heidrun.matthes@awi.de)  
Markus Meier (markus.meier@io-warnemuende.de)  
Igor Shkolnik (igor@main.mgo.rssi.ru)  
Joakim Longuer (joakim.longuer@smhi.se)  
Pranab Deb (prab@bas.ac.uk)  
Muralidhar Adakudlu (murali@uni.no)  
René Laprise (laprise.rene@gmail.com)  
Emilia Paula Diaconescu (emilia\_paula.diaconescu@ek.imss.ca)  
Torben Königk (torben.koenigk@smhi.se)  
Mirseid Akperov (aseid@ifaran.ru)  
Martin Olesen (mol@dmi.dk)  
Oliver Gutjahr (gutjahr@uni-trier.de)  
Marzena Osuch (marz@igf.edu.pl)  
Linda Mearns (lindam@ucar.edu)

**Arctic contributions**

**Annette Rinke (AWI; see pdf)**

Arctic CORDEX overview

- 13 RCMs participating in Arctic CORDEX
- Hindcast (ERA-I) simulations - 12 RCMs and 5 coupled RCMs; Most cover 1979 to 2014
- Future projections: 6 RCMs and 2 coupled RCMs; Most cover: 2006 to 2100, RCP 4.5 or 8.5.
- Ongoing analysis:
  - Analysis of individual model results
  - Multi-model analysis: General skill and across model scatter; Extremes; Precipitation and snowfall; Cyclone activity including polar lows; Gas exchange in the Arctic seas; Upper ocean state, sea ice production; Atmosphere - sea ice interactions
- Planned activities in 2016 and beyond
  - Complete atmosphere RCM future projection simulations. Goal is to have RCM simulation for 4 GCMs
  - Some higher resolution circum-Arctic or sub-Arctic domains at 25, 12, or 5 km?
  - CMIP6 downscaling?
- Possible interactions with other projects:
  - CLIC (SIMIP, sea ice & climate model forum / Arctic sea ice working group), FAMOS
  - Role of Arctic CORDEX output for off-line models and IAV: Regional Arctic ocean model, Ice sheet models, ISMIP, Hydrology

**Oliver Gutjahr (University of Trier; see pdf)**

Update about and Simulations with COSMO CLM (CCLM)

- Implemented fractional sea ice option in CCLM with manuscript submitted to *The Cryosphere*
- Have run sensitivity simulations with new sea ice option in CCLM focused on Laptev Sea
- Extreme value analysis of 10 m winds in CCLM, ERA-I, and Arctic System Reanalysis
- Plan to run 15 km CCLM for entire ERA-I period
- Ice - ocean modeling with FESOM - look at ice production. Simulations have been forced with ERA-I, plan to run FESOM simulations forced with CCLM simulations at multiple resolutions.
- Others in the department are working on polar lows.

### **René Laprise (UQAM; see pdf)**

Update about Arctic CORDEX simulations with CRCM5

- Simulations driven by GCM: Empirical correction of SST BCs  
Calculate average bias between GCM and analysis and subtract this from GCM SST for each day, month, and year.  
Next run atmospheric GCM (used CGCM for this) with updated SST and SIC from original GCM.  
Use output from intermediate GCM simulation as lateral BCs for RCM with bias-corrected SSTs
- This SST correction approach reduces near surface temperature bias in current climate RCM simulations.
- Future projections show a change in climate using original and empirically corrected GCM SSTs
- The uncertainty in the SST correction introduces one more source of uncertainty in RCM future climate projections.
- If other groups are interested in doing this, using different GCMs for the intermediate step, they should contact René.

### **Marzena Osuch (Institute of Geophysics Polish Academy of Sciences)**

- Validation of climate model simulations using data from the Spitsbergen Hornsund area and estimate of climate variability in this area from 1979 to 2004
- Using model data from Arctic CORDEX with two emission scenarios (RCP4.5 and RCP8.5) with SMHI RCA forced by 4 different GCMs
- Validation of simulations for monthly mean air temperature and precipitation, and analysis of their trends and future changes (paper in Polish Polar Res. J.)
- Future plans to look at hydrologic conditions in this region - runoff, permafrost, and glacier mass balance

### **Emilia Paula Diaconescu (Ouranous, Quebec; see her talk at the conference web page)**

- Daily precipitation and temperature extremes over northern Canada estimated from Arctic and North America CORDEX simulations and reanalysis
- Evaluate climate indices from reanalysis and RCM for reference period of 1980-2004
- Climate indices from expert team on climate change and detection of extremes
- Models: HIRHAM5, CCCma-CanRCM4, SMHI RCA4, UQAM-CRCM5
- Reanalyses: GMFD - obs corrected NCEP1 data, CFSR, MERRA, JRA-55, ERA-I
- NRCAN gridded observations
- Compare model / reanalysis data to station data using nearest grid point
- Skill metric: Reduction of variance
- Found good skill for mean temperature and maximum temperature, poor skill for minimum temperature and many precipitation variables

### **Heidrun Matthes (AWI; see her poster at the conference web page)**

- Representing Arctic extreme temperatures (cold, warm spells) in the Arctic CORDEX ensemble
- Using simulations from HIRHAM, WRF, MAR, RCA4, RCA-GUESS, RRCM, CanRCM4, CRCM5, with 11 different simulations

### **Torben König (SMHI; see his posters at the conference web page)**

- Looking at Arctic precipitation extremes with Arctic CORDEX models
- Initial results: all models have similar spatial patterns and similar to ERA-I

### **Martin Olesen (DMI)**

- Future climate in Greenland
- Created catalog of 71 climate indices for historical, 2031-2050, 2081-2100 for RCP4.5 and RCP8.5

**Mirseid Akperov (IAP RAS; see his talk at the conference page)**

- Cyclone activity in the Arctic CORDEX ensemble
- Using simulations from HIRHAM, WRF, MAR, RCA4, RCA-GUESS, RRCM, CanRCM4, CRCM5, with 11 different simulations and 3 reanalyses (ERA-Interim, NASA-MERRA2, NCEP-CFSR)
- Future plans to look polar lows activity, lapse rate (PhD student) in the Arctic;

**Antarctic contributions:**

**Julien Beaumet (Univ. Grenoble/LGGE; see pdf; see his poster at the conference web page)**

- Climate changes in Antarctica: ocean forcings, bias correction methods and global circulation models
- Using GCMs with stretched grid (CNRM - ARPEGE and LMDZ)
- Resolution over Antarctica of 35 to 50 km
- Working on developing SST and sea ice concentration bias correction methods  
SST bias correction - used two methods: Absolute anomaly method and quantile method  
Sea ice concentration bias correction - relative anomaly method (Krinner et al. 2008), quantile method, Box KNMI method
- Would be willing to provide output to Antarctic CORDEX archive

**Pranab Deb (BAS)**

- Running 15 km simulations over West Antarctica with Polar WRF
- Interested in warming over West Antarctica and ice loss in this region.
- Plan to run future simulations to 2100

**Oliver Gutjahr (University of Trier)**

- Running 15 km simulations over Weddell Sea with COSMO-CLM.

**Concluding remarks**

- Repeat announcement about Arctic CORDEX meeting in Bergen in November 28-30, 2016
- Request for any updates to simulations that have been completed or planned
- Submission of data from the finished simulations to ESGF!