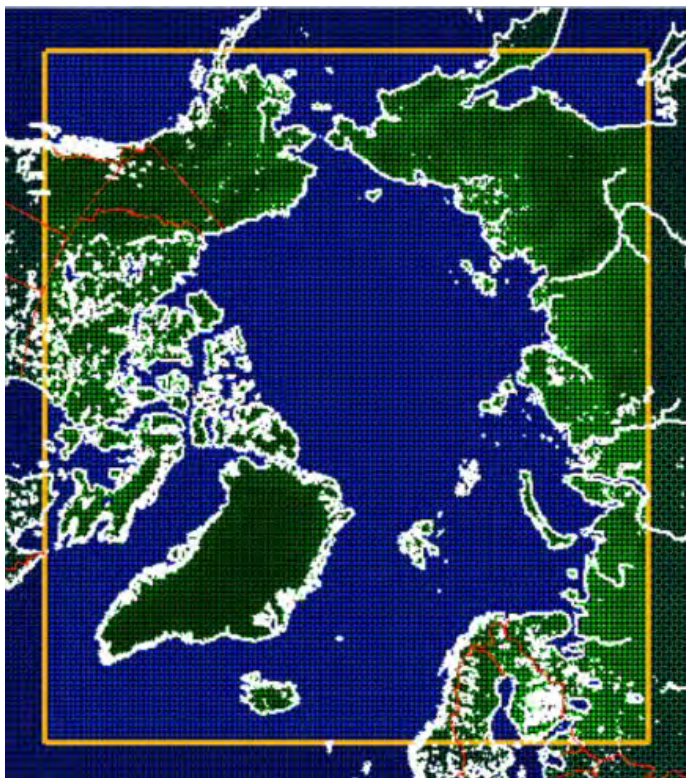


Arctic Cordex

POC: John Cassano and Annette Rinke

Circum-Arctic domain

horiz. resol. of 0.44°
(ca. 50 km x 50 km)



13 Participating Institutes (alphabetically) which run circum-Arctic RCMs

AWI	Potsdam, Germany
CCCma	Victoria, Canada
Colorado Uni.	Boulder, USA
DMI	Copenhagen, Denmark
EMUT	Trier, Germany
GERICS	Hamburg, Germany
ISU	Iowa, USA
Lund Uni.	Lund, Sweden
MGO	St. Petersburg, Russia
SMHI	Norrköping, Sweden
UNI	Bergen, Norway
Ulg	Liège, Belgium
UQAM	Montreal, Canada

SIMULATIONS

Hindcast simulations for model evaluation (ERA-Interim-driven, 1979-2014)

- 12 atmospheric RCMs finished simulations
- 5 coupled atmosphere-ice-ocean RCMs finished simulations

ERA-Interim-driven simulations

Atmosphere-only models						
		ca. 50 km	ca. 25 km	ca. 15 km	nudging	period
SMHI	RCA4	x			w/ and w/o	1980-2010
CCCma	CanRCM5	x	x		w/	1979-2014
AWI	HIRHAM5	x	x		w/	1979-2014
DMI	HIRHAM5	x			w/o	1989-2011
ULg	MAR3.6	x			w/	1979-2014
MGO	RRCM	x			w/o	1979-2014
CU/ISU	WRF	x			w/ and w/o	1979-2014
UNI	WRF	x			w/o	1979-2014
UQAM	CRCM5	x	x		w/ and w/o	1979-2014
GERICS	REMO	x	(x)		w/o	1979-2014
EMUT	CCLM			x	w/o	2002-2014 (Nov-Apr)
Uni Lund	RCA4-GUESS	x			w/o	1979-2013

w/ with; w/o without

Bold x means “simulation is finished or running”

ERA-Interim-driven simulations

Atmosphere-Ocean Models					
		resolution atm.-ocean (km)	nudging	period	status
SMHI	RCAO	50-25	w/ and w/o	1979-2012	x
Uni Lund	RCAO- GUESS	50-25	w/	1989-2011	x
CU/ISU	RASM	50-9	w/	1989-2015	x
AWI	HIRHAM- NAOSIM	50-25	w/o	1979-2014	x
GERICS	REMO- MPI- HAMOCC	50-20	w/o	1979-2014	x
DMI	HIRHAM- HYCOM	30-20			
UNI	COAWST				

w/ with; w/o without

Bold x means “simulation is finished or running”

SIMULATIONS

Future projections (GCM-driven, RCP 8.5 and 4.5, 2006-2100)

- 6 atmospheric RCMs finished simulations
- 2 coupled atmosphere-ice-ocean RCMs finished simulations

Scenario simulations (RCP8.5; 2006-2100)

Atmosphere-only models						
	RCM \ GCM	CanESM2	NorESM1-M	EC-EARTH	MPI-ESM-LR	nudging
SMHI	RCA4	x	x	x	x	w/ and w/o for MPI-ESM & EC-Earth; w/o for others
Uni Lund	RCA-GUESS			x		w/o
CCCma	CanRCM4	x				w/
AWI	HIRHAM5	(x)	(x)	x	x	w/o
DMI	HIRHAM5		x	x		w/o
ULg	MAR	x	x			w/
MGO	RRCM				x	w/o
UQAM	CRCM5	x			x	w/o ; (1)
UNI	WRF		x			w/o
GERICS	REMO		(x)		x	w/o

The associated simulations are/will be done for the historical period 1950-2005

(1) w/ and w/o bias-corrected GCM SST and sea-ice

w/ with; w/o without

Bold x means “simulation is finished or running”

Scenario simulations (RCP8.5; 2006-2100)

Atmosphere-Ocean Models						
	RCM\GCM	NorESM1-M	EC-EARTH	MPI-ESM-LR	CCSM4	nudging
SMHI	RCAO		x	x		w/ and w/o
CU/ISU	RASM				x	
AWI	HIRHAM-NAOSIM			x		w/o
GERICS	REMO-HAMOCC	(x)		x (5 ens.)		w/o
UNI	COAWST					
DMI	HIRHAM-HYCOM					

The associated simulations are/will be done for the historical period 1950-2005

w/ with; w/o without
Bold x means “simulation is finished or running”

- **Individual model** results:
 - nudging, added value, extremes, validation, climate change,...
- **Multi-model analysis** has been initiated and started:
 - General skill & across-model scatter (temperature, precipitation, wind; *Adakudlu et al.*)
 - Extremes (temperature, precipitation; *Matthes et al., Königk et al., Diaconescu et al.*)
 - Precipitation and snowfall (*Rinke et al.*)
 - Cyclone activity incl. polar lows (*Akperov et al.*)
 - Gas exchange in the Arctic seas (*Shkolnik et al.*)
 - Ocean (upper ocean T & S structure), sea-ice production & volume (*Maslowski et al.*)
 - Atmosphere-sea ice interactions (*Königk et al., Rinke et al.*)

SIMULATIONS

Future projections (CMIP5-GCM-driven, RCP 8.5, 2006-2100)

- 10 atmospheric RCMs: downscaling of 4 GCMs by 4 RCMs; 4 coupled RCMs simulation
- model developments & process understanding
- Higher resolution (circum-Arctic and/or subdomains?) – some (25, 12, 5 km) has been done
- CMIP6 downscaling

ANALYSIS

Continuation of multi-model analysis

including also

- Extreme weather events (wind, waves, cyclones, temperature & hydrolog. extremes)
- Ocean structure (upper ocean heat content, surface mixed layer, eddies) & sea-ice processes (thickness distribution, deformation, export)
- Vegetation-biogeochemical feedbacks
-

CliC (SIMIP, Sea ice & Climate Model.Forum/Arctic Sea Ice Working Group) & FAMOS

- support for our work on coupled Arctic RCMs
- benefit from observational data for the evaluation/improvement of sea-ice simulation
- learn from tuning sea-ice models

Role of Arctic Cordex output for off-line models & IAV

- Regional Arctic ocean model (*Steiner et al.*)
- Ice sheet models; ISMIP (e.g. Greenland: *DMI, Ulg*)
- Hydrology (e.g. Siberia: *Skolnik et al., Grenier et al.*)