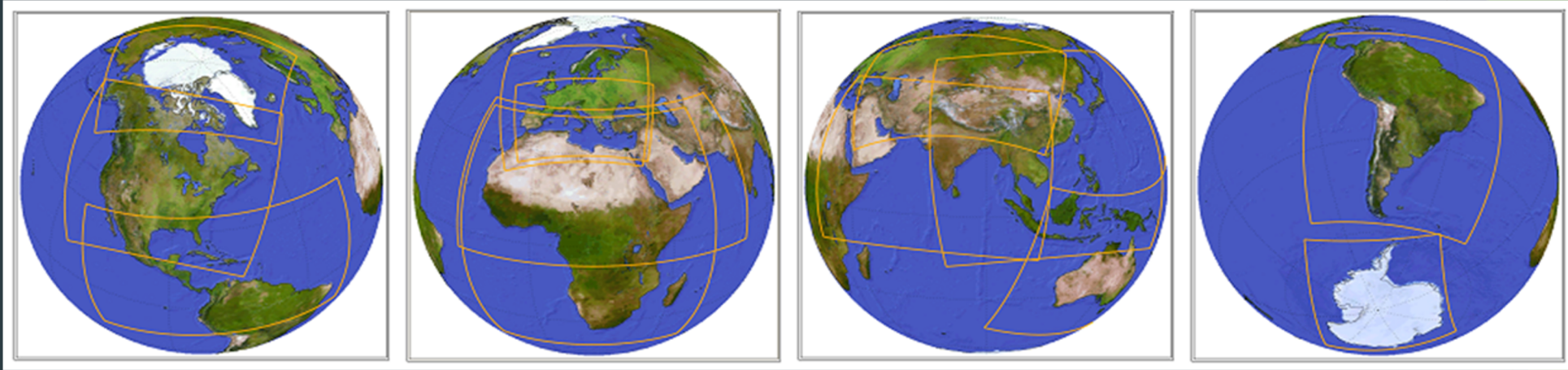


# CORDEX in South America & Introduction to the new WCRP Core Project: Regional Information for Society (RIfS)

**Silvina A. Solman**

University of Buenos Aires - Department of Atmospheric and Ocean Sciences  
CIMA (CONICET/UBA)

First Climate Research Forum in the South America Region, September 8 & 9, 2021



# *COordinated Regional Downscaling Experiment CORDEX in South America*

Silvina Solman and Daniela Jacob  
CORDEX-SAT Co-Chairs

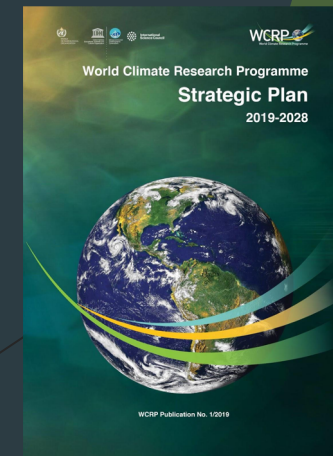
# CORDEX Overview



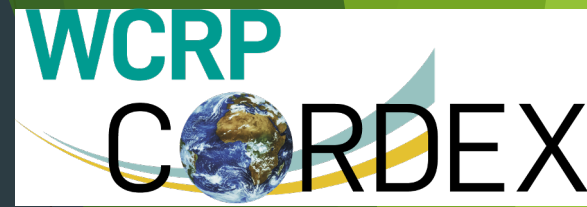
*The CORDEX vision is to advance and coordinate the science and application of regional climate downscaling through global partnerships*

## Goals:

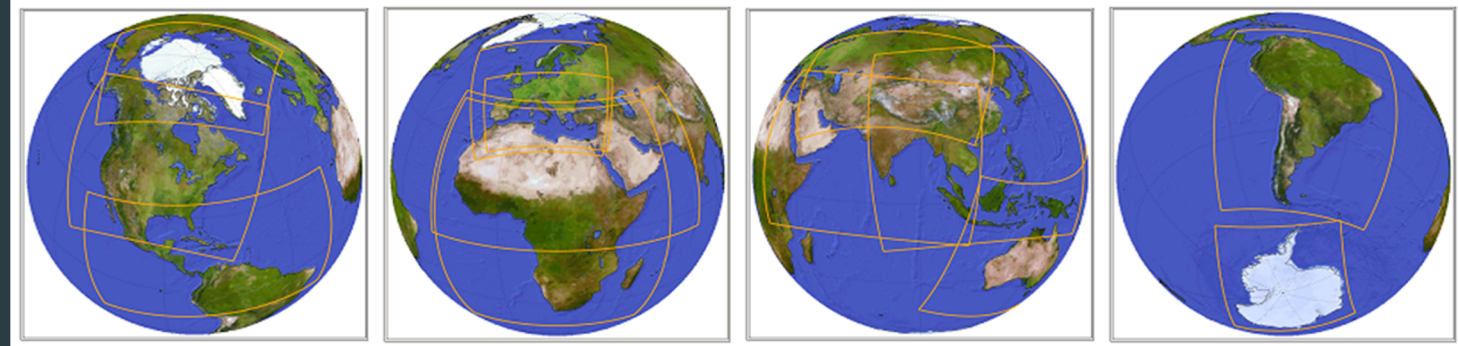
- To better understand relevant regional/local climate phenomena, their variability and changes, through downscaling
  - To evaluate and improve regional climate downscaling models and techniques
  - To produce coordinated sets of regional downscaled projections worldwide
  - To foster communication and knowledge exchange with users of regional climate information
- 
- CORDEX directly contributes to the new WCRP strategic plan, especially Pillar 4: *“Bridging climate science and society”*
  - CORDEX is an instrumental part of the *Regional Information for Society (RifS) WCRP New Core Project*



# CORDEX Structure



CORDEX includes 14 domains, regions for which regional downscaling is taking place and which have an official CORDEX designation.



CORDEX  
Science  
Advisory Team  
(SAT)

- 12 members with Daniela Jacob and Silvina Solman as co-chairs; members are appointed for a 4-year term, with the possibility of 2-year extensions.
- Reports regularly at the JSC meetings on the progress of its activities (on yearly basis).

CORDEX Points  
of Contacts  
(POCs)

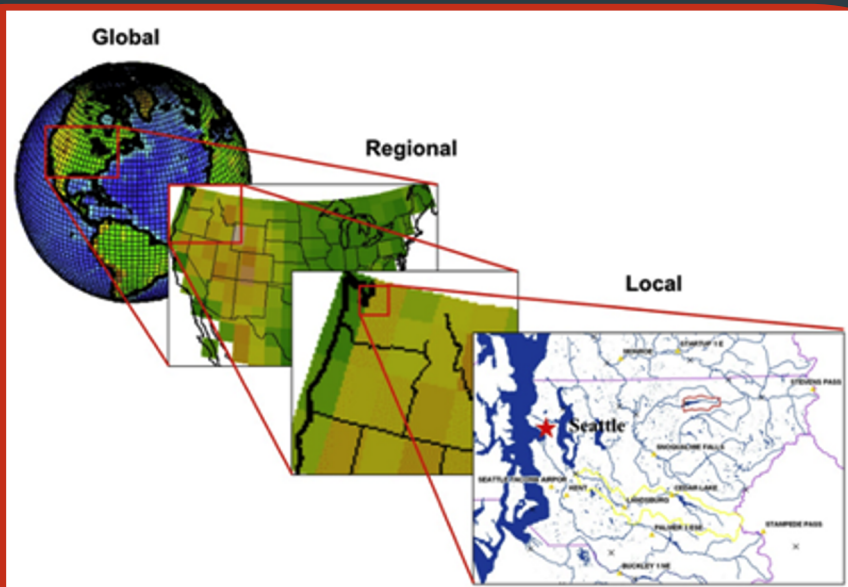
- 44 members (POCs)
- Reports annually to the SAT and CORDEX Project Office on current and future activities

CORDEX  
International  
Project Office  
(IPO)

- The IPO for CORDEX (IPOC) is hosted by SMHI with Irène Lake as Director



# CORDEX: Primary science issues



# CORDEX White Paper on Regional Climate Modelling / Empirical Statistical Downscaling-ESD: Future challenges

- Convection permitting resolution to inform risks/Vulnerability, Impacts, Adaptation and Climate Services communities (VIACS)
- RESMs to include human dimension
- Handle increasing data amounts
- Merge Dynamical Downscaling with ESD



## Flagship Pilot Studies

- Regional-to-local extremes
- Third pole region
- Convection permitting
- Land use change
- Urban areas
- Aerosols

## CMIP6 Downscaling protocol

[illegible]

## Capacity building activities

- Regional training workshops

# CORDEX data availability (input for IPCC AR6 CH6/Atlas)



- Open access
- Standardized, quality controlled
- Observational basis for verification
- Community effort
- Inventory of GCM/RCMs on [www.cordex.org](http://www.cordex.org)

CORDEX model output data is available online via:

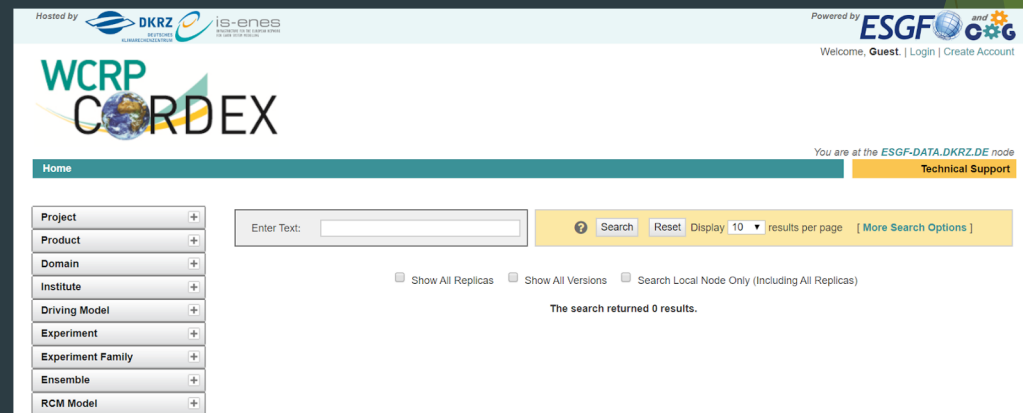
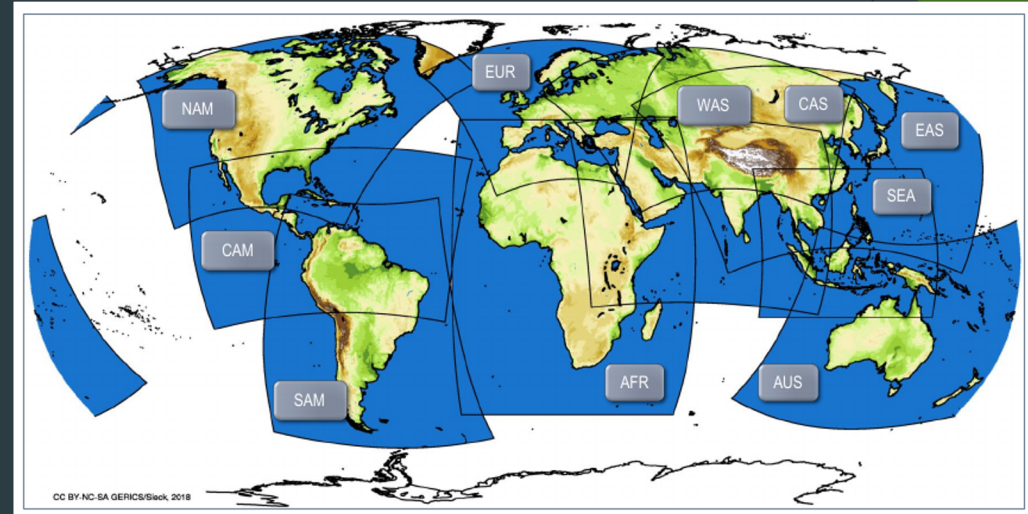
- Earth System Grid Federation
- Copernicus Climate Data Store



Climate Data Store (CDS)  
Climate data at your fingertips



## CORDEX-CORE Regions/Domains



# CORDEX South America (SAM)

1: South America (SAM): <https://cordex.org/domains/cordex-region-south-america-cordex/>

(\*) Details on registered RCMs at

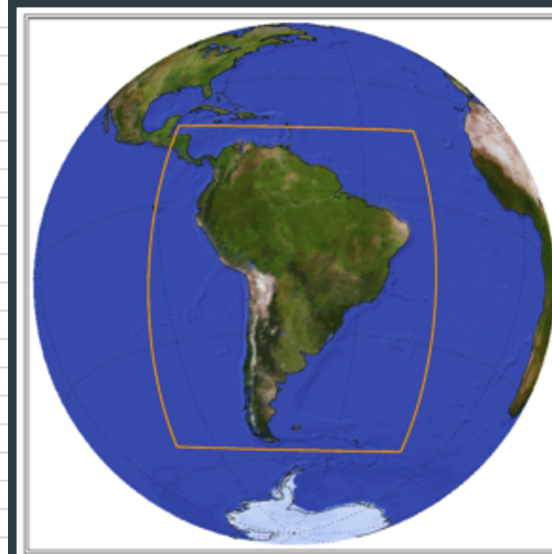
[https://github.com/IS-ENES-Data/cordex/blob/master/CORDEX\\_register.xlsx](https://github.com/IS-ENES-Data/cordex/blob/master/CORDEX_register.xlsx) (version 10 Nov 2020); see also [http://is-enes-data.github.io/CORDEX\\_RCMs\\_info.html](http://is-enes-data.github.io/CORDEX_RCMs_info.html)

(1) ESGF information updated as of 23 Nov 2020

publicly available at ESGF (23/11/2020)

available from modeling centers

#	Domain	GCM_run	RCM	Evaluation	Historical	RCP2.6	RCP4.5	RCP8.5	Institution	Access (1)
1	SAM-20	ECMWF-ERAINT	Eta_v1	1979-2010	N/A	N/A	N/A	N/A	INPE	Local provider
2	SAM-20	CanESM2_r1i1p1	Eta_v1	N/A	1961-2005	N/A	2006-2099	2006-2099	INPE	ESGF
3	SAM-20	MIROC5_r1i1p1	Eta_v1	N/A	1961-2005	N/A	2006-2099	2006-2099	INPE	ESGF
4	SAM-20	HadGEM2-ES_r1i1p1	Eta_v1	N/A	1961-2005	N/A	2006-2099	2006-2099	INPE	ESGF
5	SAM-22	ECMWF-ERAINT	REMO2015_v1	1979-2017	N/A	N/A	N/A	N/A	GERICS	ESGF
6	SAM-22	HadGEM2-ES_r1i1p1	REMO2015_v1	N/A	1970-2005	2006-2099	N/A	2006-2099	GERICS	ESGF
7	SAM-22	MPI-ESM-LR_r1i1p1	REMO2015_v1	N/A	1970-2005	2006-2100	N/A	2006-2100	GERICS	ESGF
8	SAM-22	NorESM1-M_r1i1p1	REMO2015_v1	N/A	1970-2005	2006-2100	N/A	2006-2100	GERICS	ESGF
9	SAM-22	ECMWF-ERAINT	RegCM4-7_v0	1979-2015	N/A	N/A	N/A	N/A	ICTP	ESGF
10	SAM-22	HadGEM2-ES_r1i1p1	RegCM4-7_v0	N/A	1970-2005	2006-2099	N/A	2006-2099	ICTP	ESGF
11	SAM-22	MPI-ESM-MR_r1i1p1	RegCM4-7_v0	N/A	1970-2005	2006-2099	N/A	2006-2099	ICTP	ESGF
12	SAM-22	NorESM1-M_r1i1p1	RegCM4-7_v0	N/A	1970-2005	2006-2099	N/A	2006-2099	ICTP	ESGF
13	SAM-44	ECMWF-ERAINT	RegCM4-3_v4	1979-2008	N/A	N/A	N/A	N/A	ICTP	ESGF
14	SAM-44	HadGEM2-ES_r1i1p1	RegCM4-3_v4	N/A	1970-2005	N/A	2005-2099	2005-2099	ICTP	ESGF
15	SAM-44	MPI-ESM-MR_r1i1p1	RegCM4-3_v4	N/A	1970-2005	N/A	N/A	2005-2045	ICTP	ESGF
16	SAM-44	GFDL-ESM2M_r1i1p1	RegCM4-3_v4	N/A	1970-2005	N/A	N/A	2005-2099	ICTP	ESGF
17	SAM-44	ECMWF-ERAINT	REMO2009_v1	1989-2008	N/A	N/A	N/A	N/A	MPI-CSC	ESGF
18	SAM-44	MPI-ESM-LR_r1i1p1	REMO2009_v1	N/A	1950-2005	2006-2100	2006-2100	2006-2100	MPI-CSC	ESGF
19	SAM-44	ECMWF-ERAINT	RCA4_v3	1980-2010	N/A	N/A	N/A	N/A	SMHI	ESGF
20	SAM-44	CSIRO-Mk3-6-0_r1i1p1	RCA4_v3	N/A	1951-2005	N/A	2006-2100	2006-2100	SMHI	ESGF
21	SAM-44	CanESM2_r1i1p1	RCA4_v3	N/A	1951-2005	N/A	2006-2100	2006-2100	SMHI	ESGF
22	SAM-44	EC-EARTH_r12i1p1	RCA4_v3	N/A	1951-2005	2006-2100	2006-2100	2006-2100	SMHI	ESGF
23	SAM-44	IPSL-CM5A-MR_r1i1p1	RCA4_v3	N/A	1951-2005	N/A	2006-2100	2006-2100	SMHI	ESGF
24	SAM-44	MIROC5_r1i1p1	RCA4_v3	N/A	1951-2005	2006-2100	2006-2100	2006-2100	SMHI	ESGF
25	SAM-44	HadGEM2-ES_r1i1p1	RCA4_v3	N/A	1951-2005	2006-2099	2006-2099	2006-2099	SMHI	ESGF
26	SAM-44	MPI-ESM-LR_r1i1p1	RCA4_v3	N/A	1951-2005	2006-2100	2006-2100	2006-2100	SMHI	ESGF
27	SAM-44	NorESM1-M_r1i1p1	RCA4_v3	N/A	1951-2005	2006-2100	2006-2100	2006-2100	SMHI	ESGF
28	SAM-44	GFDL-ESM2M_r1i1p1	RCA4_v3	N/A	1951-2005	N/A	2006-2100	2006-2100	SMHI	ESGF
29	SAM-44	ECMWF-ERAINT	WRF341i_v1	1979-2011	N/A	N/A	N/A	N/A	UCAN	ESGF
30	SAM-44	CanESM2_r1i1p1	WRF341i_v2	N/A	1950-2005	N/A	2006-2100	2006-2100	UCAN	ESGF
31	SAM-44i	ECMWF-ERAINT	CCAM-1391M	1979-2005	N/A	N/A	N/A	N/A	CSIRO	Local provider
32	SAM-44i	ACCESS1-0_r1i1p1	CCAM-1391M	N/A	1960-2005	N/A	2006-2099	2006-2099	CSIRO	Local provider
33	SAM-44i	CCSM4_r1i1p1	CCAM-1391M	N/A	1960-2005	N/A	2006-2099	2006-2099	CSIRO	Local provider
34	SAM-44i	CNRM-CM5_r1i1p1	CCAM-1391M	N/A	1960-2005	N/A	2006-2099	2006-2099	CSIRO	Local provider
35	SAM-44i	GFDL-CM3_r1i1p1	CCAM-1391M	N/A	1960-2005	N/A	2006-2099	2006-2099	CSIRO	Local provider
36	SAM-44i	MPI-ESM-LR_r1i1p1	CCAM-1391M	N/A	1960-2005	N/A	2006-2099	2006-2099	CSIRO	Local provider
37	SAM-44i	NorESM1-M_r1i1p1	CCAM-1391M	N/A	1960-2005	N/A	2006-2099	2006-2099	CSIRO	Local provider



## Summary of CORDEX SAM simulations available

- 37 simulations
  - 8 RCM + 12 driving GCMs
- 3 RCPs + historical + evaluation simulations
- Horizontal resolutions ranging from 20km to 50 km



# CORDEX South America (SAM): Activities



FPS-SESA: Extreme precipitation events in Southeastern South America: a proposal for a better understanding and modelling (2016-2021)

Departamento de Ciencias de la Atmósfera y los Océanos  
Facultad de Ciencias Exactas y Naturales - Universidad de Buenos Aires  
CORDEX-FPS-SESA  
<http://cordexfpssesa.at.fcen.uba.ar>

ABOUT PARTNERS EXPERIMENTS MEETINGS PUBLICATIONS CONTACT

FPS-SESA: Extreme precipitation events in Southeastern South America: a proposal for a better understanding and modeling

### Motivation

Southeastern South America (SESA) covers central-northeastern Argentina, Uruguay and southern portions of Brazil and Paraguay. There is increasing evidence that climate is changing over SESA, where extreme events are becoming more frequent and more intense. Extreme precipitation in SESA usually comes from large systems that dominate the contribution to the hydrologic cycle. Extreme precipitation events in SESA are usually accompanied by hail, strong winds, flooding and dangerous lightning that have large socio-economic impacts. Although much work has been done to understand these events, it is still a challenge to better identify the factors and mechanisms that determine the location, intensity and frequency of the precipitation extremes and their impacts.

### Objectives

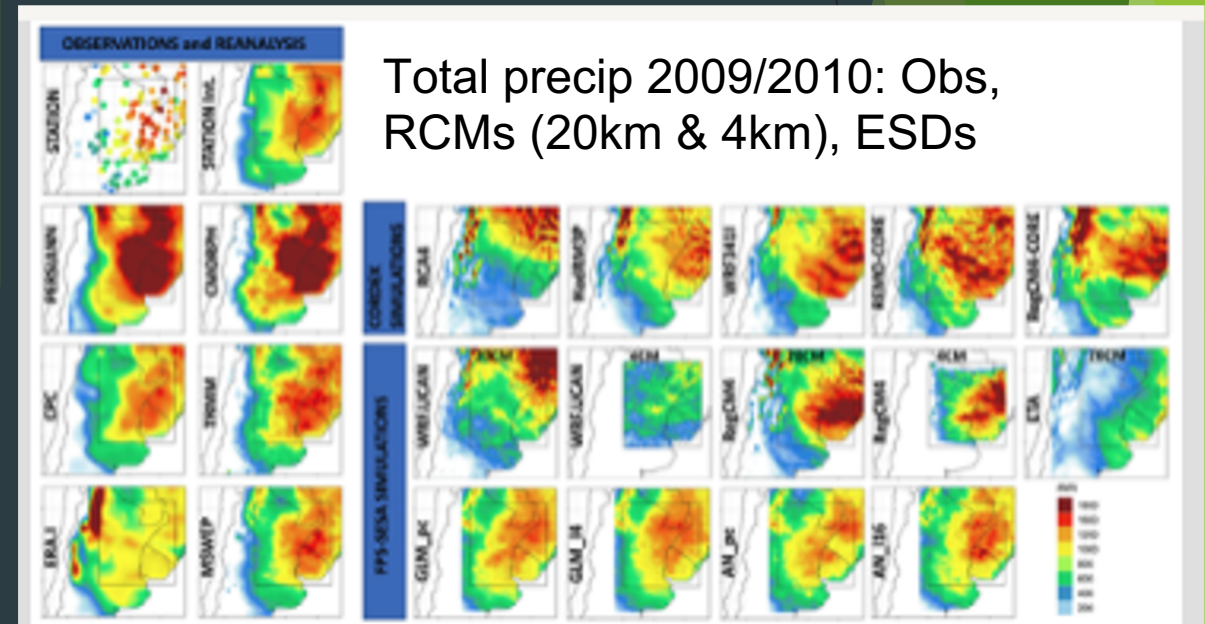
The Flagship Pilot Study in Southeastern South America (FPS-SESA) endorsed by the Coordinated Regional Climate Downscaling Experiments (CORDEX) program seeks to promote inter-institutional collaboration and further networking with focus on extreme rainfall events over SESA.

The main scientific aims are to study multi-scale processes and interactions most conducive to extreme events through both statistical and dynamical downscaling techniques, including convection-permitting simulations; and to develop actionable climate information from multiple sources (statistical and dynamical downscaling products) based on co-production with the impact and user community.

## Scientific Meetings

- Second Workshop on CORDEX-FPS South America, Sao Paulo, Brazil, 6-7 Nov. 2018
- First Workshop on CORDEX-FPS South America, Sao Jose dos Campos, Brazil, 23-24 March 2017.

Bettolli et al. 2021, DOI : 10.1007/s00382-020-05549-z;  
Lavin-Gullon et al. 2021, DOI: 10.1007/s00382-021-05637-8



# CORDEX South America (SAM): Activities



## Capacity building Activities

- CORDEX SAM & CAM Writing Workshop (2020 & 2021) – virtual (45 participants)
- CORDEX Central America and South America Training Workshop on Downscaling Techniques (2018) – Bolivia (30 participants)
- Second ICTP Advanced School on Regional Climate Modeling and Extreme Events over South America, Sao Paulo, Brazil, 5-9/11 2018



## CordexLac mailing list

[cordexlac\\_list@cima.fcen.uba.ar](mailto:cordexlac_list@cima.fcen.uba.ar)

Up to 150 members from South and Central America, the Caribbean and Latin America





# CORDEX South America (SAM)

## CORDEX SAM Points of Contact

### Dynamical Downscaling

- Silvina Solman - Universidad de Buenos Aires, Argentina [solman@cima.fcen.uba.ar](mailto:solman@cima.fcen.uba.ar)
- Rosmeri Porfirio da Rocha - University of Sao Paulo, Brazil [rosmerir@model.iag.usp.br](mailto:rosmerir@model.iag.usp.br)

### Statistical Downscaling

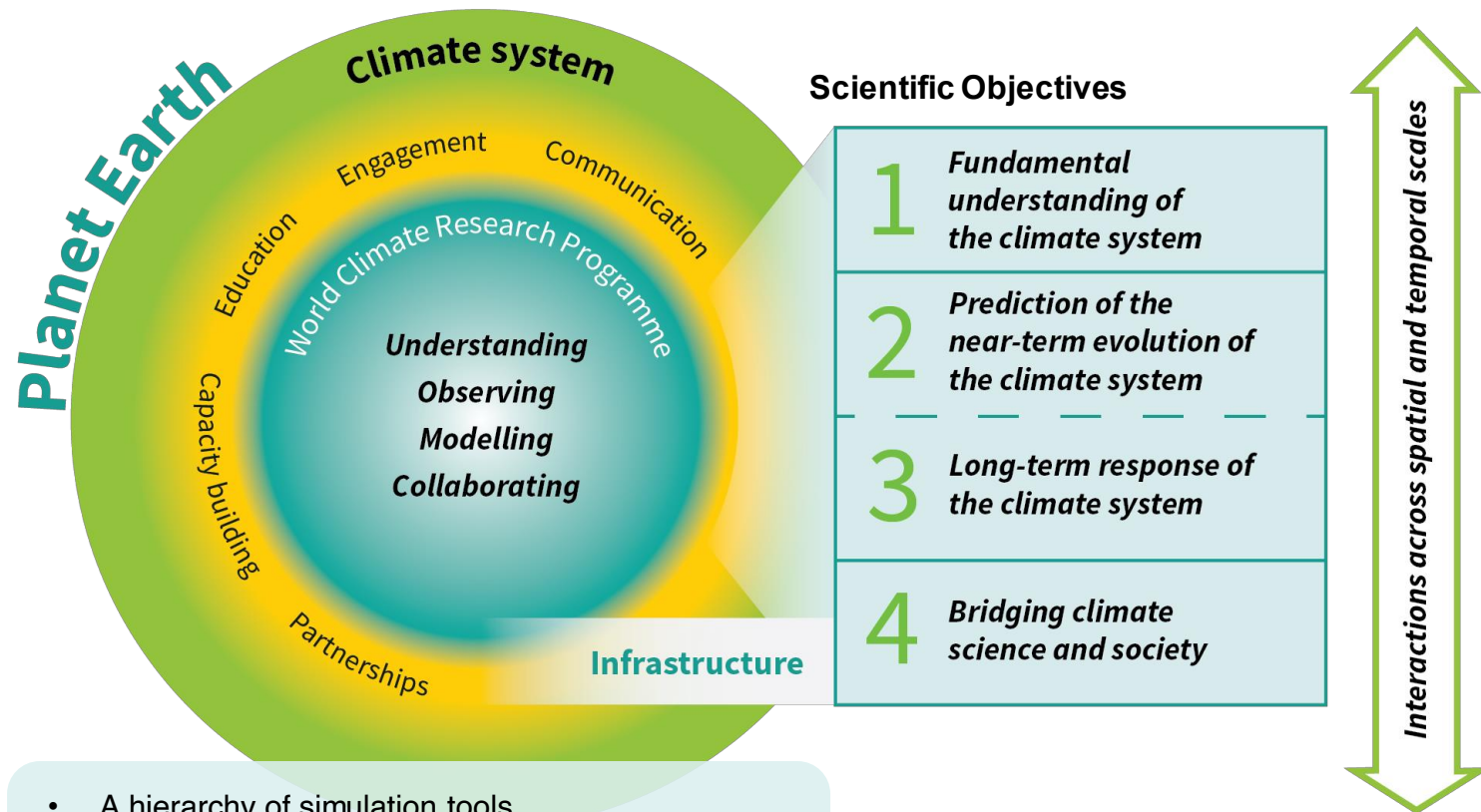
- Maria Bettolli - Universidad de Buenos Aires, Argentina [bettolli@at.fcen.uba.ar](mailto:bettolli@at.fcen.uba.ar)

# Introduction to the new WCRP Core Project: Regional Information for Society (RIfS)

Silvina Solman, Sara Pryor and Bruce Hewiston  
RIfS Co-chairs

# RIfS: Context

## WCRP Strategic Plan for the next decade



### New WCRP CORE Project RIfS

Goal: Pursue strong integration across the WCRP and add value by providing regional information that meets societal needs.

- A hierarchy of simulation tools
- Sustained observations and reference data sets
- Need for open access
- High-end computing and data management



# RifS: Brief History

Following JSC 41: Task Team on Regional Activities (TTRA)

- To propose structures and develop a concrete work plan
- Initial dialogue of the TTRA + WGRC + CORDEX

Interim Coordinating Group (ICG), 3 co-chairs (1 from CORDEX)  
Working Group on Building Blocks (WGBB)  
Governance planning committee

Dec. 2020

June 2021 - on going

May 2019

Early 2021

JSC-41b

- TTRA recommends new Home “RifS”

Mission and Vision,  
Science plan, Structure  
and IPO

## Excellent global participation

- Planning meeting in March had over 50 participants
- 18 RifS virtual planning meetings held since the end of April


# RIfS: Strategic goals and outcomes

 **Objective:** Enhance societal value of regional climate information


 **Core principles:** Facilitate and catalyze research for actionable information.

 Undertake this through research on:


- ✓ Integrating the best available science
- ✓ Incorporating decision contexts
- ✓ Engaging within a co-creation/co-production framework

 **Science foci:** Research questions relevant to regional information about the physical climate system, co-production, social sciences, communication, ethics and values.

 Foci include:

 Understanding climate drivers of regional climate variability and change related to impacts

 How to better integrate across the approaches to producing climate information

 Learning from society's decision makers, policy communities, and other stakeholders to enhance physical climate science research agendas and activities



# RIfS: Science Plan and Desired outcomes

## Seeks to advance:

- Understanding of the stakeholder and climate services landscape
- Dialogue with stakeholders on context-relevant climate information
- Assessment and articulation of skill and uncertainty in regional predictions/projections.
- Approaches to the integration and construction of regional information
- Identification and understanding of multi-scale climate drivers of regional risk

## Desired outcomes include:

- Enhanced reduction of systemic risk to climate change and variability
- Clear and sustained dialogue with major users that is regionally context relevant
- Improved understanding to develop and deliver context-dependent climate science
- Increased collaboration within and beyond the WCRP in relevant knowledge co-production.

**CORDEX is a core component of RIfS**

# RifS: Structure

## 1. RiFS Internal Board (IB) *(Includes the role of a scientific steering committee (SSC))*

- Selected from nominations to ensure of:
  - Geographic, gender and age balance
  - Expertise spanning the RifS core themes
- 15 members with additional ex-officio attendance by partners
- 3 co-chairs with expertise to span the full RifS agenda. Co-chairs nominated by the RifS internal board for approval by the JSC (1 co-chair must be from CORDEX community)

## 2. Assembly of allied WCRP Core and Lighthouse representatives *(established by IB)*

- Focused on enabling cross-cutting collaboration around regional climate information
- Point of communication from RifS engagement with external partners
- 2 Nominated members from each WCRP core project or LHA

## 3. External board with regional representatives and stakeholders *(established by IB)*

- Applications to be solicited using the widest possible network of external organizations

# RifS: Additional issues

## 3. Partnerships

### **To meet our overarching goals RifS will**

- Include social scientist and communication specialists
- Proactively engage with both the climate service and VIA communities
- Target initial pilot regions to catalyze joint activities and develop community interfaces
- Open discussion with appropriate regional activities and organizations

## 4. Requirements

RifS is exploring ideas for external resources (e.g. Bezos Earth Fund, Belmont Forum).



Questions?