



## CORDEX IGE : Bilan et perspectives

Clémentine Junquas (IRD, IGE, Grenoble, France)

*CLIMERI, Février 2022*

## CORDEX IGE : 3 zones géographiques

- ① Amérique du Sud (RegIPSL WRF-ORCHIDEE)
- ② Afrique (CORDEX-FPS)
- ③ Antarctique (ARPEGE et MAR)

## CORDEX IGE : 3 zones géographiques

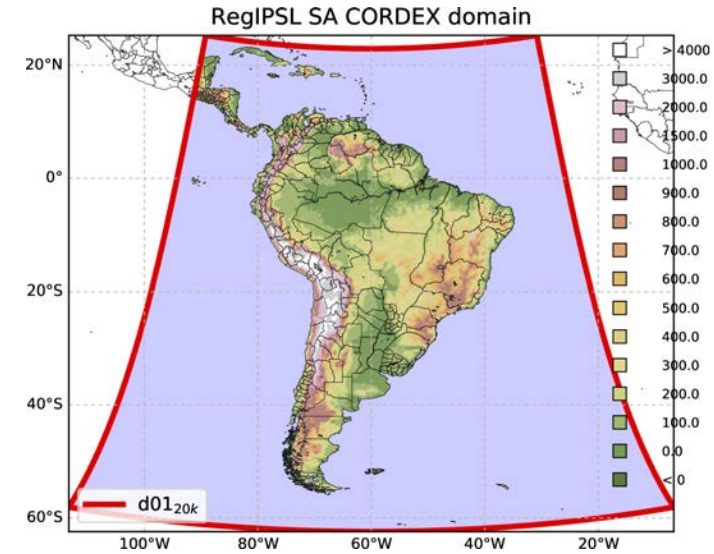
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# CORDEX Amérique du Sud

## Simulations CORDEX : RegIPSL WRF-ORCHIDEE en Amérique du Sud

| WRF-ORCHIDEE     | Evaluation ERA5 (1990-2020)          | Historical   | Future    | Info supp                       |
|------------------|--------------------------------------|--|-----------|---------------------------------|
| Continent (20km) | Run complete<br>Analysis in progress | Forcing GCM : CESM2 HR ou MPI-ESM1-2-HR<br>Scenario SSP3 7.0 |           | WRF3.7.1<br>Floodplains activés |
|                  |                                      | 1970-2000  | 2040-2070 |                                 |

2021-2023 DARI calls (PI L. Fita, UMI IFAECI/CIMA, Buenos Aires, Argentine)

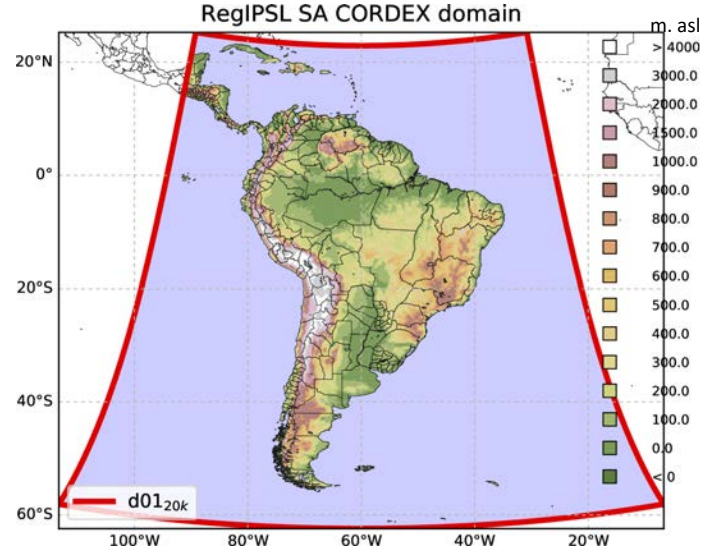


# CORDEX Amérique du Sud

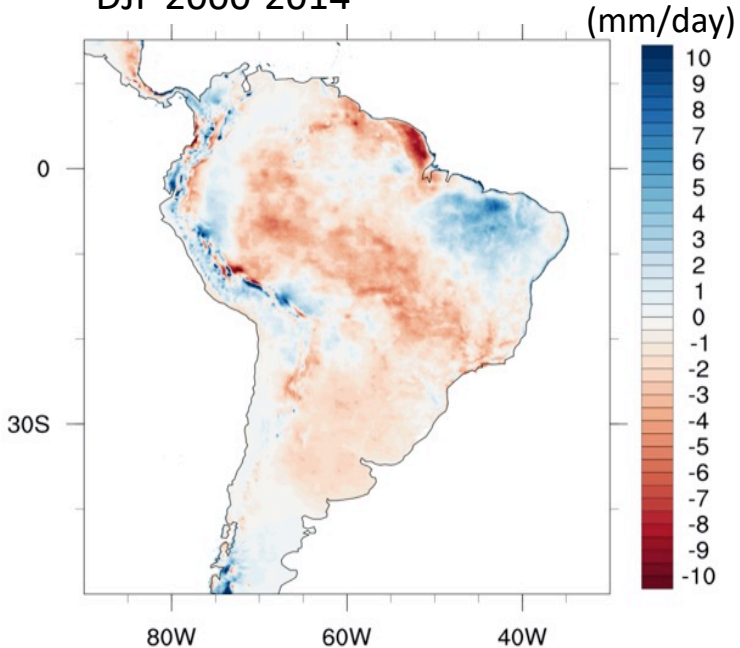
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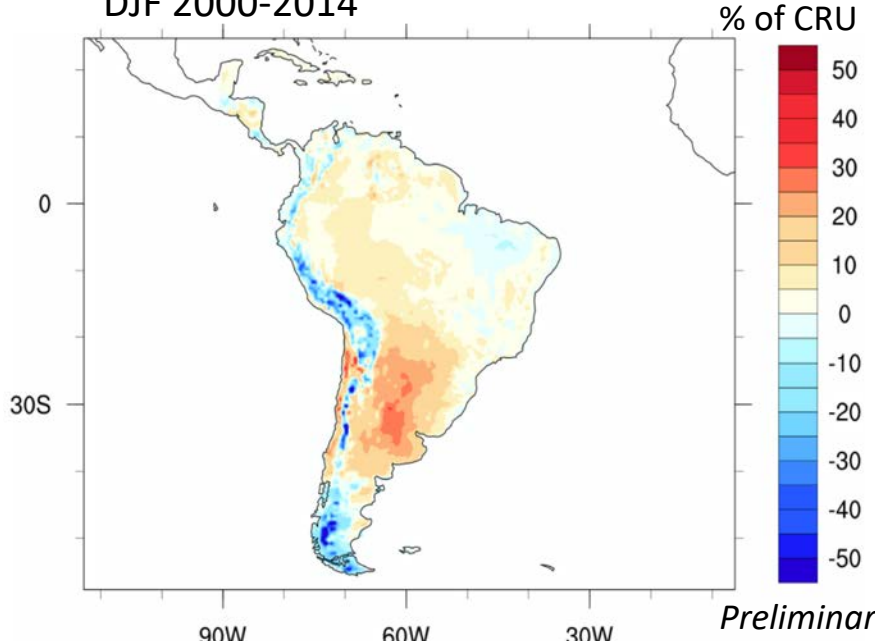
2021-2023 DARI calls (PI L. Fita, UMI IFAECI/CIMA, Buenos Aires, Argentine)



Precip Bias RegIPSL – CHIRPS  
DJF 2000-2014



TAS Bias RegIPSL – CRU  
DJF 2000-2014

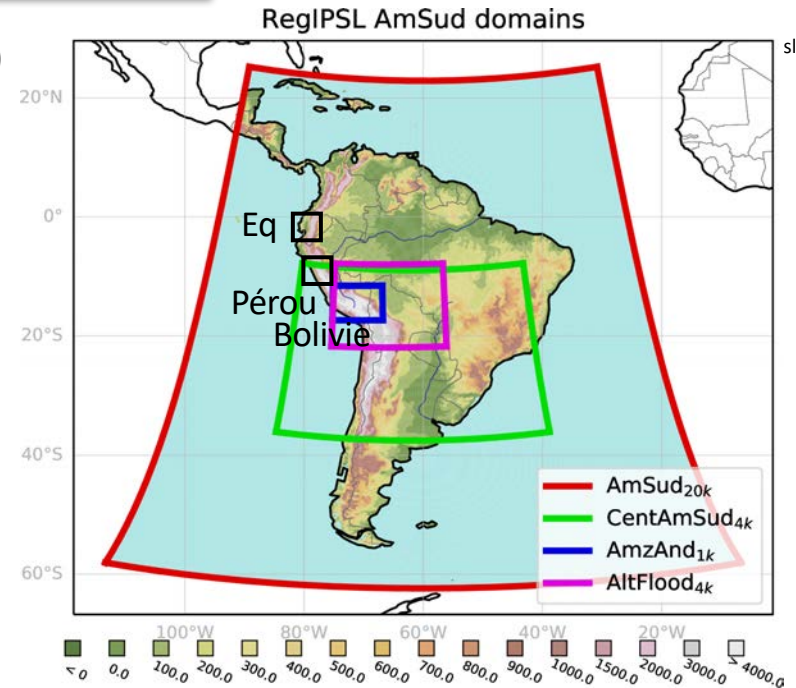


Preliminary results

# CORDEX Amérique du Sud

## Simulations de sensibilités en Amérique du Sud (WRF et WRF-ORCHIDEE)

| Domain/re solution                             | Modèle           | ERA5 (1990-2020)  | Historical (GCM) | Future (GCM) |
|--|------------------|---|------------------|--------------|
| Continent (20km) + <b>Amazon deforestation</b> | WRF-ORCHIDEE     | Run complete<br>Analysis in progress  |                  |              |
| CentAmSud (4km) + <b>floodplains</b>           | WRF-ORCHIDEE     | 3-months testing  |                  |              |
| Perou, Eq, Bolivie (1km)                       | WRF/WRF-ORCHIDEE | complete/Testing in progress  |                  |              |
| AltFlood (4km CP)                              | WRF-ORCHIDEE     | 2022 DARI calls CORDEX 20km forcing   |                  |              |
| Continent (4km CP)                             | WRF-ORCHIDEE     | <i>CpAmSur</i> PRACE Project (submitted)<br>(Colombie, Équateur, Pérou, Chili, Brésil, Argentine, France) |                  |              |



### Objectifs scientifiques :

- > Etude des processus associés à l'évolution des précipitations
- > Influence de la déforestation amazonienne sur les flux d'humidités
- > Etude des floodplains et processus associés
- > Ressources en eau, changement climatique, région Andes-Amazonie

### Projets associés :

10 projets Nord-Sud en cours (ECOS Sud et Nord, 2 CLIMAT-AMSUD, CECC IRD-AFD, MOPGA-AMANECER, LEFE PANTANAL, GDRI ANDES C2H, 2 Concytec)  
4 PhD, 1 postdoc, 2 Master thesis, 7 articles publiés, 5 soumis ou en prép  
+Collaboration SAAG (NCAR), dvpmt urban tile +PFT urbain ORCHIDEE

### Projet soumis:

PRACE « cpAmSur » (PI L. Fita), simulations CP continentales sur toute l'Amérique de Sud (4km), portail de données et formations, 6 ans  
(<http://ifaeci.cima.fcen.uba.ar/cpAmSur.php>)

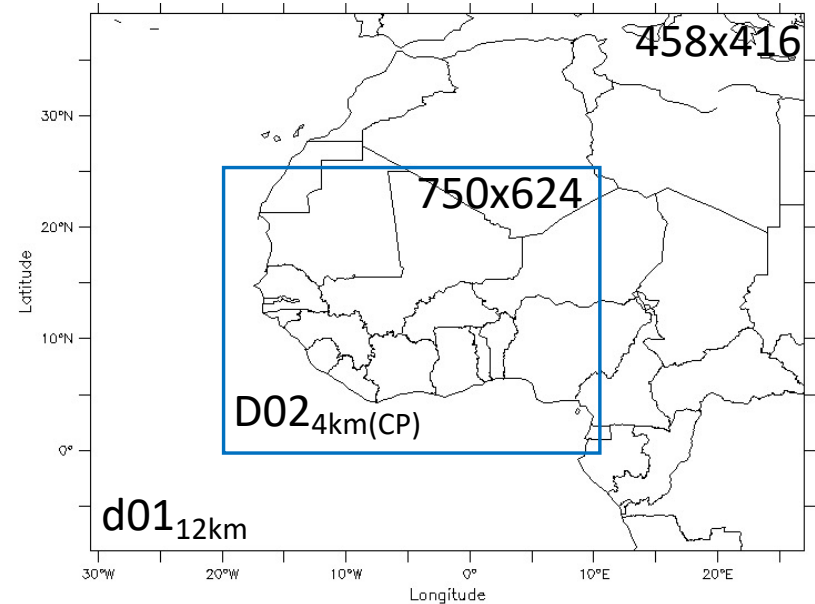
Conf : 'vi convection-permitting Climate Modelling Workshop' à Buenos Aires en Septembre

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# CORDEX Afrique

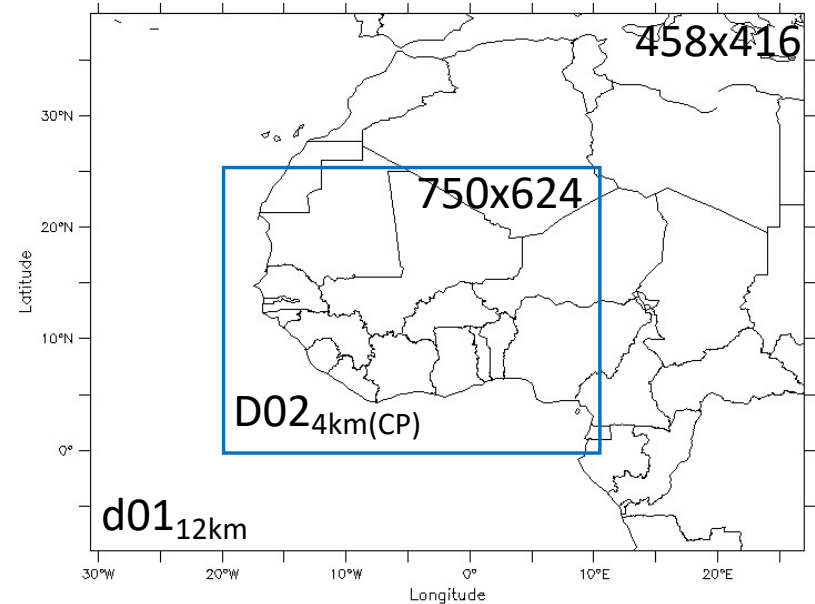
- En préparation : CORDEX-FPS pour Afrique de l'Ouest et central
- Soumission prévue fin 2022- début 2023
- 3 modèles : MAR, WRF, RegCM
- 2 domaines 12km et 4km (sauf MAR)
- Run : Centre National de Calcul de Cote d'Ivoire (Evelyne Touré, LASMES, UFHB, Abidjan)
- LMI NEXUS
- Simulations d'évaluation ERA5 en cours
- Forçages GCM CMIP6 (en cours de discussion)





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## Objectifs scientifiques :

Theme 1: Regional climate variability, extreme event trends and associated processes

Theme 2: Chemical composition, dry and wet atmospheric depositions, their environmental impacts  
———> RegCM et WRF-CHIMERE

Theme 3: Retroaction surface atmosphere and its sensitivity to regional climate variability

Theme 4: Evaluation of the regional climate resource for the integration of the renewable energy

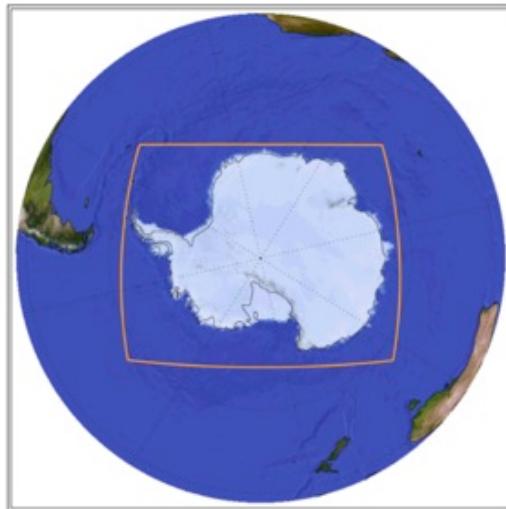
Theme 5: Urbanization and micro-climate

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# CORDEX Antarctique

- **Simulations ARPEGE** (IGE/CNRM) réalisées : Evaluation (1981-2010), future (2 GCMs, 2071-2100), 0.5°, <https://doi.org/10.5281/zenodo.4059193>
  - Avec et sans corrections de biais atmosphériques (Beaumet et al. 2021; <https://doi.org/10.5194/tc-15-3615-2021>)
- **Simulations MAR** (35km) en cours : Evaluation (1979-2020), historical et future (1980-2100), multi-scenario et multi-GCMs
  - Avec et sans le module d'érosion éolienne de la neige
  - Forçage LMDZ6 avec et sans corrections de biais atmosphériques\*
- \*Corrections de biais atmosphériques globales LMDZ6 disponibles (jusqu'à 2100, 3 scénarios)
  - Contact [gerhard.krinner@cnr.fr](mailto:gerhard.krinner@cnr.fr)



An aerial photograph showing a vast, deep blue lake in the foreground. The lake is surrounded by a range of mountains and hills. A thick layer of white, fluffy clouds stretches across the horizon, partially obscuring the distant peaks. The sky above is a clear, bright blue. The overall scene is serene and expansive.

**MERCI !**

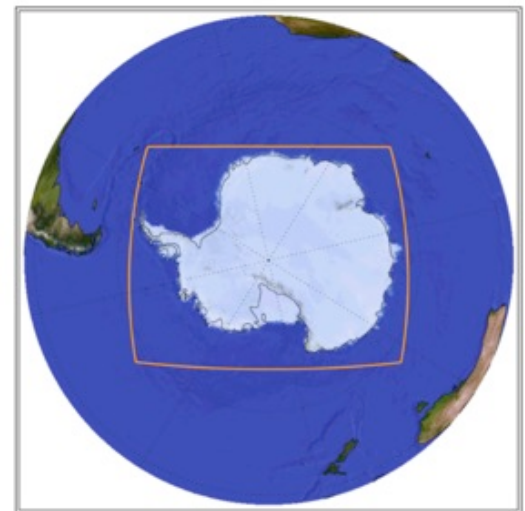
# CORDEX Antarctique

Simulations d'évaluation réalisées:

| Institute | Version       | Period    | Resolution | Forcing          | Additional information          | Contact   |
|-----------|---------------|-----------|------------|------------------|---------------------------------|---|
| IGE/CNRM  | ARPEGE v6.2.4 | 1981-2010 | 0.5° (*)   | Observed SST/SIC |                                 | J. Beaumet, G. Krinner(gerhard.krinner@cnrs.fr) |
| IGE/CNRM  | ARPEGE v6.2.4 | 1981-2010 | 0.5° (*)   | Observed SST/SIC | Atmospheric bias-correction (1) | J. Beaumet, G. Krinner(gerhard.krinner@cnrs.fr) |

(1) Run-time bias correction method based on statistics of adjustment terms of a nudged simulation, see Beaumet et al., 2021 (<https://doi.org/10.5194/tc-15-3615-2021>)

(\*) Output of all simulations available at daily time-scale and interpolated on the ANTi44 domain (actual lon/lat) for mean, min and max surface temperature, total precipitation, snowfall, snowmelt, surface snow sublimation and surface runoff, here : <https://doi.org/10.5281/zenodo.4059193>



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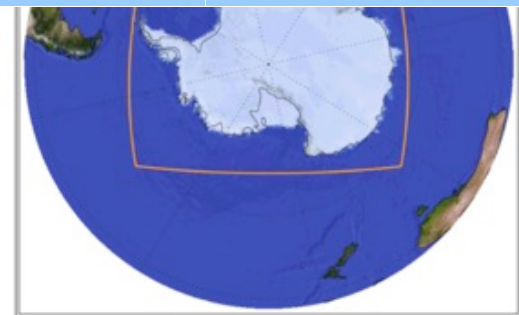
Projections futures réalisées:

| Institute | Version       | Period    | Resolution | Forcing                   | Additional information          | Contact   |
|-----------|---------------|-----------|------------|---------------------------|---------------------------------|---|
| IGE/CNRM  | ARPEGE v6.2.4 | 2071-2100 | 0.5° (*)   | MIROC-ESM RCP8.5 SST/SIC  |                                 | J. Beaumet, G. Krinner(gerhard.krinner@cnrs.fr) |
| IGE/CNRM  | ARPEGE v6.2.4 | 2071-2100 | 0.5° (*)   | NorESM-1-M RCP8.5 SST/SIC |                                 | J. Beaumet, G. Krinner(gerhard.krinner@cnrs.fr) |
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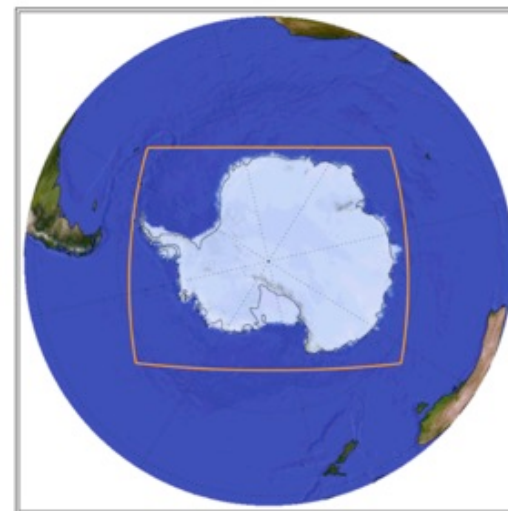
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# CORDEX Antarctique

## Simulations d'évaluation en projet:

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|-----------|-------------------|-----------|------------|---|---|---|
| IGE       | MAR.<br>vn3.11/12 | 1979-2020 | 35 km      | ERA5  | With drifting snow physics                        | Charles Amory<br>(charles.amory@univ-grenoble-alpes.fr)       |
| IGE       | MAR. vn3.12       | 1979-2014 | 35 km      | Run #1:LMDZ6 bias-corrected<br>Run #2:LMDZ6 uncorrected | Observed SIC/SST<br>Without drifting snow physics | Charles Amory<br>(charles.amory@univ-grenoble-alpes.fr)       |
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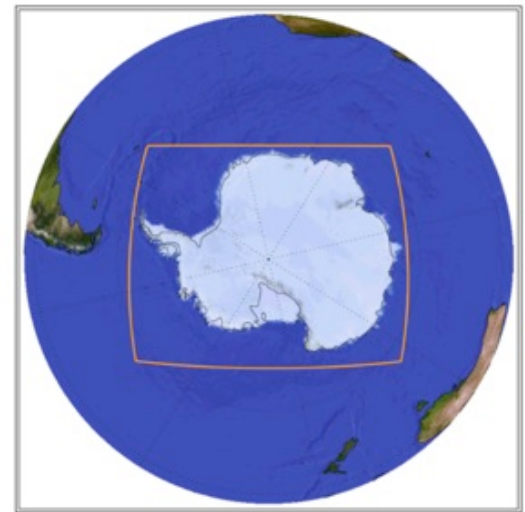
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**Bias-corrected LMDZ6 runs up to 2100 are freely available!**

- Global simulations of 256x256x79 grid points
- 6-hourly, daily and monthly outputs
- Atmospheric correction in the boundary layer (u,v,T)
- Surface oceanic corrections from CESM2 and MPI
- 3 different scenarios (ss126, ssp245 and ssp585)
- Available publicly soon and on request to [gerhard.krinner@cnr.fr](mailto:gerhard.krinner@cnr.fr) meanwhile





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| IGE       | MAR. vn3.11/12 | 1979-2020 | 35 km      | ERA5  | Without drifting snow physics                     | Christoph Kittel<br>(christoph.kittel@univ-grenoble-alpes.fr) |

## Simulations historical et future (à suivre...):

| Institute | Version     | Period    | Resolution | Scenario   | Forcing   | Additional information     | Contact   |
|-----------|-------------|-----------|------------|--|---|----------------------------|---|
| IGE       | MAR. vn3.11 | 1980-2100 | 35 km      | Runs #1 and #2:<br>Historical and RCP8.5<br><br>Runs #3: Historical<br>and SSP5-8.5  | Run #1: ACCESS1.3 (CMIP5)<br>Run #2: NorESM1-M (CMIP5)<br>Run #3: CNRM-CM6-1 (CMIP6)  | with drifting snow physics | Charles Amory<br>(charles.amory@univ-grenoble-alpes.fr)       |
| IGE       | MAR. vn3.11 | 1980-2100 | 35 km      | Runs #1 and #2:<br>Historical and RCP8.5<br><br>Runs #3, #4, #5, #6, #7<br>(and #8): Historical<br>and SSP5-8.5<br><br>Run #1 : RCP4.5<br><br>Run #5: SSP1-2.6 and<br>SSP2-4.5<br><br>Run #7: SSP1-2.6 | Run #1: ACCESS1.3 (CMIP5)<br>Run #2: NorESM1-M (CMIP5)<br>Run #3: CNRM-CM6-1 (CMIP6)<br>Run #4: CESM2 (CMIP6)<br>Run #5: MPI-ESM1-2-HR (CMIP6)<br>Run #6: CNRM-CM6-1 (CMIP6)<br>Run #7: IPSL-CM61-LR (CMIP6)<br>(Run #8: UKESM1-0-LL (CMIP6)) | w/o drifting snow physics  | Christoph Kittel<br>(christoph.kittel@univ-grenoble-alpes.fr) |

# CORDEX Antarctique

## Antarctic CORDEX with MAR at IGE

