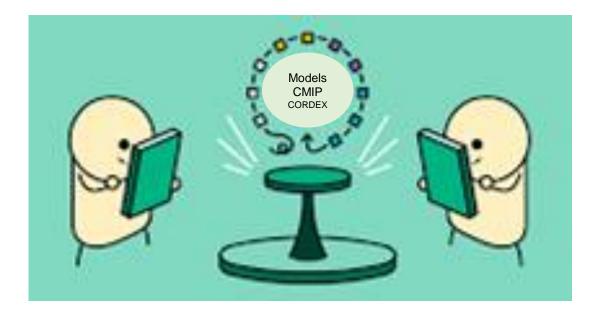
How can we download CMIP and CORDEX datasets?



Training Section November, 2023

Dr Michelle Reboita Dr Shaukat Ali

Outline

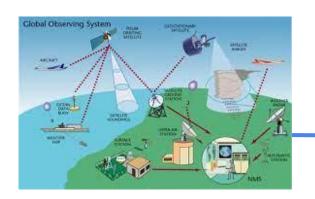
Introduction

GCM and RCM IPCC, CMIP and CORDEX Forecast and Projection

Tutorial

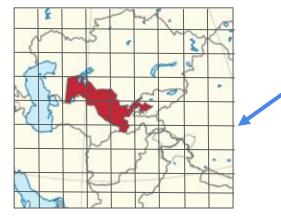
CMIP6 projections Downloading Pre-Processing Plotting CORDEX projections Downloading Pre-Processing Plotting

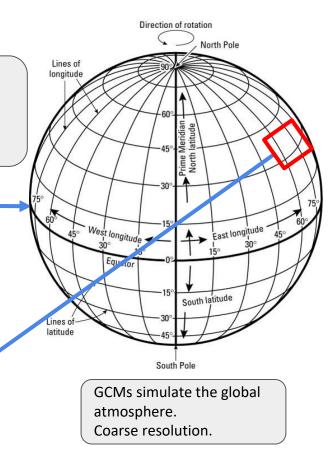




Models need observed data to be initialized. These data are registered, processed and distributed in grid points (initial conditions) → reanalysis.

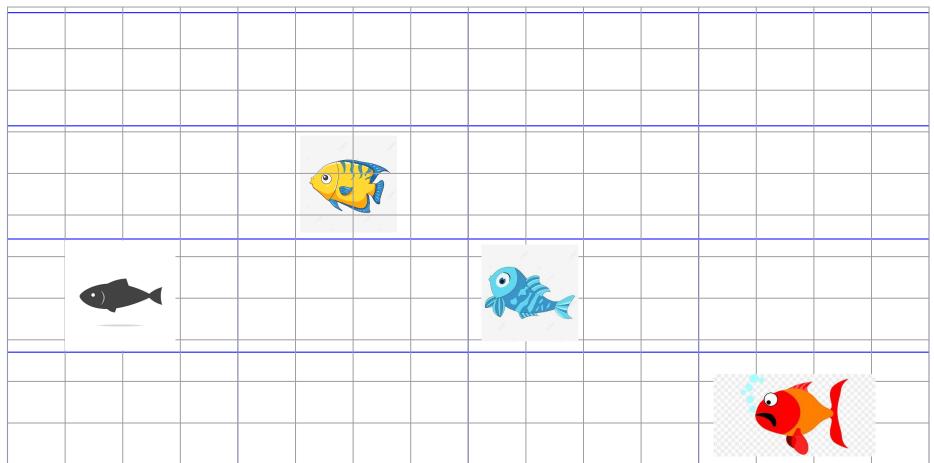
To simulate regional features of the climate, models need to have high resolution. It is expensive with GCMs but relatively cheaper with RCMs, which simulate a small part of the globe.

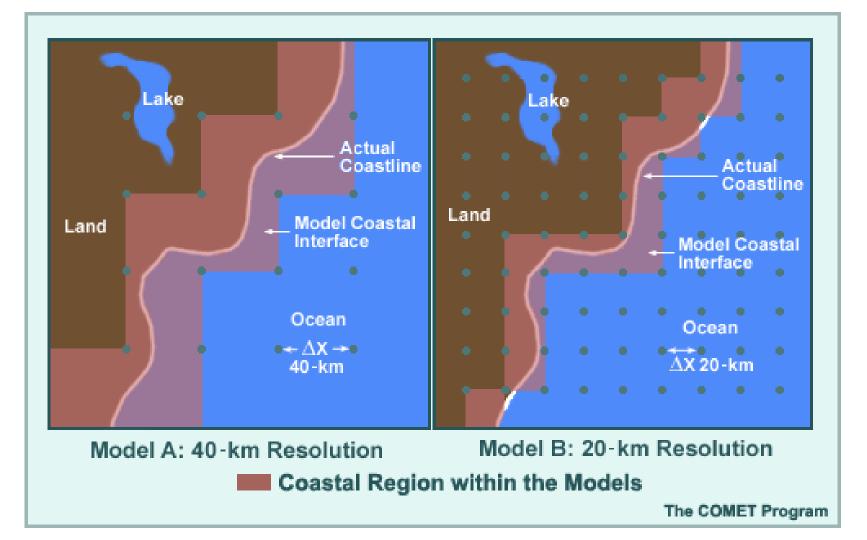




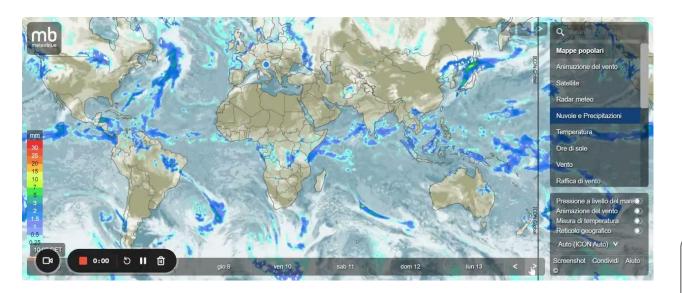
Horizontal resolution of the models

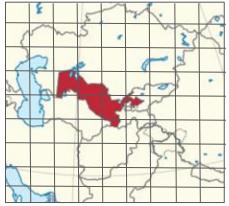
High Resolution Low resolution





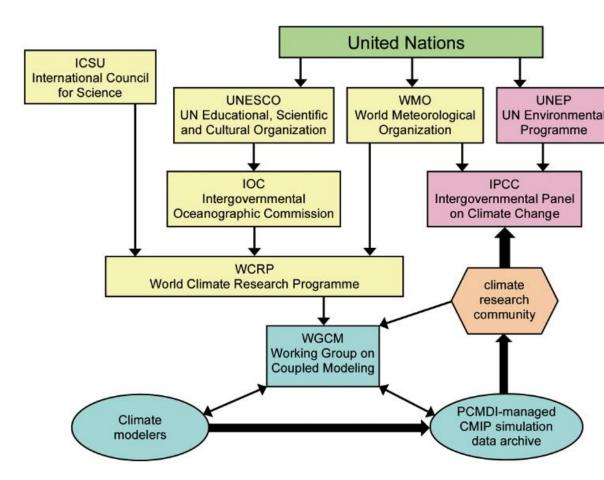
Note that the atmospheric systems are not stationary, traveling in the atmosphere But how will RCMs know that the atmospheric systems are reaching or leaving a small domain?





GCMs or reanalyses provide the initial and boundary conditions for RCMs

There are institutions that organize the protocols for the models' executions.



Organizational structure



- Created in 1988 by the United Nations Environment Programme (UN Environment) and the World Meteorological Organization (WMO);

- 195 Member countries;

- Objective: systematic review of all relevant published literature to provide policymakers with regular scientific assessments on climate change

https://www.ipcc.ch/

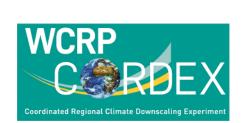
Understanding why there are CMIP and CORDEX programmes



- Created in 1995;

- Objectives: understand past, present and future climate changes; create protocols for numerical experiments and to make the multimodel output publically available in a standardized format

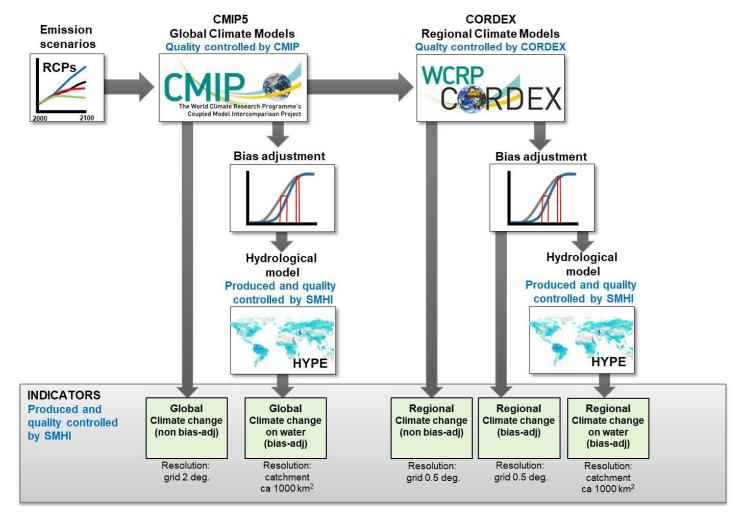
https://www.wcrp-climate.org/wgcmcmip



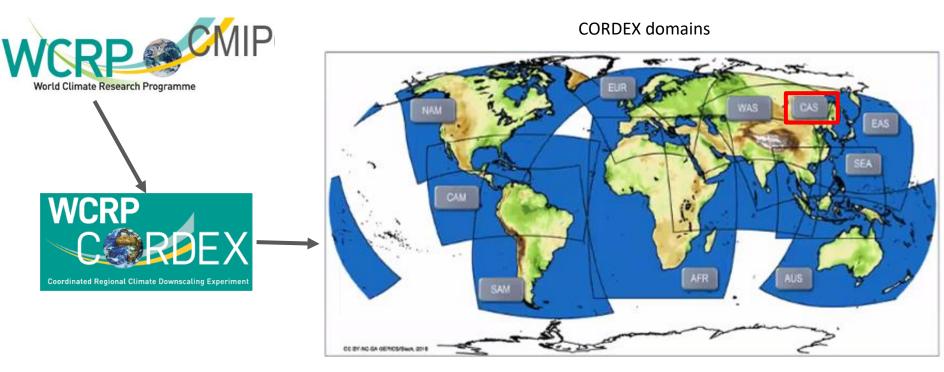
- Created in 2009;

- Objective: a coordinated framework for evaluating and improving regional climate downscaling techniques and bridging the gap between the climate modelling community and end users of climate information across the globe.

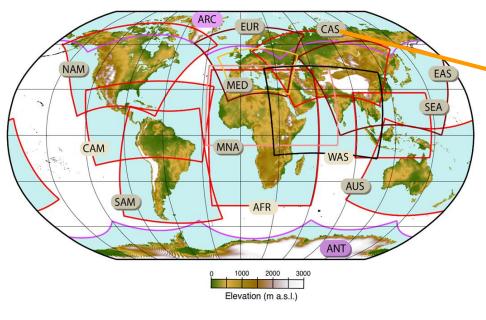
https://www.icrccordex2016.org/index.php/about/wha t-is-cordex



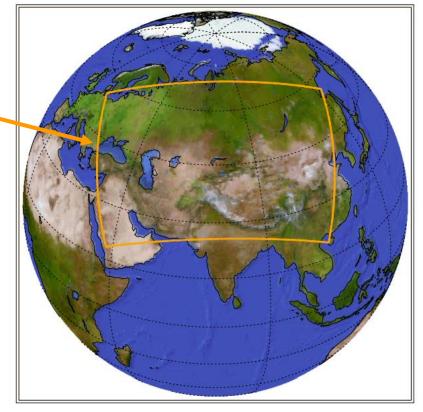
https://climateinformation.org/data-production-and-tailoring/production-of-climate-indicators/



CORDEX Central Asia domain



https://www.ipcc.ch/report/ar6/wg1/figures/atlas/figure-atlas-6



https://cordex.org/domains/region-8-central-asia/

INDUSTRIAL CLIMATE STRATEGY IN PRACTICE

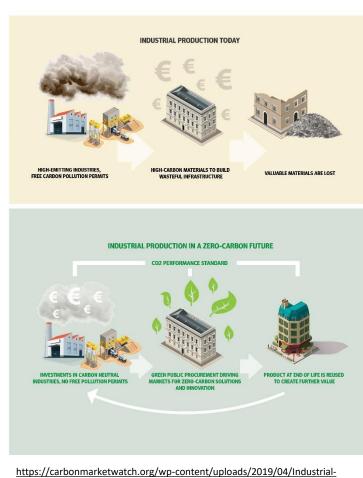
Introduction Definitions

Baseline/Reference: present-day conditions.

Forecast: predict the future based on initial conditions applied in the numerical models (it does not include scenarios).

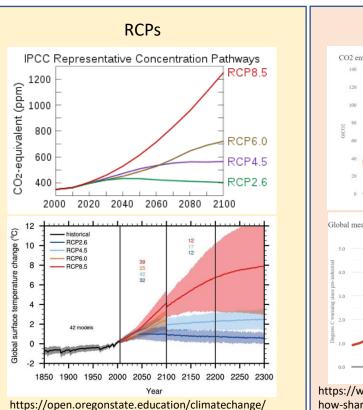
Projection: term that can be regarded as any description of the future and the pathway (scenario) leading to it.

Scenario: description of a possible future state of the world.

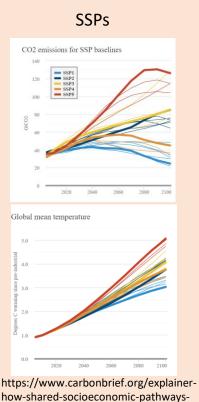


Climate-strategy-in-practise-02-01.jpg

Introduction Scenarios



chapter/impacts/



explore-future-climate-change

Representative Concentration Pathways (RCPs)

describe different levels of greenhouse gases and other radiative forcings that might occur in the future
4 pathways, spanning a broad range of forcing in 2100 (2.6, 4.5, 6.0, and 8.5 W m⁻²)

- they do not include any socioeconomic "narratives" to go alongside them.

Shared Socioeconomic Pathways (SSPs)

- include socioeconomic factors (population, economic growth, education, urbanization and the rate of technological development)
- 5 socioeconomic development trajectories defined in terms of challenges to adaptation and mitigation



Socio-economic challenges for adaptation

RCPs and SSPs are complementary

The RCPs set pathways for greenhouse gas concentrations and, effectively, the amount of warming that could occur by the end of the century. Whereas the SSPs set the stage on which reductions in emissions will – or will not – be achieved.

SSP scenarios are described by Riahi et al. (2017).



Global Environmental Change

Volume 42, January 2017, Pages 153-168



The Shared Socioeconomic Pathways and their energy, land use, and greenhouse gas emissions implications: An overview

Keywan Riahi ^a \land \boxtimes , Detlef P. van Vuuren ^b, Elmar Kriegler ^c, Jae Edmonds ^d, Brian C. O'Neill ^e, Shinichiro Fujimori ^f, Nico Bauer ^c, Katherine Calvin ^d, Rob Dellink ^g, Oliver Fricko ^a, Wolfgang Lutz ^a, Alexander Popp ^c, Jesus Crespo Cuaresma ^a, Samir KC ^{a, h}, Marian Leimbach ^c, Leiwen Jiang ^e, Tom Kram ^b, Shilpa Rao ^a ... Massimo Tavoni ^{i, j, o}

Show more 🗸

+ Add to Mendeley 😪 Share 🍠 Cite

Tutorial

CMIP6: Download



https://esgf-node.llnl.gov/search/cmip6/





Home Contact Us Data Nodes Status

World Climate Research Programme

You are at the ESGF@DOE/LLNL node
Technical Support

MIP Era	+
Activity	+
Product	+

WARNING: Not all models include a variant "r11p1f1", and across models, identical values of variant_label do not imply identical variants! To learn which forcing datasets were used in each variant, please check modeling group publications and documentation provided through ES-DOC.

CMIP6 project data downloads are unrestricted. Downloads should be performed with the -s option to a wget script without the need to login. When using this method for download, ensure you are not using additional options, eg. -s and -H should never be combined.

Source ID	+
Institution ID	+
Source Type	+
Nominal Resolution	+

Experiment ID	+
Sub-Experiment	+
Variant Label	+
Grid Label	+

Globus Transfers for LLNL-hosted data must now use the Metagrid site: https://aims2.llnl.gov/

Sec MIP6

For more information about CMIP6 data please consult this guide: https://pcmdi.llnl.gov/CMIP6/Guide/dataUsers.html

Please try our updated ESGF web application (named "Metagrid"), now undergoing beta testing. For this test release we are reaching out for help from users in the community to report any issues they encounter with the application. The beta-test web application can be found at the following site: https://aims2.llnl.gov/ Please see the following page for more information including a FAQ: https://esgf.github.io/esgf-user-support/metagrid.html

+			0	Oceant	Dent	Display (10	
+	Enter Text:		0	Search	Reset	Display 10 V results per page	e [more search Options]
+							
+		Show All Replicas	Show All Versio	ns 🗆 Se	earch Lo	cal Node Only (Including All Repli	cas)

The search returned 0 results.

Fill in the form

Technical Support

Create User Profile

You will receive a password by email.

Please provide the information below to request a CoG account. Required fields are in **bold**. Upon submission, an OpenID will be automatically assigned to you: you will need that OpenID to login. The following characters are not allowed: < > & # % { } [] \$

Please note that if you a	re logging in with a previously granted ESGF OpenID, CoG requires that Institution, City, and Country be added to your account.
User Information	
User Name	[5 to 30 characters, letters, digits and $@/./-/_$ only. Please note that the username is used to build a unique OpenID that you will use to login. If your chosen username is not available, you will be automatically assigned a similar one.]
First Name	
Last Name	
Email	
Password	[At least 8 characters, including one lower case letter, one upper case letter, one number, and one special symbol. All characters are allowed EXCEPT for () " .]
Confirm Password	[Must match the password above.]
Institution	
Department	
City	
State	

Click on login

Hosted by Department of Energy Lawrence Livermore National Laboratory



You are at the ESGF@DOE/LLNL node

Technical Support



Home Contact Us Data Nodes Status

MIP Era	+
Activity	+
Product	+

+ Source ID + Institution ID + Source Type + Nominal Resolution

Experiment ID	-
Sub-Experiment	
Variant Label	9
Grid Label	

WARNING: Not all models include a variant "r1ip1f1", and across models, identical values of variant label do not imply identical variants! To learn which forcing datasets were used in each variant, please check modeling group publications and documentation provided through ES-DOC.

CMIP6 project data downloads are unrestricted. Downloads should be performed with the -s option to a wget script without the need to login. When using this method for download, ensure you are not using additional options, eg. -s and -H should never be combined.

Globus Transfers for LLNL-hosted data must now use the Metagrid site: https://aims2.llnl.gov/

For more information about CMIP6 data please consult this guide: https://pcmdi.llnl.gov/CMIP6/Guide/dataUsers.html

Please try our updated ESGF web application (named "Metagrid"), now undergoing beta testing. For this test release we are reaching out for help from users in the community to report any issues they encounter with the application. The beta-test web application can be found at the following site: https://aims2.linl.gov/ Please see the following page for more information including a FAQ: https://esgf.github.io/esgf-user-support/metagrid.html

Experiment ID +			Orant	Dent Diretau	10	I Have Describ Onlines 1
Sub-Experiment +	Enter Text:	U	Search	Reset	10 V results per page	[More Search Options]
Variant Label +						
Grid Label +	Show All Replicas	Show All Version	ns 🗆 S	earch Local Node	Only (Including All Replica	is)

The search returned 0 results.

Use the openID received by email



Department of Energy Lawrence Livermore National Laboratory



			You are	at the ESGF@DOE/LLNL node
ESGF@DOE/LLNL Home	Data Nodes	Status		Technical Support
		OpenID Login		
		Enter your OpenID in the text box below or select your OpenID provider (if listed) from the pulldown menu.		
		Please note: if you have an older OpenID from the Earth System Grid Federation, you may have to create a new account.		
		For the best experience, please use Firefox, Chrome, or Internet Explorer. These are the browsers we support.		
		Please note that ESGF OpenIDs are case-sensitive.		
		ESGF-CoG Login		
	1	OpenID		2

Forgot OpenID? Forgot Password? Login Help Create Account

ESGF sponsors and partners	CoG version v4.0.0b2	Earth System CoG sponsors and partners
DoE Office of Science IS-ENES NASA NOAA NCI NSF	ESGF P2P Version v4.0.4	NOAA NASA NSF DoE Office of Science IS-ENES

Fill in the username and password



ESGF OpenID Login

Status: not lo	ogged-in	
	Username:	
	Password:	SUBMIT





You are at the ESGF@DOE/LLNL node

Last Search | 📜 My Data Cart (88)

Technical Support

| Clear Data Cart



Home Contact Us Data Nodes Status

MIP Era	+
Activity	+
Product	+
Source ID	+
Institution ID	+
Source Type	+
Nominal Resolution	+

+
4
+
+

WARNING: Not all models include a variant "r1i1p1f1", and across models, identical values of variant_label do not imply identical variants! To learn which forcing datasets were used in each variant, please check modeling group publications and documentation provided through ES-DOC.

CMIP6 project data downloads are unrestricted. Downloads should be performed with the -s option to a wget script without the need to login. When using this method for download, ensure you are not using additional options, eg. -s and -H should never be combined.

Globus Transfers for LLNL-hosted data must now use the Metagrid site: https://aims2.llnl.gov/

For more information about CMIP6 data please consult this guide: https://pcmdi.llnl.gov/CMIP6/Guide/dataUsers.html

Please try our updated ESGF web application (named "Metagrid"), now undergoing beta testing. For this test release we are reaching out for help from users in the community to report any issues they encounter with the application. The beta-test web application can be found at the following site: https://aims2.linl.gov/ Please see the following page for more information including a FAQ: https://esgf.github.io/esgf-user-support/metagrid.html

-	Enter Text: Search Reset Display 10 v results per page [More Search Options]	
nt 🖪	Enter Text: Image: Search Display Image: Display	
•	Select the options	
4	Show All Replicas Show All Versions Search Local Node Only (Including All Replicas)	

MIP Era	Ξ
CMIP6 (6313092)	6
Activity	+
Product	+

(382329)

Source ID –	For more information about CM
4AOP-v1-5 (6) ACCESS-CM2 (19374) ACCESS-ESM1-5 (142687) ACCESS-OM2 (280) ACCESS-OM2 (280) ACCESS-OM2 (280) ACCESS-OM2 (280) ACCESS-3 (8) AWI-CM-1-1-HR (176) AWI-CM-1-1-LR (177) AWI-CM-1-1-MR (69086)	Please try our updated ESGF w community to report any issues Please see the following page f https://esgf.github.io/esgf-user-
 AWI-ESM-1-1-LR (2385) BCC-CSM2-HR (778) BCC-ESM1 (6040) CAMS-CSM1-0 (1780) CAS-ESM2-0 (2792) CESM1-1-CAM5-CMIP5 (382329) CESM1-CAM5-SE-HR (345) CESM1-CAM5-SE-LR (377) CESM1-WACCM-SC 	
(96647) •	✓ CanESM5 (797965)
	CanESM5-1 (357 12) CanESM5-CanOE (8672) E3SM-1-0 (45859) E3SM-1-1 (1414)

WARNING: Not all models include a variant "r1i1p1f1", and across models, identical values of variant_label do not imply identical variants! To learn which forcing datasets were used in each variant, please check modeling group publications and documentation provided through ES-DOC.

CMIP6 project data downloads are unrestricted. Downloads should be performed with the -s option to a wget script without the need to login. When using this method for download, ensure you are not using additional options, eg. -s and -H should never be combined.

Globus Transfers for LLNL-hosted data must now use the Metagrid site: https://aims2.llnl.gov/

/IP6 data please consult this guide: https://pcmdi.llnl.gov/CMIP6/Guide/dataUsers.html

web application (named "Metagrid"), now undergoing beta testing. For this test release we are reaching out for help from users in the they encounter with the application. The beta-test web application can be found at the following site: https://aims2.llnl.gov/ for more information including a FAQ: -support/metagrid.html

Enter Text:	Search Reset Display 10 V	results per page [More Search Options]
Source ID) Show All Replicas 🗌 Show All Versions 🗍 Search Local Node Only (I	Including All Replicas)
CESM2 (176063) CESM2-FV2 (9604) CESM2-WACCM (31945) CESM2-WACCM-FV2	The search returned 0 results.	
(7842) CIESM (1362) CMCC-CM2-HR4 (1314) CMCC-CM2-SR5 (198757)	There is a huge list of GCMs	
CMCC-CM2-VHR4 (538) CMCC-ESM2 (7207) CNRM-CM6-1 (278225) CNRM-CM6-1-HR (7553)	Select the GCM of your choice	2
CanESM5 (797965)		
CanESM5-CanOE (8672)		

Experiment ID	-
□ hist-piAer (9318)	*
hist-piNTCF (8636)	
hist-resAMO (770)	
hist-resIPO (1018)	
hist-sol (18722)	
hist-spAer-all (1581)	
hist-stratO3 (10067)	
hist-totalO3 (3255)	
hist-volc (15605)	
histSST (3154)	
histSST-1950HC (1477)	
histSST-noLu (483)	
histSST-piAer (2300)	
histSST-piCH4 (1562)	
histSST-piN2O (956)	
histSST-piNTCF (2673)	
histSST-piO3 (917)	
historical (274069)	
historical-cmip5 (960)	
historical-ext (5130)	-
Sub-Experiment	+
Variant Label	+
Grid Label	+

Table ID

+

Select the experiment

+

-

¥

+

histSST-piO3 (917) historical (274069) historical-cmip5 (960) historical-ext (5130) Sub-Experiment Variant Label r19i2p1f1 (169) r19i2p1f2 (86) r19i2p2f1 (200) r1i1000p1f1 (391) r1i1000p1f2 (443) r1i10p1f1 (166) r1i14p1f1 (227) r1i15p1f1 (227) r1i1p11f1 (219) r1i1p1f1 (470373) r1i1p1f11 (358) r1i1p1f2 (107760) r1i1p1f242 (1448) r1i1p1f3 (11181) r1i1p1f4 (5903) r1i1p1f99 (2304) r1i1p2f1 (59210) r1i1p2f2 (208) r1i1p2f3 (4) r1i1p3f1 (21451) r111n2f0 (1000)

Grid Label

Experiment Configuration

Variant Label

ripf index denotes the

ensemble member (realization r),

initialization methods (i),

physics versions (p), and

forcing data set (f)

In each **model output file** the "**ripf**" identifier is used to uniquely distinguish each member of an ensemble, but the differences between members may not always be clearly (or correctly) recorded in the "variant_info" global attribute inside the netcdf file.

ES-DOC will therefore serve as the reference source for understanding differences between ensemble members.

Modeling groups will record in ES-DOC the key to interpreting the differences between simulations identified by different indices. In particular for each forcing index, the list of forcing data sets applied in the simulation will be recorded.

https://pcmdi.llnl.gov/CMIP6/Guide/dataUse rs.html

Some details are provided in <u>https://docs.google.com/document/d/1h0r8</u> <u>RZr_f3-</u> <u>8egBMMh7aqLwy3snpD6_MrDz1q8n5XUk/e</u> <u>dit#</u> **Initialization method** is as follows:

1: Initial conditions taken from a prior simulation, as indicated by the branch-date attribute.

2: As 1, but with an additional random perturbation applied to the initial state of the atmosphere.

https://ukesm.ac.uk/cmip6/variant-id/

Forcing configuration (example for HadGEM3-GC3.1): 1: Input4MIPs version v6.1.1; no ozone remapping 2: Input4MIPs version v6.2.0; no ozone remapping 3: Input4MIPs version v6.2.0; with ozone remapping

ripf index denotes the

ensemble member (realization r),

initialization methods (i),

physics versions (p), and

forcing data set (f)



Frequency

Table ID	+
Frequency	Ξ
1hr (1117)	
1hrCM (40)	
🗆 3hr (34109)	
3hrPt (16648)	
🗆 6hr (54652)	
🔲 6hrPt (33441)	
🗌 day (1026728)	
🗌 dec (3199)	
□ fx (169082)	
🗹 mon (4806984)	
monC (7763)	
monPt (10664)	
month (11)	
 month (11) subhrPt (4930) 	
 month (11) subhrPt (4930) yr (137914) 	
month (11)	
 month (11) subhrPt (4930) yr (137914) 	+
 month (11) subhrPt (4930) yr (137914) yrPt (5810) 	+
 month (11) subhrPt (4930) yr (137914) yrPt (5810) 	+

Variable

Realm	+
Variable	+
CF Standard Name	
 age of sea ice (4928) age of stratospheric air (443) age of surface snow (3696) air pressure (12442) air pressure at cloud top 8384) air pressure at convective cloud base (7815) air pressure at convective cloud top (9386) air pressure at mean sea evel (14025) air pressure at sea level 	
 air temperature (309912) air temperature at cloud top 1092) all-sky surface longwave adiative flux due to dust (16) all-sky surface shortwave adiative flux due to dust (16) 	

Data Node

+



C esqf-node.llnl.gov/search/cmip6/



Department of Energy Lawrence Livermore National Laboratory



GZ

Welcome, Michelle, | My Profile | Log out



Home Contact Us Data

You are at the ESGF@DOE/LLNL node

ata Nodes Status	Technical Support
L	ast Search 🏣 My Data Cart (88)
WARNING: Not all models include a variant "r1i1p1f1", and across models, identical values of variant. label do not imply identical variants!	Clear Data Cart

MIP Era	
CMIP6 (6313092)	
Activity	
Product	ſ

+ +

Source ID CESM2 (176063) . CESM2-FV2 (9604) CESM2-WACCM (31945) CESM2-WACCM-FV2 (7842) CIESM (1362) CMCC-CM2-HR4 (1314) CMCC-CM2-SR5 (198757) CMCC-CM2-VHR4 (538)

were used in each variant, please check modeling group publications and documentation provided through ES-DOC.

CMIP6 project data downloads are unrestricted. Downloads should be performed with the -s option to a wget script without the need to login. When using this method for download, ensure you are not using additional options, eg. -s and -H should never be combined.

Globus Transfers for LLNL-hosted data must now use the Metagrid site: https://aims2.llnl.gov/

For more information about CMIP6 data please consult this guide: https://pcmdi.llnl.gov/CMIP6/Guide/dataUsers.html

Please try our updated ESGF web application (named "Metagrid"), now undergoing beta testing. For this test release we are reaching out for help from users in the community to report any issues they encounter with the application. The beta-test web application can be found at the following site: https://aims2.llnl.gov/ Please see the following page for more information including a FAQ: https://esqf.github.io/esqf-user-support/metagrid.html

Enter Text:		0	Search	Reset Display 1	0 ✓ results per page	[More Search Options]
	Show All Replicas	Show All Versi	ons 🗆 Se	arch Local Node C	only (Including All Replica	s)

4 temperatures? Which is the mean C esqf-node.llnl.gov/search/cmip6/ air temperature at Experiment ID -Show All Replicas Show All Versions Search Local 1 2-m? historical (4) Search Constraints: #CMIP6 | # CanESM5 | # historical | #r1i1p1f1 | # mon | # air_temperature Sub-Experiment + Total Number of Results: 4 Variant Label -1-_ Add all displayed results to Data Cart Remove all displayed results from Data Cart r1i1p1f1 (4) Expert Users: you may display the search URL and return results as XML or return results as JSON + Grid Label 1. CMIP6.CMIP.CCCma.CanESM5.historical.r1i1p1f1.Amor.ta.gn Data Node: crd-esgf-drc.ec.gc.ca Version: 20190429 Table ID + Total Number of Files (for all variables): 1 Full Dataset Services: [Show Metadata] [List Files] [WGET Script] [LAS] [Show Citation] [PID] [Further Info] Frequency -達 Add to Data Cart mon (4) 2. CMIP6.CMIP.CCCma.CanESM5.historical.r1i1p1f1.Amor.tasmin.gn + Realm Data Node: crd-esgf-drc.ec.gc.ca Version: 20190429 + Variable Total Number of Files (for all variables): 1 Full Dataset Services: [Show Metadata] [List Files] [WGET Script] [LAS] [Show Citation] [PID][Further Info] **CF Standard Name** -1 Add to Data Cart air temperature (4) 3. CMIP6.CMIP.CCCma.CanESM5.historical.r1i1p1f1.Amon tasmax gn Data Node: crd-esqf-drc.ec.qc.ca Version: 20190429 + Data Node Total Number of Files (for all variables): 1 Full Dataset Services: [Show Metadata] [List Files] [WGET Script] [LAS] [Show Citation] [PID] [Further Info] 1 Add to Data Cart 4. CMIP6.CMIP.CCCma.CanESM5.historical.r1i1p1f1.Amor.tas.gn Data Node: crd-esqf-drc.ec.qc.ca Version: 20190429 Total Number of Files (for all variables): 1 Full Dataset Services: [Show Metadata] [List Files] [WGET Script] [LAS] [Show Citation] [PID] [Further Info]

🗯 Add to Data Cart

4 temperatures? Which is the mean air temperature at 2-m?



Visit the tutorials to learn more about the variable names.

https://pcmdi.llnl.gov/CMIP6/Guide/dataUsers.html

https://pcmdi.llnl.gov/mips/cmip3/variableList.html

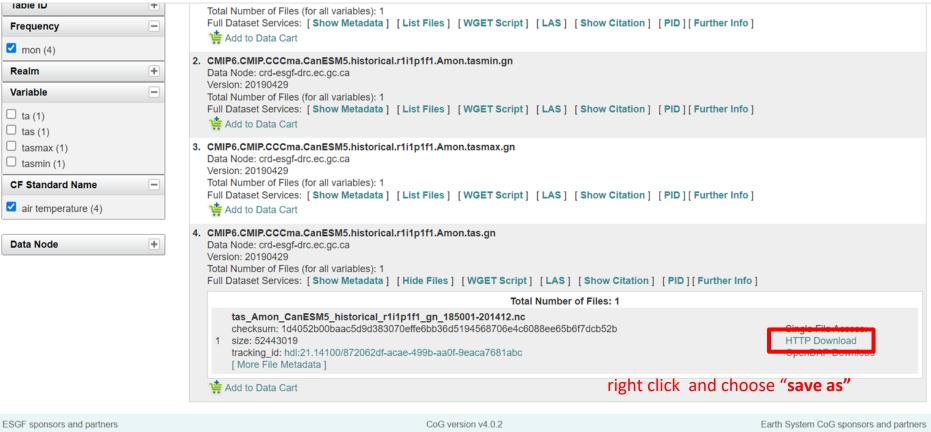
https://wcrp-cmip.org/cmip-model-and-experiment-documentation/

https://cfconventions.org/Data/cf-standard-names/current/build/cf-standard-name-table.html

CMIP6 paper: <u>https://gmd.copernicus.org/preprints/gmd-2019-219/gmd-2019-219.pdf</u>

C c esgf-noc	de.llnl.gov/	/search/cmip6/	4 temperatures? Which is the mean air temperature at
 historical (4) 		Show All Replicas Show All Versions Search Local Methods Search Constraints: #CMIP6 #CanESM5 #historical #r1i1p1f1 #mon #air_temperature	2-m?
Sub-Experiment	+	Total Number of Results: 4	Answer: tas
Variant Label	-	-1-	
✓ r1i1p1f1 (4)		Add all displayed results to Data Cart Remove all displayed r Expert Users: you may display the search URL and return results as X	
Grid Label	+	1. CMIP6.CMIP.CCCma.CanESM5.historical.r1i1p1f1.Amon.ta.gn	
		Data Node: crd-esgf-drc.ec.gc.ca Version: 20190429	
Table ID	+	Total Number of Files (for all variables): 1	
Frequency	-	Full Dataset Services: [Show Metadata] [List Files] [WGET Script] [LAS] [Show Citation] [PID] [Further Info]
🗹 mon (4)		Add to Data Cart	
Realm	+	 CMIP6.CMIP.CCCma.CanESM5.historical.r1i1p1f1.Amon.tasmin.gn Data Node: crd-esgf-drc.ec.gc.ca 	
Variable	+	Version: 20190429 Total Number of Files (for all variables): 1	
CF Standard Name		Full Dataset Services: [Show Metadata] [List Files] [WGET Script] [LAS] [Show Citation] [PID] [Further Info]
air temperature (4)		New York Cart	
		3. CMIP6.CMIP.CCCma.CanESM5.historical.r1i1p1f1.Amon.tasmax.gn	
Data Node	+	Data Node: crd-esgf-drc.ec.gc.ca Version: 20190429 Total Number of Files (for all variables): 1 Full Dataset Services: [Show Metadata] [List Files] [WGET Script] [LAS] [Show Citation] [PID][Further Info]
		4. CMIP6.CMIP.CCCma.CanESM5.historical.r1i1p1f1.Amor tas gn Data Node: crd-esgf-drc.ec.gc.ca Version: 20190429 Total Number of Files (for all variables): 1 Full Dataset Services: [Show Metadata [List Files]] WGET Script] [LAS] [Show Citation ☆ Add to Data Cart] [PID][Further Info]

C == esgf-node.llnl.gov/search/cmip6/



DoE Office of Science | IS-ENES | NASA | NOAA | NCI | NSF

CoG version v4.0.2 ESGF P2P Version v4.0.4

NOAA | NASA | NSF | DoE Office of Science | IS-ENES

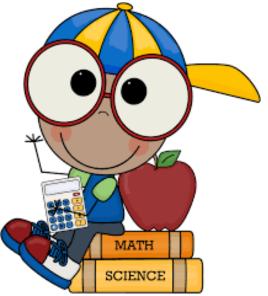
জি 🛣

D 1 1

Follow the previous steps and download the monthly mean of the air temperature at 2-m (variable tas)

Model: CanESM5 Experiment: SSP5-8.5 scenario Variant: r1i1p1f1 Frequency: monthly Variable: tas Period: 2015-2100





E	kperiment ID	
\cup	rcp26-cmip5 (170)	
	rcp45-cmip5 (170)	
	rcp85-cmip5 (170)	
\Box	ssp119 (309)	
	ssp126 (312)	
\cup	ssp245 (312)	
	ssp245-GHG (309)	
	ssp245-aer (308)	
	ssp245-cov-GHG (38)	
	ssp245-cov-aer (38)	
	ssp245-cov-fossil (38)	
	ssp245-cov-modgreen (38)	
	ssp245-cov-strgreen (38)	
	ssp245-covid (38)	
	ssp245-nat (308)	
	ssp245-stratO3 (309)	
	ssp370 (312)	
	ssp434 (309)	
	ssp460 (309)	
	ssp534-over (309)	
	ssp585 (318)	-
S	ub-Experiment	+
Va	ariant Label	
	r1i1p1f1 (10818)	
G	rid Label	+

Table ID	+
Frequency	-
🗌 3hr (22)	
3hrPt (31)	
🗌 day (1675)	
□ fx (297)	
🗹 mon (7860)	
🗆 yr (933)	
Realm	+
Variable	-
□ spco2nat (28)	
🗌 ta (77)	
□ ta500 (29)	
□ ta700 (1)	
□ ta850 (29)	
□ talk (58)	
talkos (28)	
✓ tas (81)	
tasmax (74)	
tasmin (74)	
tauu (40)	
tauuo (31)	
tauv (40)	
 tauvo (31) thetao (31) 	
thkcello (36)	
tob (32)	
(0L (0L)	

C esqf-node.llnl.gov/search/cmip6/





GR 1

Sec Mip6 World Climate Research Programme

Ho

+

+

You are at the ESGF@DOE/LLNL node

Home Contact Us	Data Nodes Status	Technical Support
		Last Search 🏣 My Data Cart (88) Clear Data Cart
MIP Era	WARNING: Not all models include a variant "r11p1f1", and across models, identical values of variant_label do not imply identical variant were used in each variant, please check modeling group publications and documentation provided through ES-DOC.	nts! To learn which forcing datasets
CMIP6 (10818)		

CMIP6 project data downloads are unrestricted. Downloads should be performed with the -s option to a wget script without the need to login. When using this method for download, ensure you are not using additional options, eg. -s and -H should never be combined.

Globus Transfers for LLNL-hosted data must now use the Metagrid site: https://aims2.llnl.gov/

Source ID CanESM5 (10818) + Institution ID Source Type + + Nominal Resolution

Experiment ID

rcp26-cmip5 (170)

Activity Product

> For more information about CMIP6 data please consult this guide: https://pcmdi.llnl.gov/CMIP6/Guide/dataUsers.html Please try our updated ESGF web application (named "Metagrid"), now undergoing beta testing. For this test release we are reaching out for help from users in the community to report any issues they encounter with the application. The beta-test web application can be found at the following site: https://aims2.llnl.gov/ Please see the following page for more information including a FAQ: https://esgf.github.io/esgf-user-support/metagrid.html

Reset Display 10 v results per page [More Search Options] 0 Search Enter Text: -Show All Versions Search Local Node Only (Including All Replicas) Show All Replicas

. Search Constraints: #CMIP6 | # CanESM5 | # r1i1p1f1



Clear Data Cart

MIP Era	-	WARNING: Not all models include a variant "r1i1p1f1", and across models, identical values of variant_label do not imply identical variants! To learn which forcing datasets were used in each variant, please check modeling group publications and documentation provided through ES-DOC.
CMIP6 (1)		
Activity	+	CMIP6 project data downloads are unrestricted. Downloads should be performed with the -s option to a wget script without the need to login. When using this method for download, ensure you are not using additional options, egs and -H should never be combined.
Product	+	Globus Transfers for LLNL-hosted data must now use the Metagrid site: https://aims2.llnl.gov/
Source ID	Ξ	For more information about CMIP6 data please consult this guide: https://pcmdi.linl.gov/CMIP6/Guide/dataUsers.html
CanESM5 (1)		Please try our updated ESGF web application (named "Metagrid"), now undergoing beta testing. For this test release we are reaching out for help from users in the community to report any issues they encounter with the application. The beta-test web application can be found at the following site: https://aims2.llnl.gov/
Institution ID	+	Please see the following page for more information including a FAQ: https://esgf.github.io/esgf-user-support/metagrid.html
Source Type	+	
Nominal Resolution	+	Enter Text: Search Reset Display 10 v results per page [More Search Options]
Experiment ID	-	
Ssp585 (1)		Show All Replicas Show All Versions Search Local Node Only (Including All Replicas)
Sub-Experiment	+	Total Number of Results: 1
Variant Label		-1-
🗹 r1i1p1f1 (1)		Add all displayed results to Data Cart Remove all displayed results from Data Cart Expert Users: you may display the search URL and return results as XML or return results as JSON
Grid Label	+	1. CMIP6.ScenarioMIP.CCCma.CanESM5.ssp585.r1i1p1f1.Amon.tas.gn
Table ID	+	Data Node: crd-esgf-drc.ec.gc.ca Version: 20190429
Frequency		Total Number of Files (for all variables): 3 Full Dataset Services: [Show Metadata] [List Files [WGET Script] [LAS] [Show Citation] [PID][Further Info]
mon (1)		Add to Data Cart

← → C sgf-node.llnl.gov/search/cmip6/

Experiment ID	-				
✓ ssp585 (1)		Show All Replicas Show All Versions Search Local Node Only (Including All Replicas) Search Constraints: *CMIP6 * CanESM5 * r11p1f1 * ssp585 * mon * tas			
Sub-Experiment	+	Total Number of Results: 1			
Variant Label	-	-1-			
🗹 r1i1p1f1 (1)		Add all displayed results to Data Cart Remove all displayed results from Data Cart Expert Users: you may display the search URL and return results as XML or return results as JSON			
Grid Label	+	1. CMIP6.ScenarioMIP.CCCma.CanESM5.ssp585.r1i1p1f1.Amon.tas.gn			
		Data Node: crd-esgf-drc.ec.gc.ca			
Table ID	+	Version: 20190429 Total Number of Files (for all variables): 3			
Frequency	-	Full Dataset Services: [Show Metadata] [Hide Files] [WGET Script] [LAS] [Show Citation] [PID][Further Info]			
🗹 mon (1)		Total Number of Files: 3			
Realm	+	tas_Amon_CanESM5_ssp585_r1i1p1f1_gn_201501-210012.nc checksum: 15e3747c7b4380b2431eac6c2c77ab91580bca02962bb45deac38be35e7cdf07 Single File Access:			
Variable	-	1 size: 27267498 tracking_id: hdl:21.14100/fd4cec7c-a59e-475b-9d4f-5c04ce24dab7 OpenDAP Download			
🗹 tas (1)		[More File Metadata] Save			
CF Standard Name	+	tas_Amon_CanESM5_ssp585_r1i1p1f1_gn_210101-218012.nc Single File Access: checksum: 45cb432cb45d87081a8f78da87cddf2aacba95ba083c70c128bb12c4be9ff73c Single File Access:			
Data Node	+	2 size: 25232340 HTTP Download tracking_id: hdl:21.14100/0a8ed2c5-9bf6-4e21-8960-c20885f86791 OpenDAP Download [More File Metadata] OpenDAP Download			
		tas_Amon_CanESM5_ssp585_r1i1p1f1_gn_218101-230012.nc Single File Access: checksum: 4cac1d5202c3b970995fd35369a8350d16e9713bde158b1446843a7049483e14 Single File Access: 3 size: 37722355 HTTP Download tracking_id: hdl:21.14100/a65012ed-84d1-4998-9cb5-c3f3de826ed2 OpenDAP Download [More File Metadata] Description			

Tutorial

CMIP6: Pre-Processing



Softwares



Climate Data Operators Objective: Manipulate data

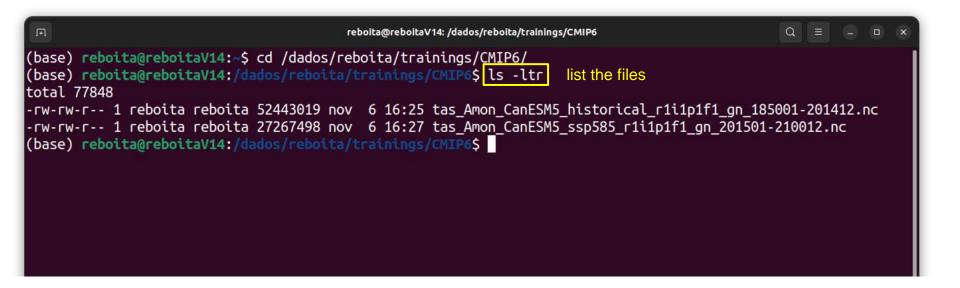




"Opening GrADS to a World of Extensions"

Grid Analysis and Display System Objective: Visualization of data

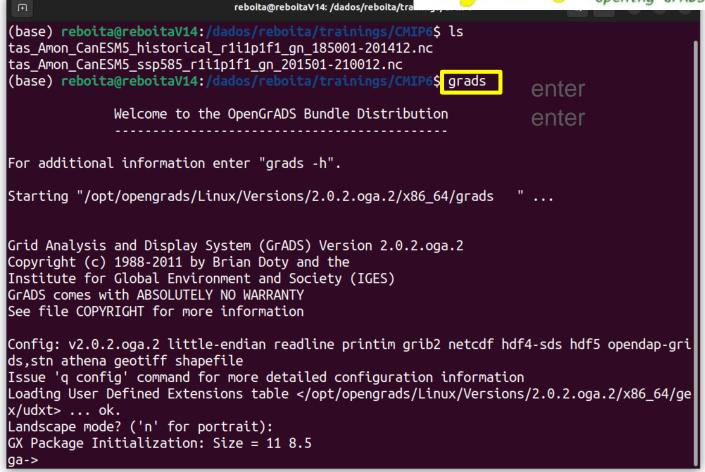
Downloaded data were stored at /trainings/CMIP6







"Opening GrADS to a World of Extensions"



reboita@reboitaV14: /dados/reboita/



penGrADS

"Opening GrADS to a World of Extensions"

Welcome to the OpenGrADS Bundle Distribution

For additional information enter "grads -h".

Starting "/opt/opengrads/Linux/Versions/2.0.2.oga.2/x86_64/grads " ...

Grid Analysis and Display System (GrADS) Version 2.0.2.oga.2 Copyright (c) 1988-2011 by Brian Doty and the Institute for Global Environment and Society (IGES) GrADS comes with ABSOLUTELY NO WARRANTY See file COPYRIGHT for more information

Config: v2.0.2.oga.2 little-endian readline printim grib2 netcdf hdf4-sds hdf5 opendap-grids,stn athena geotiff shapefile Issue 'q config' command for more detailed configuration information Loading User Defined Extensions table </opt/opengrads/Linux/Versions/2.0.2.oga.2/x86 64/gex/udxt> ... o

Landscape mode? ('n' for portrait): GX Package Initialization: Size = 11 8.5 da-> !ls tas Amon CanESM5 historical r1i1p1f1 gn 185001-201412.nc tas Amon CanESM5 ssn585 r1i1n1f1 on 201501-210012 nc sdfopen tas Amon CanESM5 historical r1i1p1f1 gn 185001-201412.nc Scanning self-describing tile: tas Amon CanESM5 historical r1i1p1f1 gn 185001-201412.nc SDF Error: 365 day calendars are no longer supported by sdfopen. To open this file with Graps, use a descriptor file with a complete TDEF entry and OPTIONS 365 day calendar. Documentation is at http://iges.org/grads/gadoc/SDFdescriptorfile.html qa->

Obs: the examples are in the Linux system. If you are using Windows, it is necessary to provide the path of the files sdfopen C:\trainings\CMIP6\ tas Amon CanESM5 histori cal r1i1p1f1 gn 185001-201412.nc



Netcdf file was not opened! Calendar problem??? Model outputs are a challenge because they have:



Netcdf file was not opened! Calendar problem???

- \rightarrow different calendars
 - standard 360 days 365 days 366 days

 \rightarrow grid type

regular space non-regular space

Examples of horizontal resolution

_	CMIP6 model name	Country	Horizontal re (lon. by lat. in	00101011	Variant label	Key references	
	ACCESS-CM2	Australia	1.9°×1.3°		r1i1p1f1	Bi et al. (2012)	
	ACCESS-ESM1-5	Australia	$1.9^{\circ} \times 1.2^{\circ}$		rli1p1f1	Law et al. (2017)	
	BCC-CSM2-MR	China	$1.1^{\circ} \times 1.1^{\circ}$		rli1p1f1	Wu et al. (2019)	
	CAMS-CSM1-0	China	$1.1^{\circ} \times 1.1^{\circ}$		rli1p1f1	Rong et al. (2019)	
	CanESM5	Canada	$2.8^{\circ} \times 2.8^{\circ}$		rli1p1f1	Swart et al. (2019) Ou	r example
	CESM2	USA	$1.3^{\circ} \times 0.9^{\circ}$		rli1p1f1	Lauritzen et al. (2018)	
	CESM2-WACCM	USA	1.3°×0.9°		rli1p1f1	Li et al. (2019)	
	CNRM-CM6-1	France	$1.4^{\circ} \times 1.4^{\circ}$		r1i1p1f2	Voldoire et al. (2019)	
	CNRM-CM6-1-HR	France	$0.5^{\circ} \times 0.5^{\circ}$		r1i1p1f2	Voldoire et al. (2019)	

 \rightarrow horizontal resolution

We need to standardize the model data.

Knowing the dataset

EMORANDUM

3

June 199

F	reboita@reboitaV14: /dados/reboita/trainings/CMIP6	Q = - • ×
(base) reboita@reboita File format : NetCL -1 : Institut Sour 1 : unknown Can	ce T Steptype Levels Num Points Num Dtype : Parameter ID	ical_r1i1p1f1_gn_185001-201412.nc
Grid coordinates : 1 gaussian	: points=8192 (128x64) F32 lon : 0 to 357.1875 by 2.8125 degrees_east circular lat : -87.8638 to 87.8638 degrees_north	GrADS does not understand 365 day calendar.
Vertical coordinate 1 : height	: levels=1 scalar	Grid coordinate is Gaussian (regular in longitude and almost regular in latitude).
Time coordinate : RefTime = 1850-0 YYYY-MM-DD hh:mm:ss	height : 2 m time : 1980 steps 01-01 00:00:00 Units = days Calendar = 365_day Bounds = true YYYY-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss	GrADS understands this type of grid but as GCMs have different horizontal resolution, we can interpolate all of them
1850-01-16 12:00:00 1850-05-16 12:00:00 1850-09-16 00:00:00	1850-02-15 00:00:00 1850-03-16 12:00:00 1850-04-16 00:00:00 1850-06-16 00:00:00 1850-07-16 12:00:00 1850-08-16 12:00:00 1850-10-16 12:00:00 1850-11-16 00:00:00 1850-12-16 12:00:00	to the same regular grid (equally spaced).
1851-01-16 12:00:00 1851-05-16 12:00:00 1851-09-16 00:00:00	1851-02-15 00:00:00 1851-03-16 12:00:00 1851-04-16 00:00:00 1851-06-16 00:00:00 1851-07-16 12:00:00 1851-08-16 12:00:00 1851-10-16 12:00:00 1851-11-16 00:00:00 1851-12-16 12:00:00	We will use CDO to adapt the file.
1852-01-16 12:00:00 1852-05-16 12:00:00	1852-02-15 00:00:00 1852-03-16 12:00:00 1852-04-16 00:00:00 1852-06-16 00:00:00 1852-07-16 12:00:00 1852-08-16 12:00:00	Use of reduced Coursion grids in spectral models M. Horal and A.J. Simmons Research Deportment

Grid coordinate

Before executing the command

cdo remapbil,grid.txt infile.nc outfile.nc

it is necessary to construct a txt file with the grid information.

This information can be obtained using cdo sinfo infile.nc

reboita@reboitaV14: /dados/reboita/trainings/CMIP6
(base) reboita@reboitaV14:/dados/reboita/trainings/CMIP6\$ cdo sinfo tas_Amon_CanESM5_historical_r1i1p1f1_gn_185001-201412.nc
File format : NetCDF4 classic zip -1 : Institut Source T Steptype Levels Num Points Num Dtype : Parameter ID
1 : unknown CanESM5 v instant 1 1 8192 1 F32z : -1
Grid coordinates : Defining 2.5° x 2.5° as horizontal
1 : gaussian : points=8192 (128x64) F32 lon : 0 to 357.1875 by 2.8125 degrees east circular points is obtained as:
lat : -87.8638 to 87.8638 degrees_north
available : cellbounds $101 = 300 / 2.3 = 144 + 1 = 143$ Vertical coordinates : $1200 / 2.5^\circ = 72 + 1 = 73$
1: height 📈 : levels=1 scalar 🗾
height : 2 m
Time coordine : time : 1980 steps
Pre = 1850-01-01 00:00:00 Units = days Cr _ndar = 365_day Bounds = true
-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss YYYY-MM-D hh:mm:ss YYYY-MM-DD hh:mm:ss 850-01-16 12:00:00 1850-02-15 00:00:00 1850-03 6 12:00:00 1850-04-16 00:00:00
1850-05-16 12:00:00 1850-06-16 00:00:00 1850-0 16 12:00:00 1850-08-16 12:00:00
1850-09-16 00:00:00 1850-10-16 12:00:00 1850-00-16 00:00:00 1850-12-16 12:00:00 1851-01-16 12:00:00 1851-02-15 00:00:00 1851-02-16 12:00:00 1851-04-16 00:00:00
1851-05-16 12:00:00 1851-06-16 00:00:00 1851 7-16 12:00:00 1851-08-16 12:00:00
1851-09-16 00:00:00 1851-10-16 12:00:00 185711-16 00:00:00 1851- 1852-01-16 12:00:00 1852-02-15 00:00:00 187-03-16 12:00:00 1852-0 gridtype = lation
xsize = 145
Onen a taut aditor and ture the ysize = 73
Open a text editor and type the xfirst = 0
grid information
XIIIC - 2.3
gedit gridWorld.txt & yfirst = -90
ymst = 50
Suggesting of editor for Windows: notepad++ yinc = 2.5



CDO

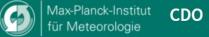
1854-01-16 12:00	:00 1854-02-15	00:00:00	1854-03-16	12:00:00	1854-04-16	00:00:00	
1854-05-16 12:00	:00 1854-06-16	00:00:00	1854-07-16	12:00:00	1854-08-16	12:00:00	ſ
1854-09-16 00:00	:00 1854-10-16	12:00:00	1854-11-16	00:00:00	1854-12-16	12:00:00	
2010-01-16 12:00	:00 2010-02-15	00:00:00	2010-03-16	12:00:00	2010-04-16	00:00:00	
2010-05-16 12:00	:00 2010-06-16	00:00:00	2010-07-16	12:00:00	2010-08-16	12:00:00	
2010-09-16 00:00	:00 2010-10-16	12:00:00	2010-11-16	00:00:00	2010-12-16	12:00:00	
2011-01-16 12:00	:00 2011-02-15	00:00:00	2011-03-16	12:00:00	2011-04-16	00:00:00	
2011-05-16 12:00	:00 2011-06-16	00:00:00	2011-07-16	12:00:00	2011-08-16	12:00:00	
2011-09-16 00:00	:00 2011-10-16	12:00:00	2011-11-16	00:00:00	2011-12-16	12:00:00	
2012-01-16 12:00	:00 2012-02-15	00:00:00	2012-03-16	12:00:00	2012-04-16	00:00:00	
2012-05-16 12:00	:00 2012-06-16	00:00:00	2012-07-16	12:00:00	2012-08-16	12:00:00	
2012-09-16 00:00	:00 2012-10-16	12:00:00	2012-11-16	00:00:00	2012-12-16	12:00:00	
2013-01-16 12:00	:00 2013-02-15	00:00:00	2013-03-16	12:00:00	2013-04-16	00:00:00	
2013-05-16 12:00	:00 2013-06-16	00:00:00	2013-07-16	12:00:00	2013-08-16	12:00:00	
2013-09-16 00:00	:00 2013-10-16	12:00:00	2013-11-16	00:00:00	2013-12-16	12:00:00	
2014-01-16 12:00	:00 2014-02-15	00:00:00	2014-03-16	12:00:00	2014-04-16	00:00:00	
2014-05-16 12:00	:00 2014-06-16	00:00:00	2014-07-16	12:00:00	2014-08-16	12:00:00	
2014-09-16 00:00	:00 2014-10-16	12:00:00	2014-11-16	00:00:00	2014-12-16	12:00:00	
	essed 1 variabl						
(base) reboita@reb	pitaV14:/dados/			🚳 gedit g	pridWorld.tx	t	

gedit is a text editor of Linux

typing **gedit** and a **file name**, a window will be opened for you to write

Abrir ~ 🕞 /d	*gridWorld.txt ados/reboita/trainings/CMIP6	Salvar	-	×
1 gridtype = latlo	nS			
2 xsize = 145				
3 ysize = 73				
4 xfirst = 0				
5 xinc = 2.5				
6 yfirst = -90				
7 yinc = 2.5				

			rebo	ita@reboitaV14: /dados/reboil	ta/trainings/CMIP6	Max-Planck-Institut CD	С
	reboita@reboita	V14:/dados/reboita/tr V14:/dados/reboita/tr	ainings/CMIP6\$ ainings/CMIP6\$ gedit	gridWorld.txt &	& does not block the terminal	für Meteorologie	
	<u>reboita@reboita</u>			mapbil,gridWorld.t	txt tas_Amon_CanESM5_historical_r	-1i1p1f1_gn_185001-201412.nc tas_Amon_(С
anESM5 cdo		p1f1_gn_185001-201412	_remap.nc sian (128x64) to lonl	at (115x73) arid	Adjusting grid and coordinates		
cdo			from 1 variable over		.76s 97MB1.		
	reboita@reboita	V14:/dados/reboita/tr			5M5_historical_r1i1p1f1_gn_185001	-201412_remap.nc	
	le format : NetCD				Knowing the new file		
	L : Institut Sour			type : Parameter] F32 : -1	(D Kiloting the field file		
	d coordinates :	SMD V LINSLANC	1 1 10202 I	F52 : -1			
	l : lonlat	: points=	10585 (145x73)				
	74. B. SERIE 604. S.	lon : 0 to 36	0 by 2.5 degrees_east				
			90 by 2.5 degrees_nor	th			
	tical coordinate		1 scalar				
	l : height	height : 2 m	1 SCala				
Tir	ne coordinate :	netgire : 2 h					
		time : 1980 st	eps				
			= days Calendar = 36				
			YYYY-MM-DD nn:mm:ss				
			1850-03-16 12:00:00 1850-07-16 12:00:00				
		1850-10-16 12:00:00	1850-11-16 00:00:00	1850-12-16 12:00:			
		1851-02-15 00:00:00	1851-03-16 12:00:00	1851-04-16 00:00:			
		1851-06-16 00:00:00	1851-07-16 12:00:00	1851-08-16 12:00:			
		1851-10-16 12:00:00	1851-11-16 00:00:00	1851-12-16 12:00:			
		1852-02-15 00:00:00	1852-03-16 12:00:00	1852-04-16 00:00:			
	2-05-16 12:00:00	1852-06-16 00:00:00	1852-07-16 12:00:00 1852-11-16 00:00:00	1852-08-16 12:00: 1852-12-16 12:00:			
		1852-10-16 12:00:00 1853-02-15 00:00:00	1853-03-16 12:00:00	1853-04-16 00:00:			
		1853-06-16 00:00:00	1853-07-16 12:00:00	1853-08-16 12:00:			
		1853-10-16 12:00:00	1853-11-16 00:00:00	1853-12-16 12:00:			
		1854-02-15 00:00:00	1854-03-16 12:00:00	1854-04-16 00:00:			
		1854-06-16 00:00:00	1854-07-16 12:00:00	1854-08-16 12:00:			
1854	1-09-16 00:00:00	1854-10-16 12:00:00	1854-11-16 00:00:00	1854-12-16 12:00:	:00		



	time : 1980 st	eps	
RefTime = 1850-0		= days Calendar = 3	65_day Bounds = true
YYYY-MM-DD hh:mm:ss	YYYY-MM-DD hh:mm:ss	YYYY-MM-DD hh:mm:ss	YYYY-MM-DD hh:mm:ss
1850-01-16 12:00:00	1850-02-15 00:00:00	1850-03-16 12:00:00	
1850-05-16 12:00:00	1850-06-16 00:00:00	1850-07-16 12:00:00	1850-08-16 12:00:00
1850-09-16 00:00:00	1850-10-16 12:00:00	1850-11-16 00:00:00	
1851-01-16 12:00:00	1851-02-15 00:00:00	1851-03-16 12:00:00	
1851-05-16 12:00:00	1851-06-16 00:00:00	1851-07-16 12:00:00	
1851-09-16 00:00:00	1851-10-16 12:00:00	1851-11-16 00:00:00	
1852-01-16 12:00:00	1852-02-15 00:00:00	1852-03-16 12:00:00	
1852-05-16 12:00:00	1852-06-16 00:00:00	1852-07-16 12:00:00	
1852-09-16 00:00:00	1852-10-16 12:00:00	1852-11-16 00:00:00	
1853-01-16 12:00:00	1853-02-15 00:00:00	1853-03-16 12:00:00	
1853-05-16 12:00:00	1853-06-16 00:00:00	1853-07-16 12:00:00	
1853-09-16 00:00:00	1853-10-16 12:00:00	1853-11-16 00:00:00	
1854-01-16 12:00:00	1854-02-15 00:00:00	1854-03-16 12:00:00	
1854-05-16 12:00:00	1854-06-16 00:00:00	1854-07-16 12:00:00	
1854-09-16 00:00:00	1854-10-16 12:00:00	1854-11-16 00:00:00	1854-12-16 12:00:00
2010-01-16 12:00:00	2010-02-15 00:00:00	2010-03-16 12:00:00	2010-04-16 00:00:00
2010-05-16 12:00:00	2010-06-16 00:00:00	2010-07-16 12:00:00	
2010-09-16 00:00:00	2010-10-16 12:00:00	2010-11-16 00:00:00	
2011-01-16 12:00:00	2011-02-15 00:00:00	2011-03-16 12:00:00	
2011-05-16 12:00:00	2011-06-16 00:00:00	2011-07-16 12:00:00	
2011-09-16 00:00:00	2011-10-16 12:00:00	2011-11-16 00:00:00	
2012-01-16 12:00:00	2012-02-15 00:00:00	2012-03-16 12:00:00	
2012-05-16 12:00:00	2012-06-16 00:00:00	2012-07-16 12:00:00	
2012-09-16 00:00:00	2012-10-16 12:00:00	2012-11-16 00:00:00	
2013-01-16 12:00:00	2013-02-15 00:00:00	2013-03-16 12:00:00	
2013-05-16 12:00:00	2013-06-16 00:00:00	2013-07-16 12:00:00	
2013-09-16 00:00:00	2013-10-16 12:00:00	2013-11-16 00:00:00	2013-12-16 12:00:00
2014-01-16 12:00:00	2014-02-15 00:00:00	2014-03-16 12:00:00	
2014-05-16 12:00:00	2014-06-16 00:00:00	2014-07-16 12:00:00	
2014-09-16 00:00:00	2014-10-16 12:00:00	2014-11-16 00:00:00	2014-12-16 12:00:00
do sinfo: Processe	d 1 variable over 198	0 timesteps [0.03s 4	8MB].

rebolta@reboltaV14:/dados/rebolta/trainings/CMIP6 (base) rebolta@reboltaV14:/dados/rebolta/trainings/CMIP6\$ ls	Max-Planck-Institut CDO für Meteorologie
	5_ssp585_r1i1p1f1_gn_201501-210012.nc tas_Amon_CanES
1 : unknown CanESM5 v instant 1 1 10585 1 F32 : -1 Grid coordinates : 1 : lonlat : points=10585 (145x73) lon : 0 to 360 by 2.5 degrees_east lat : -90 to 90 by 2.5 degrees_north Vertical coordinates :	Repeating the
1 : height : levels=1 scalar height : 2 m Time coordinate : time : 1032 steps RefTime = 1850-01-01 00:00:00 Units = days Calendar = 365_day Bounds = true	previous procedure but with the file of
YYYY-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss 2015-01-16 12:00:00 2015-02-15 00:00:00 2015-03-16 12:00:00 2015-04-16 00:00:00 2015-05-16 12:00:00 2015-06-16 00:00:00 2015-07-16 12:00:00 2015-08-16 12:00:00 2015-09-16 00:00:00 2015-10-16 12:00:00 2015-11-16 00:00:00 2015-12-16 12:00:00 2016-01-16 12:00:00 2016-02-15 00:00:00 2016-03-16 12:00:00 2016-04-16 00:00:00	future climate
2016-05-1612:00:002016-06-1600:00:002016-07-1612:00:002016-08-1612:00:002016-09-1600:00:002016-10-1612:00:002016-11-1600:00:002016-12-1612:00:002017-01-1612:00:002017-02-1500:00:002017-03-1612:00:002017-04-1600:00:002017-05-1612:00:002017-06-1600:00:002017-07-1612:00:002017-08-1612:00:002017-09-1600:00:002017-10-1612:00:002017-11-1600:00:002017-12-1612:00:00	
2018-01-16 12:00:00 2018-02-15 00:00:00 2018-03-16 12:00:00 2018-04-16 00:00:00 2018-05-16 12:00:00 2018-06-16 00:00:00 2018-07-16 12:00:00 2018-08-16 12:00:00 2018-09-16 00:00:00 2018-10-16 12:00:00 2018-11-16 00:00:00 2018-12-16 12:00:00 2019-01-16 12:00:00 2019-02-15 00:00:00 2019-03-16 12:00:00 2019-04-16 00:00:00 2019-05-16 12:00:00 2019-06-16 00:00:00 2019-07-16 12:00:00 2019-08-16 12:00:00 2019-09-16 00:00:00 2019-10-16 12:00:00 2019-11-16 00:00:00 2019-12-16 12:00:00	

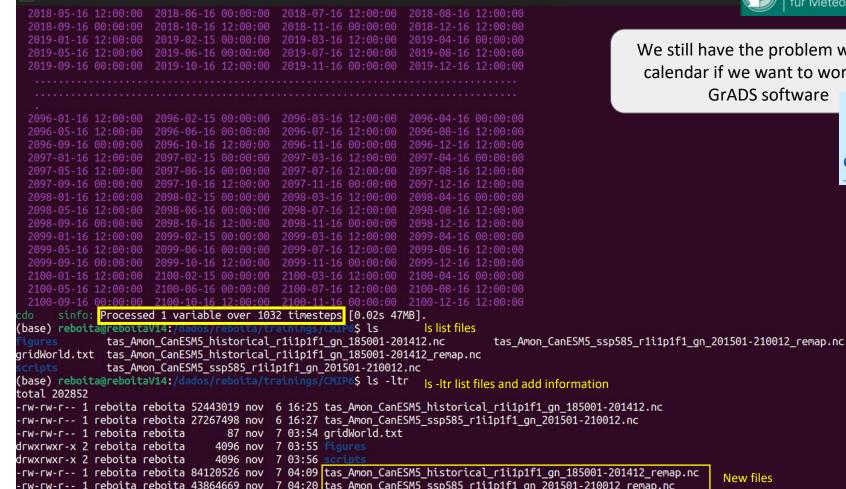


Max-Planck-Institut für Meteorologie

We still have the problem with the calendar if we want to work with GrADS software



CDO



New files

Calendar

Data can have a

standard calendar (years with 365 and 366 days)
360 days (all years with 360 days – months with 30 days)
365 days (all years with 365 days – not include February

29)

366 days (all years with 366 days)

GrADS only supports standard calendar

We can perform a **trick with cdo** for loading and visualizing the data in GrADS, but **"the date the GrADS will show is not correct"** because it considers a standard calendar







Calendar	reboita@reboitaV14: /dados/reboita/trainings/CMIP6
Calelludi	c (base) reboita@reboitaV14:/dados/reboita/trainings/CMIP6\$ cdo setcalendar,standard tas_Amon_CanESM5_historic
	al_r1i1p1f1_gn_185001-201412_remap.nc tas_Amon_CanESM5_historical_r1i1p1f1_gn_185001-201412_remap_cal.nc
	cdo setcalendar: Processed 20958300 values from 1 variable over 1980 timesteps [0.15s 85MB].
	(base) reboita@reboitaV14:/dados/reboita/trainings/CMIP6\$ cdo setcalendar,standard tas_Amon_CanESM5_ssp585_r
	1i1p1f1_gn_201501-210012_remap.nc tas_Amon_CanESM5_ssp585_r1i1p1f1_gn_201501-210012_remap_cal.nc
cdo setcalendar,standar	cdo setcalendar: Processed 10923720 values from 1 variable over 1032 timesteps [0.09s 83MB].
-	(base) reboita@reboitaV14:/dados/reboita/trainings/CMIP6\$ cdo sinfo tas_Amon_CanESM5_historical_r1i1p1f1_gn_ 185001-201412_remap_cal.nc
infile.nc outfile.nc	File format : NetCDF4 classic
	-1 : Institut Source T Steptype Levels Num Points Num Dtype : Parameter ID
	1 : unknown CanESM5 v instant 1 1 10585 1 F32 : -1
	Grid coordinates :
	1 : lonlat : points=10585 (145x73)
	lon : 0 to 360 by 2.5 degrees_east
	lat : -90 to 90 by 2.5 degrees_north
	Vertical coordinates :
	1 : height : levels=1 scalar
	height : 2 m
	Time coordinate :
	time : 1980 steps
	RefTime = 1850-01-01 00:00:00 Units = days <mark>Calendar = standard B</mark> ounds = true
	YYYY-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss
	1850-01-16 12:00:00 1850-02-15 00:00:00 1850-03-16 12:00:00 1850-04-16 00:00:00
	1850-05-16 12:00:00 1850-06-16 00:00:00 1850-07-16 12:00:00 1850-08-16 12:00:00
	1850-09-16 00:00:00 1850-10-16 12:00:00 1850-11-16 00:00:00 1850-12-16 12:00:00
	1851-01-16 12:00:00 1851-02-15 00:00:00 1851-03-16 12:00:00 1851-04-16 00:00:00
	1851-05-16 12:00:00 1851-06-16 00:00:00 1851-07-16 12:00:00 1851-08-16 12:00:00
	1851-09-16 00:00:00 1851-10-16 12:00:00 1851-11-16 00:00:00 1851-12-16 12:00:00
	1852-01-16 12:00:00 1852-02-15 00:00:00 1852-03-16 12:00:00 1852-04-16 00:00:00

Tutorial

CMIP6: Plotting



Open GrADS: type grads in the terminal



"Opening GrADS to a World of Extensions"

OpenGrADS

tarting "/opt/opengrads/Linux/Versions/2.0.2.oga.2/x86_64/grads "

Irid Analysis and Display System (GrADS) Version 2.0.2.oga.2 Copyright (c) 1988-2011 by Brian Doty and the Institute for Global Environment and Society (IGES) GrADS comes with ABSOLUTELY NO WARRANTY See file COPYRIGHT for more information

onfig: v2.0.2.oga.2 little-endian readline printim grib2 netcdf hdf4-sds hdf5 opendap-grids,stn athena geotiff shapefile ssue 'g config' command for more detailed configuration information _oading User Defined Extensions table </opt/opengrads/Linux/Versions/2.0.2.oga.2/x86 64/gex/udxt> ... ok. andscape mode? ('n' for portrait): X Package Initialization: Size = 11 8.5 load the file a-> sdfopen tas_Amon_CanESM5_historical_r1i1p1f1_gn_185001-201412_remap_cal.nc canning self-describing rile: tas Amon canesms nistorical rilipiri on 185001-201412 remap cal.nc DF file tas Amon CanESM5 historical r1i1p1f1 gn 185001-201412 remap cal.nc is open as file 1 <u>ON set to 0 360</u> GrADS 2.0.2.oga.2 AT set to -90 90 EV set to 0 0 Time values set: 1850:1:16:12 1850:1:16:12 set to 1 1 a-> g file show file information ile 1 : CanESM5 output prepared for CMIP6 Descriptor: tas Amon CanESM5 historical r1i1p1f1 gn 185001-201412 remap cal.nc Binarv: tas Amon CanESM5 historical r1i1p1f1 gn 185001-201412 remap cal.nc Type = Gridded<u>Xsize = 145 Ysize = 73 Zsize = 1 Tsize = 1980 Esize = 1</u> Number of Variables = 1 tas is the variable name tas 0 t,y,x Near-Surface Air Temperature ia-> d tas display a variable in a graphical window Contouring: 220 to 300 interval 10

```
Config: v2.2.1 little-endian readline grib2 netcdf hdf4-sds hdf5 opendap-grids,stn geotiff shapefile
                      Issue 'q config' and 'q qxconfig' commands for more detailed configuration information
                      Landscape mode? ('n' for portrait):
                      GX Package Initialization: Size - 11.8 5
Monthly means
                      ga-> sdfopen tas Amon CanESM5 historical r1i1p1f1 gn 185001-201412 remap cal.nc
                      Scanning self-describing file: tas_Amon_CanESM5_historical_filipif1_gn_185001-201412_remap_cal.nc
                      SDF file tas Amon CanESM5 historical r1i1p1f1 gn 185001-201412 remap cal.nc is open as file 1
                      LON set to 0 360
                      LAT set to -90 90
                      LEV set to 0 0
                      Time values set: 1850:1:16:12 1850:1:16:12
                      E set to 1 1
                      ga-> set t 1
                      Time values set: 1850:1:16:12 1850:1:16:12
                      ga-> set t 2
                      Time values set: 1850:2:16:12 1850:2:16:12
                      ga-> set t 13
                      Time_values_set: 1851:1:16:12 1851:1:16:12
                      ga-><mark>q file</mark>
                      File 1 : CanESM5 output prepared for CMIP6
                        Descriptor: tas Amon CanESM5 historical r1i1p1f1 gn 185001-201412 remap cal.nc
                        Binary: tas Amon CanESM5 historical r1i1p1f1 gn 185001-201412 remap cal.nc
                        Type = Gridded
                        Esize = 1
                        Number of Variables = 1
                           tas 0 t v x Near-Surface Air Temperature
                      ga-> define m01=ave(tas,t=1,t=1980,12)
                                                                          Let's do it in a GrADS script?
                      Averaging. dim = 3, start = 1, end = 1980
                      Define memory allocation size = 84680 bytes
                      ga-> define m02=ave(tas,t=2,t=1980,12)
                      Averaging. dim = 3, start = 2, end = 1980
                      Define memory allocation size = 84680 bytes
                      ga-> define m03=ave(tas,t=3,t=1980,12)
                      Averaging. dim = 3, start = 3, end = 1980
     OpenGrADS
                      Define memory allocation size = 84680 bytes
      Opening GrADS to a World of Extensions"
                      ga-> |
```

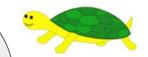
*Script to compute the climatological means from **1950** to **2014** and plot` 'reinit'

*Graphical window with white background 'set display color white' 'c'

*Loading the file: sdfopen /path/file.nc Type all in the same line 'sdfopen /dados/reboita/trainings/CMIP6/ tas_Amon_CanESM5_historical_r1i1p1f1_gn_185001-201412_remap_cal.nc'

*Monthly means

'define m1=ave(tas,t=1,t=1980,12)' 'define m2=ave(tas,t=2,t=1980,12)' 'define m3=ave(tas,t=3,t=1980,12)' 'define m4=ave(tas,t=4,t=1980,12)' 'define m5=ave(tas,t=5,t=1980,12)' 'define m7=ave(tas,t=6,t=1980,12)' 'define m8=ave(tas,t=7,t=1980,12)' 'define m9=ave(tas,t=9,t=1980,12)' 'define m10=ave(tas,t=10,t=1980,12)' 'define m11=ave(tas,t=11,t=1980,12)' 'define m12=ave(tas,t=12,t=1980,12)'



"Opening GrADS to a World of Extensions"

penGrADS

Open a text editor gedit \rightarrow Linux notepad++ \rightarrow Windows

GrADS sintaxe: Commands inside '' Comment *

Part



OpenGrADS

"Opening GrADS to a World of Extensions"

*Seasonal means

'define djf=(m1+m2+m12)/3' 'define mam=(m3+m4+m5)/3' 'define jja=(m6+m7+m8)/3' 'define son=(m9+m10+m11)/3'

*Annual mean

*option 1 'define annual=(djf+mam+jja+son)/4'

*option 2 *'define annual=(tas,t=1,tas=1980)' *Plotting

time=1 while(time<=12) 'set t 'time

'set gxout shaded' 'set clevs -20 -15 -10 -5 0 5 10 15 20' 'set ccols 9 14 4 11 5 10 7 12 8 2 6'

*Remove bottom grads information 'set grads off'

*Increase the font size 'set xlopts 1 1 0.16' 'set ylopts 1 1 0.14'

*Changing the TAS unit to Celsius 'd m'time'-273.15' 'draw title TAS ('time')' 'cbarn.gs' *Defining the path to store the figures 'printim /dados/reboita/trainings/CMIP6/ figures/TAS_'time'.png'

*Click enter to see each image pull n 'c'

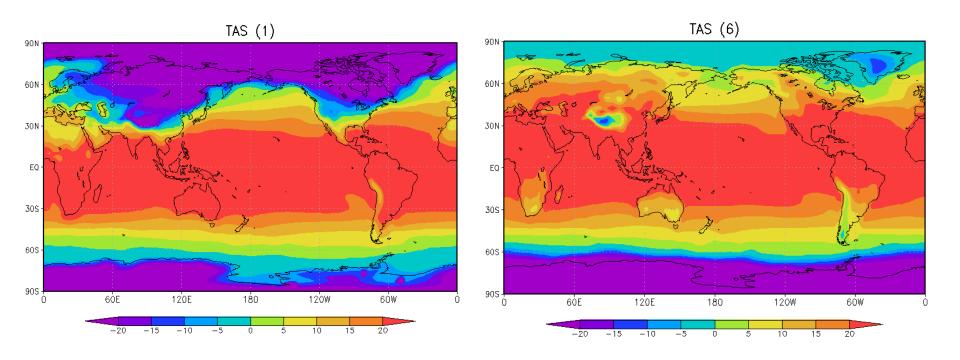
time=time+1 endwhile Part III

Part II

Air temperature 2-m (°C)



January and June (1850-2014)





Save the previous script with the name do_difference.gs

In this script, load the historical file and future file and compute the monthly and seasonal means

Historical period: 1995-2014 Future period: 2080-2099

Plot the seasonal difference between future (2080-2099) and historical period (1995-2014).



```
Abrir
           F1
```

38

```
OpenGrADS
 1 *********** Compute the monthly and seasonal climatological means of *
                                                                                                      "Opening GrADS to a World of Extensions"
                     historical and future projections
 7 **************
 3
 4 'reinit'
 5
 6 *Graphical windown with white background
 7 'set display color white'
 8 'c'
 9
11
12 *Loading the file
13 'sdfopen /dados/reboita/trainings/CMIP6/tas Amon CanESM5 historical r1i1p1f1 gn 185001-201412 remap cal.nc'
14
15 *Monthly means
16
17 'define m1h=ave(tas.time=00Z01Jan1995.time=00Z31Dec2014.12)'
18 'define m2h=ave(tas,time=00Z01Feb1995,time=00Z31Dec2014,12)'
19 'define m3h=ave(tas,time=00Z01Mar1995,time=00Z31Dec2014,12)'
20 'define m4h=ave(tas,time=00Z01Apr1995,time=00Z31Dec2014,12)'
21 'define m5h=ave(tas.time=00Z01Mav1995.time=00Z31Dec2014.12)'
22 'define m6h=ave(tas,time=00Z01Jun1995,time=00Z31Dec2014,12)'
23 'define m7h=ave(tas,time=00Z01Jul1995,time=00Z31Dec2014,12)'
24 'define m8h=ave(tas,time=00Z01Aug1995,time=00Z31Dec2014,12)'
25 'define m9h=ave(tas,time=00Z01Sep1995,time=00Z31Dec2014,12)'
26 'define m10h=ave(tas,time=00Z010ct1995,time=00Z31Dec2014,12)'
27 'define m11h=ave(tas,time=00Z01Nov1995,time=00Z31Dec2014,12)'
28 'define m12h=ave(tas.time=00Z01Dec1995.time=00Z31Dec2014.12)'
29
30 *Seasonal means
31
32 'define difh=(m1h+m2h+m12h)/3'
33 'define mamh=(m3h+m4h+m5h)/3'
34 'define jjah=(m6h+m7h+m8h)/3'
35 'define sonh=(m9h+m10h+m11h)/3'
36
37 'close 1'
```

```
OpenGrADS
39
40
                                                                                          "Opening GrADS to a World of Extensions"
42
43 *Loading the file
44 'sdfopen /dados/reboita/trainings/CMIP6/tas Amon CanESM5 ssp585 r1i1p1f1 gn 201501-210012 remap cal.nc'
45
46 *Monthly means
47
48 'define m1f=ave(tas,time=00Z01Jan2080,time=00Z31Dec2099,12)'
49 'define m2f=ave(tas,time=00Z01Feb2080,time=00Z31Dec2099,12)'
50 'define m3f=ave(tas,time=00Z01Mar2080,time=00Z31Dec2099,12)'
51 'define m4f=ave(tas,time=00Z01Apr2080,time=00Z31Dec2099,12)'
52 'define m5f=ave(tas,time=00Z01May2080,time=00Z31Dec2099,12)'
53 'define m6f=ave(tas,time=00Z01Jun2080,time=00Z31Dec2099,12)'
54 'define m7f=ave(tas,time=00Z01Jul2080,time=00Z31Dec2099,12)'
55 'define m8f=ave(tas,time=00Z01Aug2080,time=00Z31Dec2099,12)'
56 'define m9f=ave(tas,time=00Z01Sep2080,time=00Z31Dec2099,12)'
57 'define m10f=ave(tas,time=00Z010ct2080,time=00Z31Dec2099,12)'
58 'define m11f=ave(tas.time=00Z01Nov2080.time=00Z31Dec2099.12)'
59 'define m12f=ave(tas,time=00Z01Dec2080,time=00Z31Dec2099,12)'
60
61 *Seasonal means
62
63 'define diff=(m1f+m2f+m12f)/3'
64 'define mamf=(m3f+m4f+m5f)/3'
65 'define jjaf=(m6f+m7f+m8f)/3'
66 'define sonf=(m9f+m10f+m11f)/3'
67
68
69
71
72 'define dif1=diff-difh'
73 'define dif2=mamf-mamh'
74 'define dif3=jjaf-jjah'
75 'define dif4=sonf-sonh'
```

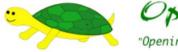
```
78
79 *Plotting
80
81 time=1
82 while(time<=4)
83
84 'set t 'time
85
86 'set gxout shaded'
87 *'set clevs 1 2 3 4 5 6 7 8 9'
88 *'set ccols 9 14 4 11 5 10 7 12 8 2 6'
89 'set mpdset mres'
90
91 *Remove bottom grads information
92 'set grads off'
93
94 *Increase the font size
95 'set xlopts 1 1 0.16'
96 'set vlopts 1 1 0.14'
97
98
99 *Changing the TAS unit to Celsius
LOO 'color 0 10 1 -kind white->yellow->orange->tomato->red'
101 'd dif'time''
LO2 'draw title TAS ('time')'
LO3 'cbarn.gs'
104 *Defining the path to store the figures
L05 'printim /dados/reboita/trainings/CMIP6/figures/dif_TAS_'time'.png'
106
107 *Click enter to see each image
LO8 pull n
L09 'c'
110
111 time=time+1
112 endwhile
L13
```



OpenGrADS "Opening GrADS to a World of Extensions"

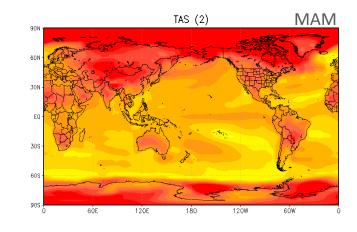
Air temperature 2-m (°C) Future (2080-2099) - Historical (1995-2014)

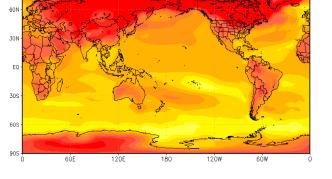
90N



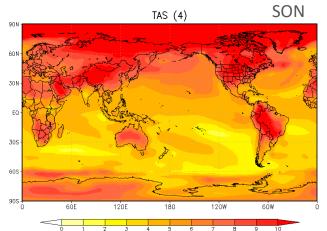
DJF

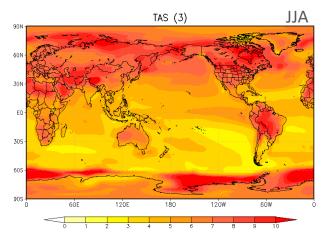
OpenGrADS "Opening GrADS to a World of Extensions"





TAS (1)





Extracting a time series



"Opening GrADS to a World of Extensions"

Using **CDO**: merge the files of historical and future periods

cdo mergetime in_01.nc in_02.nc out.nc

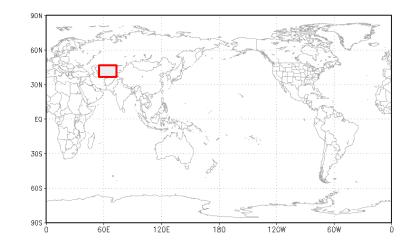
Using **GrADS**: compute the monthly mean of the air temperature for each time step for the whole globe and for an area covering Uzbekistan, convert the unit from K to °C and save the results in a text file with the configuration:

Month Year Globe

UΖ

Using **Excel**: plot the monthly time series. Compute the annual mean and make a new plot.

> Uzbekistan coordinates lon1 = 56lon2 = 73lat1 = 37 lat2 = 45.5





t CDO

F	reboita@reboitaV14: /dados/reboita/trainings/CMIP6 Q = ×
(base) reboita@reboitaV14:	:/dados/reboita/trainings/CMIP6\$ cdo mergetime tas_Amon_CanESM5_historical_r1i1p1f1_gn_185001-201412_re
	15_ssp585_r1i1p1f1_gn_201501-210012_remap_cal.nc tas_Amon_CanESM5_185001_210012.nc
cdo mergetime: Processe	ed 31882020 values from 2 variables over 3012 timesteps [0.28s 85MB].
(base) reboita@reboitaV14:	:/dados/reboita/trainings/CMIP6\$ cdo sinfo tas_Amon_CanESM5_185001_210012.nc
File format : NetCDF4 of	
	T Steptype Levels Num Points Num Dtype : Parameter ID
1 : unknown CanESM5	v instant 1 1 10585 1 F32 : -1
Grid coordinates :	
1 : lonlat	: points=10585 (145x73)
	lon : 0 to 360 by 2.5 degrees_east
	lat : -90 to 90 by 2.5 degrees_north
Vertical coordinates :	
1 : height	: levels=1 scalar
Time and a to a	height : 2 m
Time coordinate :	time : 3012 steps
PofTimo - 1850-01-01	1 00:00:00 Units = days Calendar = standard Bounds = true
	Y-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss
1850-01-16 12:00:00 185	
	50-06-16 00:00:00 1850-07-16 12:00:00 1850-08-16 12:00:00
	50-10-16 12:00:00 1850-11-16 00:00:00 1850-12-16 12:00:00
	51-02-15 00:00:00 1851-03-16 12:00:00 1851-04-16 00:00:00
1851-05-16 12:00:00 185	51-06-16 00:00:00 1851-07-16 12:00:00 1851-08-16 12:00:00
1851-09-16 00:00:00 185	51-10-16 12:00:00 1851-11-16 00:00:00 1851-12-16 12:00:00
1852-01-16 12:00:00 185	52-02-15 00:00:00 1852-03-16 12:00:00 1852-04-16 00:00:00
1852-05-16 12:00:00 185	
	52-10-16 12:00:00 1852-11-16 00:00:00 1852-12-16 12:00:00
	53-02-15 00:00:00 1853-03-16 12:00:00 1853-04-16 00:00:00
1853-05-16 12:00:00 185	53-06-16 00:00:00 1853-07-16 12:00:00 1853-08-16 12:00:00

```
Abrir 🗸
          (F)
```

write timeseries tas globe UZ.gs /dados/reboita/trainings/CMIP6/scripts

1 3 *This program creates a time series of each selected region 4 5 'reinit' 6 8 *** MODIFY HERE (INCLUDING PATH) 9 10 'sdfopen /dados/reboita/trainings/CMIP6/tas Amon CanESM5 185001 210012.nc' 11 13 14 ***Here we get the variable name automatically 15 'a file 16 row=sublin(result.7) 17 **var**=subwrd(row,1) 18 say 'variavel name =' var 19 20 ***Here we get the time stpes automatically 21 'a file 22 row=sublin(result,5) 23 ntimonth=subwrd(row,12) 24 say 'ntimonth =' ntimonth 25 26 *Looping time 27 tt=1 28 while(tt<=ntimonth)</pre> 29 'set t 'tt 30 31 'a dims' 32 row=sublin(result,5) 33 dd=subwrd(row.6) 34 month=substr(dd.6.3) 35 year=substr(dd,9,4) 36 37 say year 38 39 40 if (month = JAN) ; month1 = 01 ; endif 41 if (month = FEB) ; month1 = 02 ; endif 42 if (month = MAR) ; month1 = 03 ; endif 43 if (month = APR) ; month1 = 04 ; endif 44 if (month = MAY) ; month1 = 05 ; endif 45 if (month = JUN) ; month1 = 06 ; endif 46 if (month = JUL) : month1 = 07 : endif 47 if (month = AUG) : month1 = 08 : endif 48 if (month = SEP) : month1 = 09 : endif 49 if (month = OCT) : month1 = 10 : endif 50 if (month = NOV) : month1 = 11 : endif 51 if (month = DEC) ; month1 = 12 ; endif 52 53 say month1 54





54 55 'set gxout print' 56 57 *** MODIFY HERE (COORDINATES) 58 59 'define globe=aave('var',lon=0,lon=360,lat=-90,lat=90)' 60 *Changing the unit from Kelvin to Celsius 61 'd alobe-273.15' 62 value1=sublin(result,2) 63 sav value1 64 65 'define uz=aave('var',lon=56,lon=73,lat=37,lat=45.5)' 66 67 'd uz-273.15' 68 value2=sublin(result.2) 69 say value2 70 71 72 *** MODIFY HERE (PATH AND NAME OF THE OUTFILE) 73 74 write('/dados/reboita/trainings/CMIP6/tas Globe UZ 1850 2100.txt'. month1 ' ' year ' ' value1 ' ' value2) 75 tt=tt+1 76 endwhile 77 78 79 close('/dados/reboita/trainings/CMIP6/tas Globe UZ 1850 2100.txt', month1 ' ' year ' ' value1 ' ' value2) 80 81 'quit' 82 83 84

Month			Year	Globe	UZ
1 01	1050	11 0044	. 7	24052	
		11.8046			
		11.7817		36329	
4 0 4	1050	12.4595	2.0	97021	
5 05		14.5039		.611	
6 06					
7 07	1050	15.2251	23	.9384 .6044	
8 08		15.4461		.2175	
				. 3015	
10 10	1950	14.8028	, 1/. , 7/	49819	
		12.7558		57058	
12 12				.91333	
13 01		12.0429		.28357	
14 02	1051	11 6120	7	. 59214	
15 03	1951	12 4555	5 0 7	72916	
16 04	1051	12.455		00079	
17 05	1851	11.6125 12.4555 13.3934 14.2977	1 2.0	.8416	
				.1348	
10 07	1851	14.9978	7 24	.8856	
20 08	1851	15.1831	24	. 5981	
	1051	14.2871	16	.7393	
22 10	1951	13.3619		13953	
23 11		12.4745		.0703	
24 12		11.6876		.1215	
25 01	1852	11.4539	11	1.5507	
26 02		11.5844		.30785	
27 03	1852	12 3319	2 0 /	103973	
28 04	1852	12.3318 13.3007	7 6 7	77463	
29 05		14.4446	5 17	.9846	
		15.1435		.8986	
31 07	1852	15.4465	26	4004	
32 08	1852	15.2506	5 24	6624	
33.09	1852	15.2500 14.4683 13.5744	16	1689	
34 10	1852	13.5744	1 10	7595	
35 11	1852	12.6336	5 3.6	53298	
	1852	11.9406	5 -0	.707756	
37 01		11.6266		558405	
38 02	1853			53058	
39 03		12.4467		9339	
40 04		13.4692		2142	
41 05	1853	14.5869		8867	
42 06		15.219		1159	
43 07		15.6425		4353	
44 08	1853				
45 09		14.6549		8877	
46 10	1853	13.742	7.98	3781	
47 11		12.84			
48 12		12.1913			
49 01	1854	11.7131	L - 6	73157	
50 02	1854	11.775	-4.4	10387	
51 03	1854	12.4198	8 0.0	0287897	
52 04	1854	12.4198 13.5564	10	3253	

write_timeseries_tas_globe_UZ.gs

	Colar V de Transferênci	N			→ A^ . ⊘n → <u>A</u>					Geral IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	~ 2 000 اتع	Forn	natação Con natar como os de Célula Estilos	Tabela ¥
R8	~) : [× •	✓ <i>f</i> x											
	А	В	С	D	Е	F	G	Н	1		J	К	L	М
1	1	1850	11,8046	-7,24953										
2	2	1850	11,7817	-9,70016				21.1						
3	3	1850	12,4595	2,86329				Glob	al: M	onthly	Data			
4	4	1850	13,5271	9,97021		25 —								
5	5	1850	14,5039	17,611										
6	6	1850	15,2251	23,9384		20 —								
						20							<u></u>	
7	7	1850	15,6805	26,6044		20						-		
8	8	1850	15,6805 15,4461	26,6044 23,2175		15								
8 9	8	1850 1850	15,6805 15,4461 14,8028	26,6044 23,2175 17,3015										
8 9 10	8 9 10	1850 1850 1850	15,6805 15,4461 14,8028 13,7539	26,6044 23,2175 17,3015 7,49819										
8 9 10 11	8 9 10 11	1850 1850 1850 1850	15,6805 15,4461 14,8028 13,7539 12,7558	26,6044 23,2175 17,3015 7,49819 2,57058		15								
8 9 10 11 12	8 9 10 11 12	1850 1850 1850 1850 1850	15,6805 15,4461 14,8028 13,7539 12,7558 12,0429	26,6044 23,2175 17,3015 7,49819 2,57058 -1,91333		15								
8 9 10 11 12 13	8 9 10 11 12 1	1850 1850 1850 1850 1850 1851	15,6805 15,4461 14,8028 13,7539 12,7558 12,0429 11,5722	26,6044 23,2175 17,3015 7,49819 2,57058 -1,91333 -8,28357		15 10 —								
8 9 10 11 12 13 14	8 9 10 11 12 1 2	1850 1850 1850 1850 1850 1851 1851	15,6805 15,4461 14,8028 13,7539 12,7558 12,0429 11,5722 11,6125	26,6044 23,2175 17,3015 7,49819 2,57058 -1,91333 -8,28357 -7,59214		15 10 — 5 —								
8 9 10 11 12 13 14 15	8 9 10 11 12 1 2 3	1850 1850 1850 1850 1850 1851 1851 1851	15,6805 15,4461 14,8028 13,7539 12,7558 12,0429 11,5722 11,6125 12,4555	26,6044 23,2175 17,3015 7,49819 2,57058 -1,91333 -8,28357 -7,59214 0,72916		15 10 — 5 —	105 209 313 417 521 521	729 833 937 041	145 249 353	561 565 665	977 977	081 185 289 393	601 705 809	913
8 9 10 11 12 13 14 15 16	8 9 10 11 12 1 2 3 4	1850 1850 1850 1850 1851 1851 1851 1851	15,6805 15,4461 14,8028 13,7539 12,7558 12,0429 11,5722 11,6125 12,4555 13,3934	26,6044 23,2175 17,3015 7,49819 2,57058 -1,91333 -8,28357 -7,59214 0,72916 9,00079		15 10 — 5 —	105 209 313 417 521 521	729 833 937 1041	1145 1249 1353	1457 1561 1665	1873 1977 1977	2081 2185 2289 2393	2497 2601 2705 2809	2913
8 9 10 11 12 13 14 15 16 17	8 9 10 11 2 1 2 3 4 5	1850 1850 1850 1850 1851 1851 1851 1851	15,6805 15,4461 14,8028 13,7539 12,7558 12,0429 11,5722 11,6125 12,4555 13,3934 14,2977	26,6044 23,2175 17,3015 7,49819 2,57058 -1,91333 -8,28357 -7,59214 0,72916 9,00079 17,8416		15 10 — 5 —	105 209 313 417 521 521	729 833 937 1041	1145 1249 1353	1457 1561 1665 1665	1873 1977	2081 2185 2289 2393	2497 2601 2705 2809	2913
8 9 10 11 12 13 14 15 16 17 18	8 9 10 11 2 3 4 5 6	1850 1850 1850 1850 1850 1851 1851 1851	15,6805 15,4461 14,8028 13,7539 12,7558 12,0429 11,5722 11,6125 12,4555 13,3934 14,2977 14,9978	26,6044 23,2175 17,3015 7,49819 2,57058 -1,91333 -8,28357 -7,59214 0,72916 9,00079 17,8416 23,1348		15 10 — 5 —	105 209 313 417 521 521	729 833 937 1041	1145 1249 1353	1457 1561 1565 1565	1,03 1873 1977	2081 2185 2185 2389 2393	2497 2601 2705 2809	2913
8 9 10 11 12 13 14 15 16 17	8 9 10 11 2 1 2 3 4 5	1850 1850 1850 1850 1851 1851 1851 1851	15,6805 15,4461 14,8028 13,7539 12,7558 12,0429 11,5722 11,6125 12,4555 13,3934 14,2977	26,6044 23,2175 17,3015 7,49819 2,57058 -1,91333 -8,28357 -7,59214 0,72916 9,00079 17,8416		15 10 — 5 —	105 209 313 417 521 521 521	229 833 937 1041	1145 1249 1353	1457 1561 1565 1665	1873 1977 1977	2081 2185 2289 2383 2389	2497 2601 2705 2809	5913

Excel

	А	В	С		
1		Global	Uzbekistan		
2	1850	13,8163	10,90559818		From the monthly data, get the annual mean.
3	1851	13,3941	8,158455		
4	1852	13,4644	9,093306417		
5	1853	13,6187	10,82830792		You can compute it using Excel . See Dr. Ali's tutorial.
6	1854	13,4817	10,08572331		
7	1855	13,4301	8,5883775		Annual Mean Temperature
8	1856	13,4804	9,8877425		
9	1857	13,4721	8,30967725		
10	1858	13,4495	8,153013275	0	- Marte
11	1859	13,576	8,932196167		May My May May May May May May May May M
12	1860	13,5384	8,147553333	5	
13	1861	13,5038	9,726085275		
14	1862	13,3523	8,954719333	0	Mandahananananananananananananananananana
15	1863	13,4913	10,07634833		
16	1864	13,4783	9,861345833	5	5
17	1865	13,3559	7,8404775		
18	1866	13,5938	9,318476767	0	
19	1867	13,7386	10,55818		1850 1857 1864 1871 1878 1878 1878 1892 1892 1996 1913 1913 1927 1927 1920 1966 1966 1976 1966 1976 1976 1976 1976
20	1868	13,5894	9,581425833		GlobalUzbekistan
21	1869	13,5522	10,14803917		

Tutorial

CORDEX: Download



CORDEX-CORE (Coordinated Regional Climate Downscaling Experiments - Coordinated Output for Regional Evaluations)

- set of simulations for most CORDEX domains

- scenarios RCPs 2.6 and 8.5, and
- 25 km of horizontal resolution



Coordination of Regional Downscaling 🔒

William Joseph Gutowski and Filippo Giorgi

https://doi.org/10.1093/acrefore/9780190228620.013.658 Published online: 28 February 2020

Summary

Regional climate downscaling has been motivated by the objective to understand how climate processes not resolved by global models can influence the evolution of a region's climate and by the need to provide climate change information to other sectors, such as water resources, agriculture, and human health, on scales poorly resolved by global models but where impacts are felt. There are four primary approaches to regional downscaling: regional climate models (RCMs), empirical statistical downscaling (ESD), variable resolution global models (VARGCM), and "time-slice" simulations with high-resolution global atmospheric models (HIRGCM). Downscaling using RCMs is often referred to as dynamical downscaling to contrast it with statistical downscaling. Although there have been efforts to coordinate each of these approaches, the predominant effort to coordinate regional downscaling activities has involved RCMs.

Der Springer Link

Climate Dynamics Journal has a special issue focusing on the CORDEX-CORE

Editorial | Published: 04 August 2021

Editorial for the CORDEX-CORE Experiment I Special Issue

Filippo Giorgi 🖂, Erika Coppola, Claas Teichmann & Daniela Jacob

<u>Climate Dynamics</u> 57, 1265–1268 (2021) | <u>Cite this article</u> 1050 Accesses | 1 Altmetric | <u>Metrics</u>

The CORDEX-CORE initiative

The Coordinated Regional Downscaling Experiment (CORDEX, Giorgi et al. <u>2009</u>; Jones et al. <u>2011a</u>) is the main reference program for the climate downscaling community. During its first activities, CORDEX has resulted in the production of ensembles of projections over continental scale domains covering most land areas of the globe at an intermediate resolution of ~ 50 km (e.g. Giorgi and Gutowski <u>2015</u>), with the exception of the EURO-CORDEX (Jacob et al. <u>2013</u>; Jacob et al. <u>2020</u>) and MED-CORDEX (Ruti et al. <u>2016</u>) programs for which higher resolution projections have been completed. However, one of the weaknesses of this first set of CORDEX projections is the heterogeneity in size and simulation protocol (or graphic chains of driving global).



WEBPAGE

RCMs currently contributing to the CORDEX CORE framework simulate at least nine domains (Figure 1) with horizontal resolution of 0.22° (about 25 km, see Figure 1a and 1b):

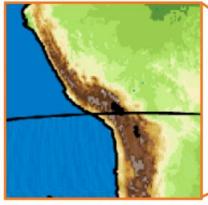
- REMO model (contribution by GERICS)
- RegCM model (, Italy, with the participation of Institute of Atmospheric Physics, Chinese Academy of Sciences (IAP/CAS), Oak Ridge National Laboratory, Tennessee, National Center for Atmospheric Research, NCAR, The Hong Kong University of Science and Technology)
- •

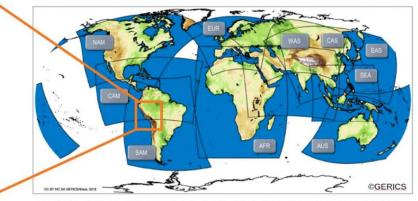
Experiments:

- evaluation: reanalysis, 1979 to 2017
- historical, RCP2.6 and RCP8.5: GCMs, 1950 (1970) to 2100

Forcings: ERA-Interim re-analysis, GCMs representing the range of low, medium, and high global equilibrium climate sensitivity (ECS) (in addition, there are three backup GCMs, as alternative forcing). The driving GCMs selected for the CORDEX-CORE ensemble offer a broad spread of ECS and were based on the suitability for the dynamical downscaling (McSweeney et al, 2015):

- NCC-NORESM (low ECS, backup: GFDL-ESM2M)
- MPI-ESM-LR/MPI-ESM-MR (medium ECS, backup: EC-Earth)
- HadGEM-ES (high ECS, backup: MIROC-MIROC5)





https://cordex.org/experiment-guidelines/cordex-core/cordex-core-simulations/

Figure 1b: Orographically structured area at CORDEX-CORE resolution of 0.22°.

Figure 1a: CORDEX-CORE model domains used in the simulations. From top-left to bottom right: North America (NAM), Central America (CAM), South America (SAM), Europe (EUR), Africa (AFR), South Asia (WAS), East Asia (EAS), Southeast Asia (SEA), and Australasia (AUS). The domain

CORDEX-CORE available projections

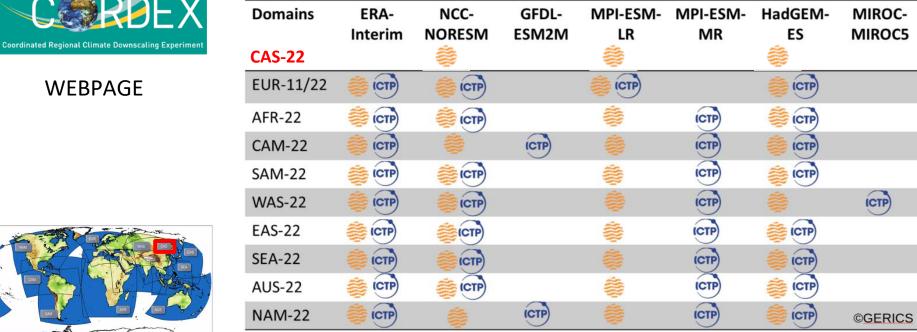
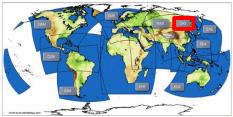


Figure 2: CORDEX-CORE simulation matrix. Orange GERICS-logo represents simulations performed using REMO, ICTP-logo represents simulations using RegCM.

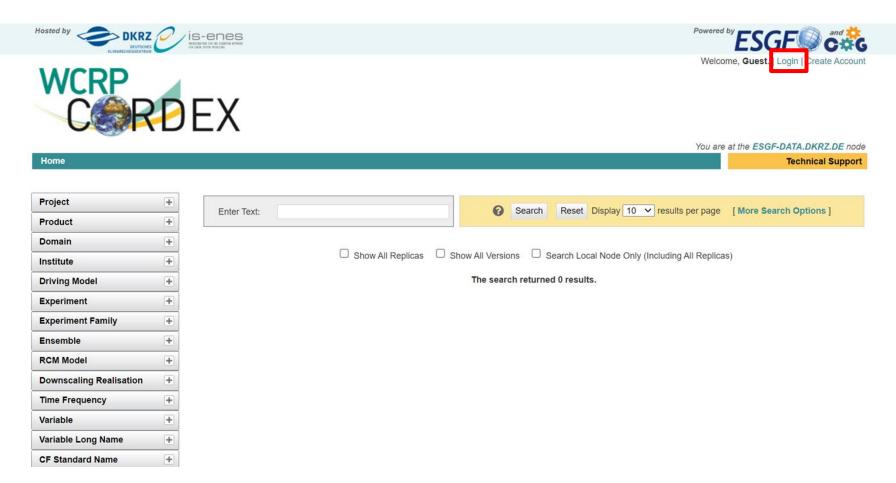
> Projections are performed by volunteers (no financial support). WCRP needs more researchers to collaborate with the work.



WEBPAGE

WCRP

https://esgf-data.dkrz.de/search/cordex-dkrz/



Hosted by OKRZ OV IS-CORES	Powered by ESGF @ or the
	Welcome, reboita. Register a New Project My Profile Log out
	You are at the ESGF-DATA.DKRZ.DE node
ESGF-DATA.DKRZ.DE Home	Technical Support
	Last Search 🧮 My Data Cart (0) Clear Data Cart
OpenID Login	
Enter your OpenID	in the text box below or select your OpenID provider (if listed) from the pulldown menu.
Pleas	e note: if you have an older OpenID from the Earth System Grid Federation, you may have to create a new account.
For the best expe	rience, please use Firefox, Chrome, or Internet Explorer. These are the browsers we support.
	Please note that ESGF OpenIDs are case-sensitive.
ESGF-CoG Login	
OpenID 🕨	Login

Forgot OpenID? Forgot Password? Login Help Create Account



ESGF OpenID Login

Status: not logge	ed-in	
4	Username: Password:	SUBMIT



Powered by ESGF C and CC

Welcome, reboita. | Register a New Project | My Profile | Log out

WCRP C	E	Welcome, reboita. Register a New Project My Profile Log out
Home		Technical Support
		Last Search 🐺 My Data Cart (0) Clear Data Cart
Project	+	
Product	+	Enter Text: O Search Reset Display 10 V results per page [More Search Options]
Domain	+	
Institute	+	Show All Replicas Show All Versions Search Local Node Only (Including All Replicas)
Driving Model	+	The search returned 0 results.
Experiment	+	
Experiment Family	+	
Ensemble	+	
RCM Model	+	
Downscaling Realisation	+	
Time Frequency	+	
Variable	+	
Variable Long Name	+	
CF Standard Name	+	
Datanode	+	

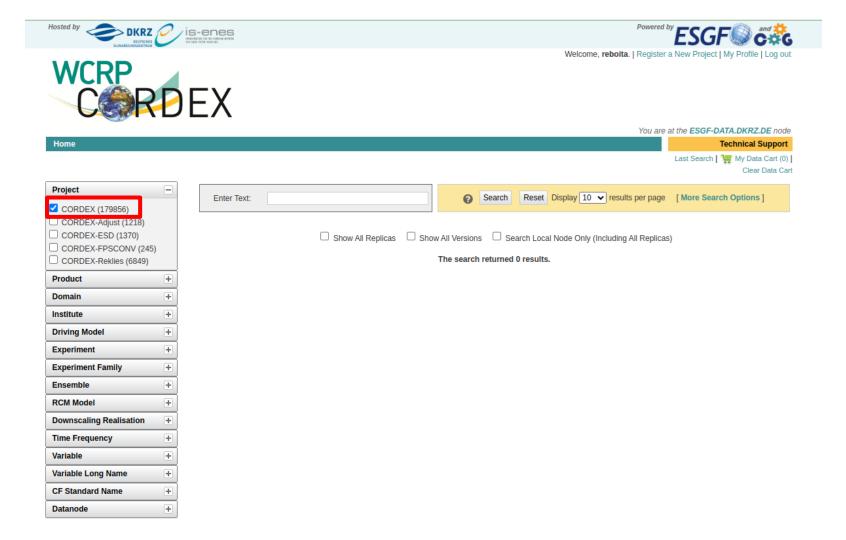
ESGF sponsors and partners DoE Office of Science | IS-ENES | NASA | NOAA | NCI | NSF

CoG version v4.0.1 ESGF P2P Version v2.8.1-master-release

Earth System CoG sponsors and partners NOAA | NASA | NSF | DoE Office of Science | IS-ENES

http://esgf-data.dkrz.de

Privacy Policy | Terms of Use | Impressum









You are at the ESGF-DATA.DKRZ.DE node Home **Technical Support** Last Search | 🦉 My Data Cart (0) | Clear Data Cart Project Search Reset Display 10 v results per page [More Search Options] Enter Text: CORDEX (179856) CORDEX-Adjust (1218) CORDEX-ESD (1370) Show All Replicas Show All Versions Search Local Node Only (Including All Replicas) CORDEX-FPSCONV (245) The search returned 0 results CORDEX-Reklies (6849) Product ÷ Domain -AFR-22 (5582) AFR-44 (14554) AFR-44i (3796) ALP-3 (245) ANT-44 (2333) ANT-44i (1734) ARC-22 (79) ARC-44 (4504) ARC-44i (2249) AUS (199) Domain AUS-22 (5500) AUS-44 (7278) AUS-44i (10849) CAM-22 (3758) CAM-44 (4292) CAM-44i (2436) Central Asia: CAS22 (25 km of horizontal resolution) CAS-22 (1160) 🗆 CAS-44 (227) EAS-22 (3351) EAS-44 (2541) -+Institute Driving Model + Experiment +Experiment Family $\left| + \right|$

Domain	Ξ
AFR-22 (5582)	4
AFR-44 (14554)	
AFR-44i (3796)	
ALP-3 (245)	
ANT-44 (2333)	
🗆 ANT-44i (1734)	
ARC-22 (79)	
ARC-44 (4504)	
ARC-44i (2249)	
🗆 AUS (199)	- 1
AUS-22 (5500)	
AUS-44 (7278)	
AUS-44i (10849)	
CAM-22 (3758)	
CAM-44 (4292)	
CAM-44i (2436)	
CAS-22 (1160)	
CAS-44 (227)	
EAS-22 (3351)	
EAS-44 (2541)	-
Institute	+
Driving Model	(F)
Experiment	
 evaluation (17896) historical (58279) 	
□ rcp26 (25548) □ rcp45 (30177)	
□ rcp85 (57638)	
	_
Experiment Family	+
Ensemble	
🗆 r0i0p0 (2091)	
r12i1p1 (18720)	
🗹 r1i1p1 (158535)	
🗆 r2i1p1 (2872)	
🗆 r3i1p1 (6984)	
🗆 r4i1p1 (108)	
🗆 r5i1p1 (108)	
🗆 r6i1p1 (39)	
🗆 r9i1p1 (81)	
RCM Model	÷
	_

Time Frequency

 $\left| + \right|$

Hosted by	is-enes
WCRP	Welcome, reboita. Register a New Project My Profile Log out
	You are at the ESGF-DATA.DKRZ.DE node
Home	Technical Support
	Last Search 🍟 My Data Cart (0) Clear Data Cart
Project –	Enter Text: Reset Display 10 V results per page [More Search Options]
 CORDEX (179856) CORDEX-Adjust (1218) CORDEX-EDD (1370) CORDEX-FPSCONV (245) CORDEX-Reklies (6849) 	Search Local Node Only (Including All Replicas) The search returned 0 results.
Product +	
Domain –	
AFR-22 (5582) AFR-44 (14554) AFR-44 (14554) AFR-44 (13796) ALP-3 (245) ANT-44 (2333) ANT-44 (1734) ARC-22 (79) ARC-44 (4504) ARC-44 (4204) AUS-22 (5500) AUS-44 (2249) AUS-42 (2758) CAM-24 (2459) CAM-22 (3758) CAM-44 (4292) CAM-22 (3758) CAM-44 (4294) CAM-22 (3758) CAM-44 (2436) CAS-42 (275) EAS-42 (2351) EAS-42 (2351) EAS-44 (2541) ▼	
Institute 🛨	
Driving Model +	
Experiment -	
evaluation (17896)	

The next selection is **RCM model**

But not all models in the list are available for CAS To know the models available for CAS click on search and come back to RCM option







1 Add to Data Cart

You are at the ESGF-DATA.DKRZ.DE node Home Technical Support Last Search | 🦉 My Data Cart (0) Clear Data Cart Project E Reset Display 10 v results per page [More Search Options] Enter Text: 0 Search CORDEX (333) Product F Show All Replicas Show All Versions Search Local Node Only (Including All Replicas) Domain Search Constraints: #CORDEX | #CAS-22 | #historical | #r1i1p1 CAS-22 (333) Total Number of Results: 333 -1-23456 Next >> Institute + Add all displayed results to Data Cart Remove all displayed results from Data Cart Expert Users: you may display the search URL and return results as XML or return results as JSON Ŧ Driving Model Experiment cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REMO2015.v1.3hr.tas 1. Data Node: esqf1.dkrz.de historical (333) Version: 20191015 Total Number of Files (for all variables); 36 Experiment Family + Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] 1 Add to Data Cart Ensemble 2. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REMO2015.v1.6hr.hus850 🗹 r1i1p1 (333) Data Node: esgf1.dkrz.de RCM Model ΕĐ. Version: 20191015 Total Number of Files (for all variables): 36 Downscaling Realisation + Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] 1 Add to Data Cart **Time Frequency** Ŧ 3. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REMO2015.v1.6hr.ua850 Variable Æ Data Node: esqf1.dkrz.de $\left| + \right|$ Version: 20191015 Variable Long Name Total Number of Files (for all variables): 36 **CF Standard Name** Ŧ. Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] 👾 Add to Data Cart Datanode ΕĐ. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REMO2015.v1.6hr.ua200 4. Data Node: esqf1.dkrz.de Version: 20191015 Total Number of Files (for all variables): 36 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] 增 Add to Data Cart 5. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REMO2015.v1.6hr.ta200 Data Node: esqf1.dkrz.de Version: 20191015 Total Number of Files (for all variables): 36 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download]

Driving Model +	Expert Users: you may display the search URL and return results as XML or return results as JSON
Experiment - historical (333) Experiment Family + Ensemble -	1. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.rJi1p1.REMO2015.v1.3hr.tas Data Node: esgf1.dkrz.de Version: 20191015 Total Number of Files (for all variables): 36 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download]
r1i1p1 (333) RCM Model ALARO-0 (12) REM02015 (321)	2. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.rlilp1.REM02015.v1.6hr.hus850 Data Node: esgf1.dkr2.de Version: 20191015 Total Number of Files (for all variables): 36 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download]
Downscaling Realisation + Time Frequency - 1 hr (3) 3hr (45)	3. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.rJi1p1.REMO2015.v1.6hr.ua850 Data Node: esgf1.dkrz.de Version: 20191015 Total Number of Files (for all variables): 36 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] Add to Data Cart
☐ 6hr (24) ☐ day (88) ☑ mon (88) ☑ sem (85) Variable +	4. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REM02015.v1.6hr.ua200 Data Node: esgf1.dkrz.de Versio: 20191015 Total Number of Files (for all variables): 36 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download]
Variable Long Name	5. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REMO2015.v1.6hr.ta200 Data Node: esgf1.dkrz.de Version: 20191015 Total Number of Files (for all variables): 36 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] Add to Data Cart
Daily Maximum Near- Surface Wind Speed (9) Daily Minimum Near-Surface Air Temperature (12) Eastward Wind (24) Vind (24) Vind (24)	6. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.rli1p1.REM02015.v1.6hr.ta850 Data Node: esgf1.dkrz.de Version: 20191015 Total Number of Files (for all variables): 36 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download]
Geopotential Height (12) Near-Surface Air Temperature (15) Near-Surface Relative Humidity (12) Near-Surface Specific	7. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.rli1p1.REM02015.v1.mon.hfss Data Node: esgf1.dkr2.de Version: 20191015 Total Number of Files (for all variables): 5 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download]
Humidity (12) Near-Surface Wind Speed (12) Northward Wind (24) Precipitation (18) Specific Humidity (12)	8. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REMO2015.v1.mon.hfls Data Node: esgf1.dkrz.de Version: 20191015 Total Number of Files (for all variables): 5 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download]
CF Standard Name + Datanode +	 cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.rlilp1.REM02015.v1.mon.evspsbl Data Node: esgf1.dkrz.de Versio: 20191015 Total Number of Files (for all variables): 5 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download]







You are at the ESGF-DATA.DKRZ.DE node Home Technical Support Last Search | 🦉 My Data Cart (0) Clear Data Cart Project Search Reset Display 10 v results per page [More Search Options] Enter Text: 0 CORDEX (333) Product F+ Show All Replicas Show All Versions Search Local Node Only (Including All Replicas) Domain Search Constraints: # CORDEX | # CAS-22 | # historical | # r1i1p1 CAS-22 (333) Total Number of Results: 333 -1-23456 Next >> Institute +Add all displayed results to Data Cart Remove all displayed results from Data Cart Expert Users: you may display the search URL and return results as XML or return results as JSON +Driving Model Experiment E cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REMO2015.v1.3hr.tas 1. Data Node: esqf1.dkrz.de historical (333) Version: 20191015 Total Number of Files (for all variables); 36 Experiment Family ΕĐ. Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] 1 Add to Data Cart Ensemble -2. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REMO2015.v1.6hr.hus850 🗹 r1i1p1 (333) Data Node: esgf1.dkrz.de RCM Model Version: 20191015 Total Number of Files (for all variables): 36 ALARO-0 (12) Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] REMO2015 (321) 🇯 Add to Data Cart Downscaling Realisation 3. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REMO2015.v1.6hr.ua850 Data Node: esqf1.dkrz.de Time Frequency Version: 20191015 Total Number of Files (for all variables): 36 1hr (3) Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] 3hr (45) 1 Add to Data Cart 6hr (24) cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REMO2015.v1.6hr.ua200 4. 🗌 day (88) Data Node: esqf1.dkrz.de 🗹 mon (88) Version: 20191015 Total Number of Files (for all variables): 36 sem (85) Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] Variable +👾 Add to Data Cart Variable Long Name 5. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REMO2015.v1.6hr.ta200 Data Node: esqf1.dkrz.de Air Temperature (24) Version: 20191015 Total Number of Files (for all variables): 36 Convective Precipitation (12) Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] Daily Maximum Near-

1 Add to Data Cart



H

						You are	at the ESGF-DATA.DKRZ.DE node
Home							Technical Support
							Last Search 🧺 My Data Cart (0)
	-						Clear Data Carl
Project	-	Enter Text:	Search	Reset	Display 10 V	results per page	[More Search Options]
CORDEX (6)							
Product	+	Show All Replicas Show All Versions		arch Lor	al Nodo Only (Incl	iding All Doplicas	A
Domain	-	Search Constraints: CORDEX CAS-22 historical r11p1 REMO2				Juling All Replicas	7)
🗹 CAS-22 (6)		Total Num	per of Re	esults: 6			
Institute	+	Add all displayed results to Data Cart	-1- Remove	e all disn	laved results from	Data Cart	
Driving Model	+	Expert Users: you may display the search URL					
Experiment	Ξ	1. cordex.output.CAS-22.GERICS.NCC-NorESM1-M.historical.r1i1p1.REM02	015.v .r	non.ta20	00		
historical (6)		Data Node: esgf1.dkrz.de Version: 20191015					
Experiment Family	+	Total Number of Files (for all variables): 5 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalo	1 [WC	FT Scri	nt] [PID] [Glo	hus Download 1	
Ensemble		Add to Data Cart		LIGH		ous bonnouu j	
r1i1p1 (6)		2. cordex.output.CAS-22.GERICS.NCC-NorESM1-M.historical.r1i1p1.REM02	015.v	non.ta85	50		
RCM Model		Data Node: esgf1.dkrz.de Version: 20191015	_				
REMO2015 (6)		Total Number of Files (for all variables): 5 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalo		ET Scri	pt] [PID] [Glo	bus Download 1	
Downscaling Realisation	Ŧ	Add to Data Cart					
Time Frequency	(E)	3. cordex.output.CAS-22.GERICS.MPI-M-MPI-ESM-LR.historical.r1i1p1.REM	02015.v	1.mon.ta	200		
mon (6)		Data Node: esgf1.dkrz.de Version: 20191015					
Variable	(+)	Total Number of Files (for all variables): 5 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WG	ET Scri	pt] [PID] [Glo	bus Download]	
Variable Long Name		Add to Data Cart					
	Land I	 cordex.output.CAS-22.GERICS.MPI-M-MPI-ESM-LR.historical.r1i1p1.REM Data Node: esqf1.dkrz.de 	02015.v	1.mon.ta	850		
Air Temperature (6)	-	Version: 20191015					
CF Standard Name	+	Total Number of Files (for all variables): 5 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalo] [WG	ET Scri	pt] [PID] [Glo	bus Download]	
Datanode	+	📫 Add to Data Cart					
		5. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REM Data Node: esgf1.dkrz.de Version: 20191015 Total Number of Files (tor all variables): 5 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalon				bus Download]	
		6. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.rli1p1.REM Data Node: esgf1.dkrz.de Version: 20191015 Total Number of Files (for all variables): 5 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalon Provide to Parts Cord				bus Download]	

In this selection we obtained the air temperature at 200 and 850 hPa. But we are interested in near-surface air temperature. Let's do a new selection.



		You are a	at the ESGF-DATA.DKRZ.DE nod
Home			Technical Support
			Last Search 🧺 My Data Cart (0) Clear Data Ca
Project	Ξ		
CORDEX (6)		Enter Text: Search Reset Display 10 V results per page	[More Search Options]
Product	+		
Domain	-	Enter Text:	🥬 🛛 🛛 First, re
🗹 CAS-22 (6)		Total Number of Results: 6	selecte
Institute	+	-1-	Selecte
Driving Model	+		
Experiment	Ξ	1. cordex.output.CAS-22.GERICS.NCC-NorESM1-M.historical.r1i1p1.REMO2015.v1.mon.ta200	
🗹 historical (6)			
Experiment Family	+		
Ensemble	-		
🗹 r1i1p1 (6)		2. cordex.output.CAS-22.GERICS.NCC-NorESM1-M.historical.r1i1p1.REM02015.v1.mon.ta850	
RCM Model	-	Version: 20191015	
REMO2015 (6)	1		
Downscaling Realisation	+	🐏 Add to Data Cart	
Time Frequency	Ξ	 cordex.output.CAS-22.GERICS.MPI-M-MPI-ESM-LR.historical.r1i1p1.REMO2015.v1.mon.ta200 Data Node: esqf1.dkrz.de 	
🗹 mon (6)		Version: 20191015	
Variable	+	Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download]	
Variable Long Name	Ξ		
🗹 Air Temperature (6)	-	Data Node: esgf1.dkrz.de	
CF Standard Name	+	Total Number of Files (for all variables): 5	
Datanode	+		
		Version: 2019[015 Total Number of Files (for all variables): 5 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] Add to Data Cart 6. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REM02015.v1.mon.ta850 Data Node: esgl1.dkrz.de Version: 20191015 Total Number of Files (for all variables): 5 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download]	
		Add to Data Cart	

irst, remove the air temperature elected by clicking on x

Project ·	Enter Text: 2 Search Reset Display 10 v results per page [More Search Options]
CORDEX (84)	
Product ·	
Domain -	Show All Replicas Show All Versions Search Local Node Only (Including All Replicas) Search Constraints: CORDEX CAS-22 CAS-22 kistorical Kr1i1p1 REMO2015 Kmon
CAS-22 (84)	Total Number of Results: 84
Institute	
Driving Model	Expert Users: you may display the search URL and return results as XML or return results as JSON
Experiment ·	1. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REMO2015.v1.mon.hfss
historical (84)	Data Node: esgf1.dkrz.de Version: 20191015
Experiment Family	Total Number of Files (for all variables): 5 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download]
Ensemble ·	
🗹 r1i1p1 (84)	 cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.rli1p1.REMO2015.v1.mon.hfls Data Model agef1 dirz da
RCM Model	
REMO2015 (84)	Total Number of Files (for all variables): 5 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download]
Downscaling Realisation	Add to Data Cart
Time Frequency	 cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REMO2015.v1.mon.evspsbl Data Node: esgf1.dkrz.de
🗹 mon (84)	Version: 20191015 Total Number of Files (for all variables): 5
Variable	Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download]
Variable Long Name	
Air Temperature (6) Convective Precipitation (3) Daily Maximum Near- Surface Air Temperature (3) Daily Maximum Near-	4. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REM02015.v1.mon.hurs Data Node: esg11 dktz.de Version: 20191015 Total Number of Files (for all variables): 5 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] Add to Data Cart
Laany waxintain Veear- Surface Wind Speed (3) Daily Minimum Near-Surface Air Temperature (3) Estatward Wind (6) Evaporation (3) Geoentential Height (3)	 5. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REM02015.v1.mon.hus850 Data Node: esgf1.dkrz.de Version: 20191015 Total Number of Files (for all variables): 5 Total Number of Files (for all variables): 5 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download]
Near-Surface Air Temperature (3) Near-Surface Relative Humidity (3) Near-Surface Specific Humidity (3)	6. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.rli1p1.REM02015.v1.mon.tasmax Data Node: esgf1.dkrz.de Version: 20191015 Total Number of Files (for all variables): 5 Foull Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download]
Near-Surface Wind Speed (3) Northward Wind (6) Precipitation (3) Specific Humidity (3)	 7. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REM02015.v1.mon.tasmin Data Node: esg1.dkr.zde Version: 20191015 Total Number of Files (for all variables): 5 Foil Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] Add to Data Cart

1.

Select the variable and click on search







You are at the ESGF-DATA.DKRZ.DE node Home Technical Support Last Search | 🧺 My Data Cart (0) | Clear Data Cart Project Search Reset Display 10 v results per page [More Search Options] Enter Text: CORDEX (3) Product F+ Show All Replicas Show All Versions Search Local Node Only (Including All Replicas) Domain Search Constraints: #CORDEX | #CAS-22 | #historical | #r1i1p1 | #REMO2015 | #mon | #Near-Surface Air Temperature CAS-22 (3) Total Number of Results: 3 -1-Institute +Add all displayed results to Data Cart Remove all displayed results from Data Cart Expert Users: you may display the search URL and return results as XML or return results as JSON Driving Model +Experiment E Ok! 1. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REMO2015.v1.mc.tas Data Node: esqf1.dkrz.de Click on List Files historical (3) Version: 20191015 Total Number of Files (for all variables): 5 Experiment Family ΕĐ. Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] Add to Data Cart Ensemble -2. cordex.output.CAS-22.GERICS.NCC-NorESM1-M.historical.r1i1p1.REMO2015.v1.mon.tas 🗹 r1i1p1 (3) Data Node: esgf1.dkrz.de RCM Model Version: 20191015 Total Number of Files (for all variables): 5 REMO2015 (3) Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] 🗯 Add to Data Cart Downscaling Realisation $\left| + \right|$ 3. cordex.output.CAS-22.GERICS.MPI-M-MPI-ESM-LR.historical.r1i1p1.REMO2015.v1.mon.tas **Time Frequency** Data Node: esqf1.dkrz.de Version: 20191015 mon (3) Total Number of Files (for all variables): 5 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] Variable +1 Add to Data Cart Variable Long Name E Near-Surface Air Temperature (3) **CF Standard Name** +

ESGF sponsors and partners DoE Office of Science | IS-ENES | NASA | NOAA | NCI | NSF

EĐ.

Datanode





		You are a	at the ESGF-DATA.DKRZ.DE node
Home			Technical Support
			Last Search 🧮 My Data Cart (0) Clear Data Cart
Project	-	Enter Text: Search Reset Display 10 v results per page	[More Search Options]
CORDEX (3)		Enter Text:	
Product	+		
Domain	-	Show All Replicas Show All Versions Search Local Node Only (Including All Replicas Search Constraints: CORDEX CAS-22 * historical * r11p1 * REMO2015 * mon * Near-Surface Air Temperature)
🗹 CAS-22 (3)		Total Number of Results: 3	
Institute	+	-1- Add all displayed results to Data Cart Remove all displayed results from Data Cart	
Driving Model	+	Expert Users: you may display the search URL and return results as XML or return results as JSON	
Experiment	-	1. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REMO2015.v1.mon.tas	
historical (3)		Data Node: esgf1.dkrz.de Version: 20191015	Note that the files are
Experiment Family	+	Total Number of Files (for all variables): 5 Full Dataset Services: [Show Metadata] [Hide Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download]	separated by periods
Ensemble	-	Total Number of Files: 5	
🗹 r1i1p1 (3)		tas_CAS-22_MOHC-HadGEM2-ES_historical_r111p1_GERICS-REMO2015_v1_mon_197001-197012.nc checksum: c975390895ed508a1a91f0/4dcedb4e3f69de7d09cf493f9b7be45b06b6cde43	Single File Access:
RCM Model		1 size: 2863519	HTTP Download OpenDAP Download
REMO2015 (3)		tracking_id: hdl:21.14103/2bb4bceb-15dc-4a19-8cbc-89df7e6fc4f6 [More File Metadata]	Globus Download
Downscaling Realisation	+	tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REMO2015_v1_mon_197101-198012.nc checksum: 0b944c6415275f0cf92699e45d0874237a1dca2279e447f1e6690a7ad1b7cdca	Single File Access:
Time Frequency	-	2 size: 18750029 tracking, id: hdl:21.14103/33d14c93-cbcc-4cbf-9959-9857d4a24a4f	HTTP Download OpenDAP Download
Z mon (3)		[More File Metadata]	Globus Download
Variable	+	tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REMO2015_v1_mon_198101-199012.nc checksum: d73345e9ae4180516a1f22cc0cb4f1a651499e5ba200d8f43c155a4f3fc009bb	Single File Access: HTTP Download
Variable Long Name	-	3 size: 18740840 tracking id: hdl:21.14103/4678f320-8430-4397-bfbd-188b991efb14	OpenDAP Download
Near-Surface Air Tempera 3)	iture	[More File Metadata] tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REMO2015_v1_mon_199101-200012.nc	Globus Download
CF Standard Name	+	checksum: e6f2ee420be64ef60dfbbaa6a8452b88ed2cc61dc93ad5646a2a18644 <mark>271064e</mark> 4 size: 18733160	HTTP Download
Datanode	+	tracking_id: hdl:21.14103/d31a8ec7-bbd6-4112-8d6d-08d145ec07b6 [More File Metadata]	Globus Download
		tas_CAS-22_MOHC-HadGEM2-E5_historical_r1i1p1_GERICS-REM02015_v1_mon_200101-200512.nc checksum: fe55d2c235f72642234e2e5b4c331019001b0a8e0d80281f284bb4edi59074f2 5 size: 9914779 tracking_id: hdl:21.14103/d44dd83c-7836-4471-beb4-4dc622ae962c [More File Metadata]	HTTP Download Globus Download
		Add to Data Cart Click c	on this and "save as"



Follow the previous steps, download:

Variable: near-surface air temperature (tas) Frequency: monthly Experiment: RCP8.5 scenario Period: 2050-2060 Model: HadGEM2-ES











		You are at the	ESGF-DATA.DKRZ.DE node
Home			Technical Support
		Last	Search 🏣 My Data Cart (0) Clear Data Cart
Project	-	Courte Death Distance 10 and and and and	ere Course Ontines 1
CORDEX (3)		Enter Text:	bre Search Options J
Product	+		
Domain	-	Show All Versions Search Local Node Only (Including All Replicas) Search Constraints: #CORDEX #CAS-22 #thistorical #r1i1p1 #REMO2015 #mon #Near-Surface Air Temperature	
CAS-22 (3)		Remove this option Total Number of Results: 3	
Institute	+	Add all displayed results to Data Cart Remove all displayed results from Data Cart	
Driving Model	+	Expert Users: you may display the search URL and return results as XML or return results as JSON	
Experiment	-	1. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REMO2015.v1.mon.tas	
historical (3)		Data Node: esgf1.dkrz.de Version: 20191015	
Experiment Family	+	Total Number of Files (for all variables): 5 Full Dataset Services: [Show Metadata] [Hide Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download]	
Ensemble	-	Total Number of Files: 5	
🗹 r1i1p1 (3)		tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REMO2015_v1_mon_197001-197012.nc checksum: c975390895ed508a1a91t0/t4dcedb4e3/69de7d09c/t493f9b7be45b06b6cde43	Single File Access:
RCM Model	-	1 size: 2863519 tracking id: hdl:21.14103/2bb4bceb-15dc-4a19-8cbc-89df7e6fc4f6	HTTP Download OpenDAP Download
REMO2015 (3)		[More File Metadata]	Globus Download
Downscaling Realisation	+	tas_CAS-22_MOHC-HadGEM2-ES_historical_rlip1_GERICS-REMO2015_v1_mon_197101-198012.nc checksum: 0b944c6415275f0cf92699e45d0874237a1dca2279e447f1e6690a7ad1b7cdca	Single File Access:
Time Frequency	-	2 size: 18750029 tracking id: hdi:21.14103/33d14c93-cbcc-4cbf-9959-9857d4a24a4f	HTTP Download OpenDAP Download
🗹 mon (3)		[More File Metadata]	Globus Download
Variable	+	tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REMO2015_v1_mon_198101-199012.nc checksum: d73345e9ae4180516a1f22cc0cbdf1a651499e5ba200d8f43c155a4f3fc009bb	Single File Access: HTTP Download
Variable Long Name	-	3 size: 18740840 tracking_id: hdl:21.14103/4678f320-8430-4397-bfbd-188b991efb14	OpenDAP Download Globus Download
Near-Surface Air Temperat	ature	[More File Metadata]	Globus Download
(3) CF Standard Name	+	tas_CAS-22_MOHC-HadGEM2-ES_historical_flip1_GERICS-REMO2015_v1_mon_199101-200012.nc checksum:e6/2ee420be64ef60dfbbaa6a8452b88ed2cc61dc93ad5646a2a1864427f684e	Single File Access: HTTP Download
Datanode	+	4 size: 18733160 tracking_id: hdl:21.14103/d31a8ec7-bbd6-4112-8d6d-08d145ec07b6 [More File Metadata]	OpenDAP Download Globus Download
		tas_CAS-22_MOHC-HadGEM2-ES_historical_r1ilp1_GERICS-REMO2015_v1_mon_200101-200512.nc checksum: fe55d2c235f72642234e2e5b4c331019001b0a8e0d802811284bb4edf59b74f2 5 size: 9914779 tracking_id: hdl:21.14103/d44d83c-7836-4471-beb4-4dc622ae962c [More File Metadata]	Single File Access: HTTP Download OpenDAP Download Globus Download







You are at the ESGF-DATA.DKRZ.DE node

Home			Technical Support
			Last Search 🏣 My Data Cart (0) Clear Data Car
Project	- Entry	Text: 2. @ Search Reset Display 10 v results per page	[More Search Ontions]
CORDEX (10)	Enter	Text: 2. Ø Search Reset Display 10 ▼ results per page	[more Search Options]
Product	+		
Domain	Search Co	□ Show All Replicas □ Show All Versions □ Search Local Node Only (Including All Replica: straints: #CORDEX #CAS-22 #r11p1 #REMO2015 #mon #Near-Surface Air Temperature	5)
CAS-22 (10)		Total Number of Results; 10	
Institute	+	-1- Add all displayed results to Data Cart Remove all displayed results from Data Cart	
Driving Model	+	Expert Users: you may display the search URL and return results as XML or return results as JSON	
Experiment	- 1. corde	x.output.CAS-22.GERICS.ECMWF-ERAINT.evaluation.r1i1p1.REMO2015.v1.mon.tas	
 evaluation (1) historical (3) rcp26 (3) rcp85 (3) 	Versio Total I Full D	Node: esgf1.dkrz.de m: 20191030 Number of Files (for all variables): 5 ataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download dd to Data Cart	1
Experiment Family		x.output.CAS-22.GERICS.MOHC-HadGEM2-ES.historical.r1i1p1.REMO2015.v1.mon.tas	
Ensemble	Data Versio	Node: esgf1.dkrz.de nr: 20191015	
🗹 r1i1p1 (10)		Number of Files (for all variables): 5 ataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download]
RCM Model	- * A	dd to Data Cart	
REMO2015 (10)		x.output.CAS-22.GERICS.NCC-NorESM1-M.historical.r11p1.REMO2015.v1.mon.tas Node: esgf1.dkrz.de	
Downscaling Realisation		n: 20191015 Number of Files (for all variables): 5	
Time Frequency		ataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download dd to Data Cart]
🗹 mon (10)		x.output.CAS-22.GERICS.MPI-M-MPI-ESM-LR.historical.r1i1p1.REMO2015.v1.mon.tas	
Variable	+ Data I	n: 20191015	
Variable Long Name	- Total I	Number of Files (for all variables): 5 ataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download	1
Near-Surface Air Temperat (10)	re 🏥 A	dd to Data Cart	1
CF Standard Name	+ Data I	x.output.CAS-22.GERICS.MPI-M-MPI-ESM-LR.rcp26.r1i1p1.REMO2015.v1.mon.tas Node: esgf1.dkrz.de	
Datanode	+ Total I Full D	in: 20191025 Vumber of Files (for all variables): 10 ataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download dit to Data Cart]







You are at the ESGF-DATA.DKRZ.DE node Home Technical Support Last Search | 🦉 My Data Cart (0) Clear Data Cart Project -Reset Display 10 v results per page [More Search Options] Enter Text: 0 Search CORDEX (3) Product EF. Show All Replicas Show All Versions Search Local Node Only (Including All Replicas) Domain -Search Constraints: #CORDEX | #CAS-22 | #r1i1p1 | #REMO2015 | #mon | #Near-Surface Air Temperature | #rcp85 CAS-22 (3) Total Number of Results: 3 -1-Institute (H) Add all displayed results to Data Cart Remove all displayed results from Data Cart Expert Users: you may display the search URL and return results as XML or return results as JSON F Driving Model Experiment Ε 1. cordex.output.CAS-22.GERICS.MOHC-HadGEM2-ES.rcp85.r1i1p1.REMO2015.v1.mon.tas Data Node: esgf1.dkrz.de rcp85 (3) Version: 20191029 Total Number of Files (for all variables): 10 Experiment Family + Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] Add to Data Cart Ensemble 2. cordex.output.CAS-22.GERICS.MPI-M-MPI-ESM-LR.rcp85.r1i1p1.REMO2015.v1.mon.tas r1i1p1 (3) Data Node: esgf1.dkrz.de RCM Model Version: 20191029 Total Number of Files (for all variables): 10 REMO2015 (3) Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] 🗯 Add to Data Cart Downscaling Realisation $\left| + \right|$ 3. cordex.output.CAS-22.GERICS.NCC-NorESM1-M.rcp85.r1i1p1.REMO2015.v1.mon.tas **Time Frequency** ы Data Node: esgf1.dkrz.de Version: 20191029 mon (3) Total Number of Files (for all variables): 10 Full Dataset Services: [Show Metadata] [List Files] [THREDDS Catalog] [WGET Script] [PID] [Globus Download] Variable Ŧ 🗯 Add to Data Cart Variable Long Name E Near-Surface Air Temperature (3) **CF Standard Name** +

EĐ.

Datanode

+		Show All Replicas Show All Versions Search Local Node Only (Including All Replicas)	
	Search C		
		Total Number of Results: 3	
+		-1- Add all displayed results to Data Cart Remove all displayed results from Data Cart	
+		Expert Users: you may display the search URL and return results as XML or return results as JSON	
-			
+			
-			
		tas_CAS-22_MOHC-HadGEM2-ES_rcp85_r1i1p1_GERICS-REMO2015_v1_mon_200601-201012.nc	Single File Access:
	1	checksum: 48c6107e100264834c03a25a77321f7b1b172f2a80855755db90d806f4tt6902 size: 9907223	HTTP Download OpenDAP Download
		tracking_id: hdl:21.14103/56922197-6835-4b7a-9331-b095682c9dca [More_File_Metadata]	Globus Download
		tas_CAS-22_MOHC-HadGEM2-ES_rcp85_r1i1p1_GERICS-REMO2015_v1_mon_201101-202012.nc	Single File Access:
	2		HTTP Download
-		tracking_id: hdl:21.14103/e309bf0f-598a-41a7-bb5e-4afdaa4ddfdd	OpenDAP Download Globus Download
			01 I 51 I
	2	checksum: 3181e2ce74e67945379a1bfa4dd05d5140e840aa247b8ae1f489b1d116e979fa	Single File Access: HTTP Download
-		tracking_id: hdl:21.14103/3cb6d0df-f900-4f32-9a19-0b527bf85b14	OpenDAP Download Globus Download
ture			
+		checksum: aa4536a8cd8eaa165618321b56b2ab4807919a8ba64e8518c8ace28defa8478e	Single File Access: HTTP Download
	4	tracking_id: hdl:21.14103/fdcc1f60-8142-4011-b6e9-98637196a714	OpenDAP Download Globus Download
			clobas bomildad
	_	checksum: 25bcda3f3d62054f8cc55a1908d376441398034ea523eecbf4c717ea3c69df79	Single File Access: HTTP Download
	5	size: 18692374 tracking_id: hdl:21.14103/35d7f877-466c-4f4e-9d9a-71439576161a	OpenDAP Download Globus Download
		[More File Metadata]	Ciobus Downioad
		tas_CAS-22_MOHC-HadGEM2-ES_rcp85_r111p1_GERICS-REMO2015_v1_mon_205101-206012.nc checksum: 8b7d2468f6747886304baf54795c82c5a9561ddead6b9f37572cc7c6ede28086	Single File Access: HTTP Download
	6	size: 18667740 tracking, id: hdl:21 14103/b319e949-2f16-4e55-b798-b7dc0e067b32	OpenDAP Download
		[More File Metadata]	Globus Download
	7	size: 18655304	HTTP Download
		[More File Metadata]	Globus Download
		tas_CAS-22_MOHC-HadGEM2-ES_rcp85_r111p1_GERICS-REMO2015_v1_mon_207101-208012.nc	Single File Access:
	8	size: 18654109	HTTP Download OpenDAP Download
		tracking_id: hdl:21.14103/36f191e9-6055-4519-b358-7ca1c13009dd [More File Metadata]	Globus Download
		tas_CAS-22_MOHC-HadGEM2-ES_rcp85_r1i1p1_GERICS-REMO2015_v1_mon_208101-209012.nc	Single File Access:
	9	checksum: 9c6c9a3a8b4d06c6b0a5048bc655a1f32c30274224c6dc1299fae58f33846798 size: 18648688	HTTP Download OpenDAP Download
	+ + + + +	Search C	Search Constraints: gCORDEX [g CAS-22] gr(11]1] g/EREMO2D15 [g mon] g/Ken5-2014 Note Computing All Regulacies) Search Constraints: g/CORDEX [g CAS-22] gr(11]1] g/EREMO2D15 [g mon] g/Ken5-2014 Note Computing All Regulacies) Search Constraints: g/CORDEX [g CAS-22] gr(11]1] g/EREMO2D15 [g mon] g/Ken5-2014 Note Computing All Regulacies) Search Constraints: g/CORDEX [g CAS-22] gr(11]1] g/EREMO2D15 [g mon] g/Ken5-2014 Note computing All Regulacies) Total Number of Results: 3 -4 -4 -4 -4 -4 -4 -4 -4 -4 -4 -4 -4 -4

Click on this and "save as"

Knowing the dataset

reboita@reboitaV14: /dados/reboita/trainings/C	ORDEX_CAS Q ≡ _ • ×
(base) reboita@reboitaV14:/dados/reboita/trainings\$ cd CORDEX CAS/	
(base) reboita@reboitaV14:/dados/reboita/trainings/CORDEX_CAS\$ ls	
figures	
scripts	
<pre>tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REM02015_v1_mon_199101-200012.nc</pre>	
tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REM02015_v1_mon_200101-200512.nc	
<pre>tas_CAS-22_MOHC-HadGEM2-ES_rcp85_r11p1_GERICS-REM02015_v1_mon_206101-207012.nc (base)_reboita@reboitaV14:/dados/reboita/trainings/CORDEX_CAS\$_cdo_sinfo_tas_CAS-22_MOHO</pre>	C Hadrema ES historical stitut CEPTCS DEMODALS v1 mon 199101 2000
12.nc	
rtte format : NetCDF4 classic zip	
-1 : Institut Source T Steptype Levels Num Points Num Dtype : Parameter ID	
1 : unknown GERICS-REM02015 v instant 1 1 62109 1 F32z : -1	
Grid coordinates in	
1 : curvilinear : points=62109 (309x201)	
lon : 10.7899 to 140.1774 degrees_east	
lat : 18.00188 to 69.51006 degrees_north available : cellbounds	
mapping : rotated latitude longitude	GrADS does not understand a 360 day
rlon : -34.87 to 32.89 by 0.22 degrees	calendar.
rlat : -21.01 to 22.99 by 0.22 degrees	Calchdar.
Vertical coordinates :	
1 : height : levels=1 scalar	Grid coordinate is curvilinear .
height : 2 m	
Time coordinate :	
time : 120 steps RefTime = 1949-12-01 00:00:00 onus = days Calendar = 360 day Bounds = true	We will use CDO to adapt the file.
YYYY-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss YYYY-MM-dd hit.mm.ss rrrr-MM-DD hh:mm:ss	
1991-01-16 00:00:00 1991-02-16 00:00:00 1991-03-16 00:00:00 1991-04-16 00:00:00	
1991-05-16 00:00:00 1991-06-16 00:00:00 1991-07-16 00:00:00 1991-08-16 00:00:00	But before, we will merge the historical
1991-09-16 00:00:00 1991-10-16 00:00:00 1991-11-16 00:00:00 1991-12-16 00:00:00	
1992-01-16 00:00:00 1992-02-16 00:00:00 1992-03-16 00:00:00 1992-04-16 00:00:00	files.
1992-05-16 00:00:00 1992-06-16 00:00:00 1992-07-16 00:00:00 1992-08-16 00:00:00	
1992-09-16 00:00:00 1992-10-16 00:00:00 1992-11-16 00:00:00 1992-12-16 00:00:00 1993-01-16 00:00:00 1993-02-16 00:00:00 1993-03-16 00:00:00 1993-04-16 00:00:00	
1993-05-16 00:00:00 1993-06-16 00:00:00 1993-07-16 00:00:00 1993-08-16 00:00:00	
1993-09-16 00:00:00 1993-10-16 00:00:00 1993-11-16 00:00:00 1993-12-16 00:00:00	
1994-01-16 00:00:00 1994-02-16 00:00:00 1994-03-16 00:00:00 1994-04-16 00:00:00	
1994-05-16 00:00:00 1994-06-16 00:00:00 1994-07-16 00:00:00 1994-08-16 00:00:00	

rebolta@reboltaV14: /dados/rebolta/trainings/CORDEX_CAS Q = - ×
(base) reboita@reboitaV14:/dados/reboita/trainings/CORDEX_CAS\$ ls figures scripts
tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REM02015_v1_mon_199101-200012.nc
tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REM02015_v1_mon_200101-200512.nc
tas_CAS-22_MOHC-HadGEM2-ES_rcp85_r1i1p1_GERICS-REM02015_v1_mon_206101-207012.nc
(base) reboita@reboitaV14:/dados/reboita/trainings/CORDEX_CAS\$ cdo mergetime tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REM020
15_v1_mon_199101-200012.nc tas_CAS-22_MOHC-HadGEM2-ES_historicat_ritip1_GERICS-REM02015_v1_mon_200101-200512.nc tas_CAS-22_MOHC-HadGEM2
-ES_historical_r1i1p1_GERICS-REM02015_v1_mon_199101-200512.nc
cdo mergetime: Processed 11179620 values from 2 variables over 180 timesteps [0.13s 94MB].
(base) reboita@reboitaV14:/dados/reboita/trainings/CORDEX_CAS\$ cdo sinfo tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REMO2015_v
mon_199101-200512.nc
File format : NetCDF4 classic
-1 : Institut Source T Steptype Levels Num Points Num Dtype : Parameter ID
1 : unknown GERICS-REMO2015 v instant 1 1 62109 1 F32 : -1 Grid coordinates :
1 : curvilinear : points=62109 (309x201) lon : 10.7899 to 140.1774 degrees east
lat : 18.00188 to 69.51006 degrees north
available : cellbounds
<pre>mapping : rotated_latitude_longitude</pre>
rlon : -34.87 to 32.89 by 0.22 degrees
rlat : -21.01 to 22.99 by 0.22 degrees
Vertical coordinates :
1 : height : levels=1 scalar
height : 2 m
Time coordinate :
time : 180 steps
RefTime = 1949-12-01 00:00:00 Units = days Calendar = 360_day Bounds = true
YYYY-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss
1991-01-16 00:00:00 1991-02-16 00:00:00 1991-03-16 00:00:00 1991-04-16 00:00:00 1991-05-16 00:00:00 1991-06-16 00:00:00 1991-07-16 00:00:00 1991-08-16 00:00:00
1991-03-16 00:00:00 1991-06-16 00:00:00 1991-07-16 00:00:00 1991-08-16 00:00:00 1991-09-16 00:00:00 1991-10-16 00:00:00 1991-11-16 00:00:00 1991-12-16 00:00:00

Grid coordinate

Max-Planck-Institut CDO für Meteorologie

Before executing the command

cdo remapbil,grid.txt infile.nc outfile.nc

it is necessary to construct a txt file with the grid information.

This information can be obtained using cdo sinfo infile.nc

reboita@reboitaV14: /dados/reboita/trainings/C	ORDEX_CAS	Q = - • ×
(base) reboita@reboitaV14:/dados/reboita/trainings/CORDEX_CAS\$ cdo sinfo tas_CA	AS-22_MOHC-HadGEM2-ES_historical_r1i	1p1_GERICS-REM02015_v
1_mon_199101-200512.nc File format : NetCDF4 classic		
-1 : Institut Source T Steptype Levels Num Points Num Dtype : Paramete		
1 : unknown GERICS-REM02015 v instant 1 1 62109 1 F32 : - Grid coordinates :	-1	
1 : curvilinear : points=62109 (309x201)	10°=130°	
	8°=51°	
available : cellbounds		0.25° as horizontal
<pre>mapping : rotated_latitude_longitude</pre>	resolution. So, th	e number of grid
rlat : -21.01 to 22.99 by 0.22 degrees	points is obtaine	
Vertical coordinates :		° = 520 + 1 = 521
1 : height : levels=1 scalar height : 2 m	lat = 51° / 0.25 °	= 204 + 1 = 205
Time coordinate :		
time : 180 steps RefTime = 1949-12-01 00:00:00 Units = days Calendar = 360 day Bounds =	= true	
YYYY-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss YYYY-MM-DD hh:	:mm:ss	
1991-01-16 00:00:00 1991-02-16 00:00:00 1991-03-16 00:00:00 1991-04-16 00: 1991-05-16 00:00:00 1991-06-16 00:00:00 1991-07-16 00:00:00 1991-08-16 00:		
1991-09-16 00:00:00 1991-10-16 00:00:00 1991-11-16 00:00:00 1991-12-16 00:		
1992-01-16 00:00:00 1992-02-16 00:00:00 1992-03-16 00:00:00 1992-04-16 00: 1992-05-16 00:00:00 1992-06-16 00:00:00 1992-07-16 00:00:00 1992-08-16 00:		
1992-09-16 00:00:00 1992-10-16 00:00:00 1992-11-16 00:00:00 1992-12-16 00:		
1993-01-16 00:00:00 1993-02-16 00:00:00 1993-03-16 00:00:00 1993-04-16 00 1993-05-16 00:00:00 1993-06-16 00:00:00 1993-07-16 00:00:00 1993-08-16 00		
1993-09-16 00:00:00 1993-10-16 00:00:00 1993-17-16 00:00:00 1993-08-16 00:		
1994-01-16 00:00:00 1994-02-16 00:00:00 1994-03-16 00:00:00 1994-04-16 00:	•	
1994-05-16 00:00:00 1994-06-16 00:00:00 1994-07-16 00:00:00 1994-08-16 00: 1994-09-16 00:00:00 1994-10-16 00:00:00 1994-11-16 00:00:00 1994-12-16 00:		
One on a taxt a ditar and two a the	ysize = 205	
Open a text editor and type the	$x_{\text{first}} = 10.8$	
grid information 💦 💦		
	xinc = 0.25	
gedit gridCAS.txt &	yfirst = 18.0	
	•	
Suggesting of editor for Windows: notepad++	yinc = 0.25	



reboita@reboitaV14: /dados/reboita/trainings/CORDEX_CAS					
<pre>(base) reboita@reboitaV14:/dados/reboita/trainings/CORDEX_CAS\$ gedit gridCAS.txt</pre>	Abrir ~ 🕞	gridCAS.txt /dados/reboita/trainings/CORDEX_CAS	Salvar =	- • ×	
	1 gridtype = latlon 2 xsize = 521 3 ysize = 205 4 xfirst = 10.8 5 xinc = 0.25 6 yfirst = 18 7 yinc = 0.25				
gedit is a text editor of Linux					

reboita@reboitaV14: /dados/reboita/trainings/CORDEX_CAS	Max-Planck-Institut	CDO
(base) reboita@reboitaV14:/dados/reboita/trainings/CORDEX_CAS\$ ls Listing files	für Meteorologie	000
figures acidCAS_txt		
gridCAS.txt		
tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REM02015_v1_mon_199101-200012.nc		
tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REM02015_v1_mon_199101-200512.nc		
tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REM02015_v1_mon_200101-200512.nc Adjusting grid and coordinates: historical period	iod	
tas_CAS-22_MOHC-HadGEM2-ES_rcp85_r1i1p1_GERICS-REM02015_v1_mon_206101-207012.nc Adjusting gnd und coordinates instorical period (base) reboita@reboitaV14:/dados/reboita/trainings/CORDEX_CAS\$ [cdo remapbil,gridCAS.txt tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i]		1
(base) rebolta@reboltav14:/dados/rebolta/crainings/CORDEX_CASS cdo remapbil,gridCAS.txt tas_CAS-22_MOHC-HadGEM2-ES_historical_r11: mon_199101-200512.nc tas_CAS-22_MOHC-HadGEM2-ES_historical_r111p1_GERICS-REM02015_v1_mon_199101-200512_remap.nc	IPI_OEKICS-REMUZ015_V	*
cdo remapbil: Processed 11179620 values from 1 variable over 180 timesteps [0.43s 99MB] Adjusting grid and coordinates: future		
(base) rebolta@reboltaV14:/dados/rebolta/trainings/CORDEX_CAS\$ cdo remapbil,gridCAS.txt tas_CAS-22_MOHC-HadGEM2-ES_rcp85_r1i1p1_G	ERICS-REM02015_v1_mon	_2
06101-207012.nc tas_CAS-22_MOHC-HadGEM2-ES_rcp85_r1i1p1_GERICS <mark>-REM02015_v1_mon_206101-207012_remap.nc contractor contrac</mark>		
cdo remapbil: Processed 7453080 values from 1 variable over <u>120 timesteps [0.24s 103MB]</u> . Knowing the new historical file		
(base) reboita@reboitaV14:/dados/reboita/trainings/CORDEX_CAS\$ cdo sinfo tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REMOX	2015_v1_mon_199101-20	05
12_remap.nc		
File format : NetCDF4 classic		
-1 : Institut Source T Steptype Levels Num Points Num Dtype : Parameter ID 1 : unknown GERICS-REMO2015 v instant 1 1 106805 1 F32 : -1		
	the problem	
1 : lonlat : points=106805 (521x205)	•	
lon: 10.8 to 140.8 by 0.25 degrees_east with the calen	dar if we want	
Vertical coordinates :	GrADS software	
1 : height : levels=1 scalar		
height : 2 m		
Time coordinate :		
time : 180 steps		
RefTime = 1949-12-01 00:00:00 Units = days Calendar = 360_day Bounds = true		
1991-01-16 00:00:00 1991-02-16 00:00:00 1991-03-16 00:00:00 1991-04-16 00:00:00		
1991-05-16 00:00:00 1991-06-16 00:00:00 1991-07-16 00:00:00 1991-08-16 00:00:00		
1991-09-16 00:00:00 1991-10-16 00:00:00 1991-11-16 00:00:00 1991-12-16 00:00:00		
1992-05-16 00:00:00 1992-06-16 00:00:00 1992-07-16 00:00:00 1992-08-16 00:00:00		

reboita@reboitaV14: /dados/reboita/trainings/CORDEX_CAS		Max-Planck-Institut	CDO
(base) reboita@reboitaV14:/dados/reboita/trainings/CORDEX_CAS\$ ls Listing files		für Meteorologie	CDO
figures			
gridCAS.txt			
scripts			
tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REMO2015_v1_mon_199101-200012.nc tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REMO2015_v1_mon_199101-200512.nc			
tas_CAS-22_MOHC-HaddeM2-ES_NESTON tCal_FITIPI_dERICS-REMO2015_V1_MON_199101-200512.nc tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REMO2015_v1_mon_199101-200512_remap.nc			
tas_CAS-22_MOHC-HadGEM2-ES_historical_r1ip1_GERICS-REMO2015_v1_mon_200101-200512_nc			
tas CAS-22 MOHC-HadGEM2-ES_rcp85_rli1p1_GERICS-REM02015_v1_mon_206101-207012.nc Adjusting calendar; historical pariod			
tas_CAS-22_MUHC-HadGeM2-ES_FCP85_FILIPI_GERICS-REMU2015_VI_MON_206101-20/012_FEMap.nc			
(base) reboita@reboitaV14:/dados/reboita/trainings/CORDEX_CAS\$ cdo setcalendar.standard tas_CAS-22_MOHC-HadGEM2-ES_histori	<u>.cal r1i</u>	1p1_GERICS-REMO2015_\	/1
mon_199101-200512_remap.nc tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REM02015_v1_mon_199101-200512_remap_cal.nc cdo setcalendar: Processed 19224900 values from 1 variable over 180 timesteps [0.08s 81MB]. Adjusting calendar	lar: futu	re	
<pre>cdo setcalendar: Processed 19224900 values from 1 variable over 180 timesteps [0.08s 81MB]. Adjusting calend (base) reboita@reboitaV14:/dados/reboita/trainings/CORDEX_CAS\$ cdo setcalendar,standard tas_CAS-22_MOHC-HadGEM2-ES_rcp85_r</pre>			2
(dase) reportant end tas_CAS-22_MOHC-HadGEM2-ES_rCp85_r1ip1_GERICS-REM02015_v1_mon_206101-207012_remap_cal.nc	TCIPI_G		1_2
cdo setcalendar: Processed 12816600 values from 1 variable over 120 timesteps [0.06s 80MB]. Knowing	the new	historical file	
(base) reboita@reboitaV14:/dados/reboita/trainings/CORDEX_CAS\$ cdo sinfo tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GER]	CS-REMO	2015_v1_mon_199 <u>101-2</u> 0	005
12_remap_cal.nc			
File format : NetCDF4 classic			
-1 : Institut Source T Steptype Levels Num Points Num Dtype : Parameter ID			
1 : unknown GERICS-REMO2015 v instant 1 1 106805 1 F32 : -1 Grid coordinates :			
1 : lonlat : points=106805 (521x205)			
lon : 10.8 to 140.8 by 0.25 degrees_east			
lat : 18 to 69 by 0.25 degrees_north			
Vertical coordinates :			
1 : height : levels=1 scalar			
height : 2 m			
Time coordinate :			
RefTime = 1949-12-01 00:00:00 Units = days Calendar = standard Bounds = true			
YYYY-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss YYYY-MM-DD hh:mm:ss			
1991-01-16 00:00:00 1991-02-16 00:00:00 1991-03-16 00:00:00 1991-04-16 00:00:00			
1991-05-16 00:00:00 1991-06-16 00:00:00 1991-07-16 00:00:00 1991-08-16 00:00:00			
1991-09-16 00:00:00 1991-10-16 00:00:00 1991-11-16 00:00:00 1991-12-16 00:00:00			
1992-01-16 00:00:00 1992-02-16 00:00:00 1992-03-16 00:00:00 1992-04-16 00:00:00			
1992-05-16 00:00:00 1992-06-16 00:00:00 1992-07-16 00:00:00 1992-08-16 00:00:00 1992-09-16 00:00:00 1992-10-16 00:00:00 1992-11-16 00:00:00 1992-12-16 00:00:00			
1992-09-10 00.00.00 1992-10-10 00.00.00 1992-11-10 00.00.00 1992-12-10 00.00.00			

Ē	reboita@reboitaV14: /dados/reboita/trainings/CORDEX_CAS	Q =		•	\mathbf{x}
(base) rebo	<pre>ita@reboitaV14:/dados/reboita/trainings/CORDEX_CAS\$ grads enter</pre>				
	Welcome to the OpenGrADS Bundle Distribution				
For additio	nal information enter "grads -h".				
Starting "/	opt/opengrads/Linux/Versions/2.0.2.oga.2/x86_64/grads "				
Copyright (Institute f GrADS comes	is and Display System (GrADS) Version 2.0.2.oga.2 c) 1988-2011 by Brian Doty and the or Global Environment and Society (IGES) with ABSOLUTELY NO WARRANTY PYRIGHT for more information				
na geotiff Issue 'q co	nfig' command for more detailed configuration information				
Loading Use ok.	r Defined Extensions table <td>2/x86_64/9</td> <td>jex/uc</td> <td>lxt></td> <td>••••</td>	2/x86_64/9	jex/uc	lxt>	••••
Landscape m	ode? ('n' for portrait):				
GX Package ga-> !ls	Initialization: Size = 11 8.5				
figures					
gridCAS.txt					
scripts tas CAS-22	MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REM02015_v1_mon_199101-20001	l2.nc			
tas_CAS-22_	MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REMO2015_v1_mon_199101-20051	l2.nc			
	MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REMO2015_v1_mon_199101-2005 MOHC-HadGEM2-ES historical r1i1p1 GERICS-REMO2015 v1 mon 199101-20051			-	
	MOHC-Haddem2-ES_NISIONICal_TIIPI_GERICS-REMO2015_V1_MON_199101-2005 MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REMO2015_V1_Mon_200101-20051		IC		9
tas_CAS-22_	MOHC-HadGEM2-ES_rcp85_r1i1p1_GERICS-REM02015_v1_mon_206101-207012.nc				
	MOHC-HadGEM2-ES_rcp85_r1i1p1_GERICS-REM02015_v1_mon_206101-207012_rem MOHC-HadGEM2-ES rcp85 r1i1p1 GERICS-REM02015 v1 mon 206101-207012 rem		2		
	MORC-Haddemz-es_rcpss_rllpi_derics-remozdis_vi_mon_z00101-20/012_rem MO2015 v1 mon 199101-200512 remap cal.nc sdfopen file.nc	nap.nc			
Scanning se	lf-describing file: tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GEF	RICS-REMO	2015_\	/1_mo	n_1
	2_remap_cal.nc s_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_GERICS-REMO2015_v1_mon_199	101-2005	2 500	120 6	2]
nc is open		101-2005.	iz_rer	ap_c	ac.
LON set to	10.8 140.8				
LAT set to					
LEV set to					

Load the files in GrADS

Compute the mean air temperature for historical period 1995-2005 future: 2061-2070

Plot a map FUTURE - HISTORICAL

sdfopen tas_CAS-22_MOHC-HadGEM2-ES_historical_r1i1p1_ GERICS-REMO2015_v1_mon_199101-200512_remap_cal.nc

sdfopen tas_CAS-22_MOHC-HadGEM2-ES_rcp85_r1i1p1_GERICS-REMO2015_v1_mon_206101-207012_remap_cal.nc



🕫 reboita@reboitaV14: /dados/reboita/trainings/CORDEX_CAS 🔍 😑 💷

LEV set to 0 0 Time values set: 1991:1:16:0 1991:1:16:0 E set to 1 1 <S_rcp85_r1i1p1_GERICS-REM02015_v1_mon_206101-207012_remap_cal.nc

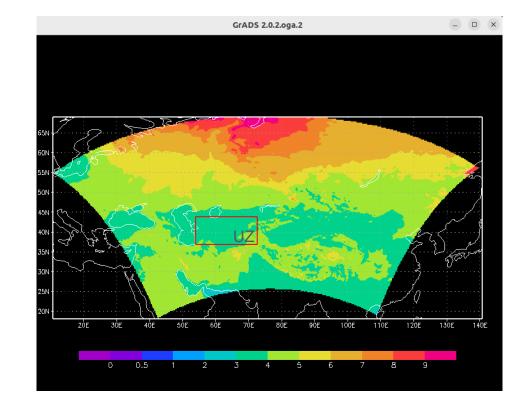
Scanning self-describing file: tas_CAS-22_MOHC-HadGEM2-ES_rcp85_r1i1p1_ GERICS-REM02015_v1_mon_206101-207012_remap_cal.nc SDF file tas_CAS-22_MOHC-HadGEM2-ES_rcp85_r1i1p1_GERICS-REM02015_v1_mon_ 206101-207012_remap_cal.nc is open as file 2

ga-> q file 1

File 1 : GERICS-REM02015 model output prepared for CORDEX historical Descriptor: tas CAS-22 MOHC-HadGEM2-ES historical r1i1p1 GERICS-REM020 15 v1 mon 199101-200512 remap cal.nc Binary: tas CAS-22 MOHC-HadGEM2-ES historical r1i1p1 GERICS-REM02015 v 1 mon 199101-200512 remap cal.nc Type = Gridded Xsize = 521 Ysize = 205 Zsize = 1 Tsize = 180 Esize = 1 Number of Variables = 1tas 🧿 t,y,x Near-Surface Air Temperature ga-> q file 2 File 2 : GERICS-REMO2015 model output prepared for CORDEX RCP8.5 Descriptor: tas CAS-22 MOHC-HadGEM2-ES rcp85 r1i1p1 GERICS-REM02015 v1 _mon_206101-207012_remap_cal.nc Binary: tas CAS-22 MOHC-HadGEM2-ES rcp85 r1i1p1 GERICS-REM02015 v1 mon 206101-207012 remap cal.nc Tvpe = GriddedXsize = 521 Ysize = 205 Zsize = 1 Tsize = 120 Esize = 1 Number of Variables = 1tas 🛛 t,y,x Near-Surface Air Temperature ga-> define mh=ave(tas.1.time=00Z01Jan1995.time=00Z12Dec2005) Averaging. dim = 3, start = 49, end = 180Define memory allocation size = 854440 bytes ga-> define mf=ave(tas.2.time=00Z01Jan2061.time=00Z12Dec2070) Averaging. dim = 3, start = 841, end = 960 Define memory allocation size = 8<u>54440 bytes</u> ______define dif=mf-mh Define memory allocation size = 854440 bytes ga-> set axout shaded ga-> set clevs 0 0.5 1 2 3 4 <u>5 6 7 8 9</u> Number of clevs = 11 oa-≻ d dif

Attention: both files have a variable with the same name

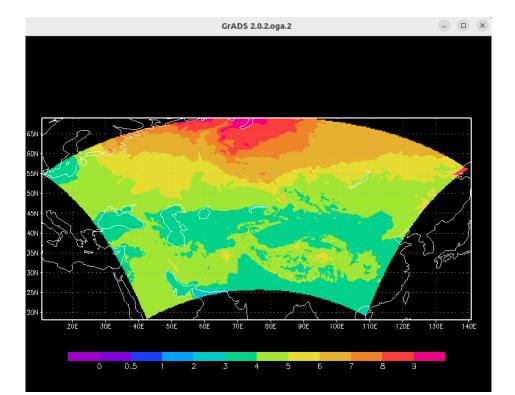
Numbers are attributed to the variables to identify them following the order of the sdfopen



Task completed

Future - Historical

Air temperature



To improve your learning, read more about

CDO

https://code.mpimet.mpg.de/projects/cdo/wiki/Tutorial https://gianni.geosci.monash.edu/tools/climate-data-analysis-tutorial/

GrADS

<u>http://cola.gmu.edu/grads/gadoc/tutorial.html</u> <u>https://www2.atmos.umd.edu/~dkuhl/documents/GRADSmanual.pdf</u> <u>https://gradsaddict.blogspot.com/p/tutorials.html</u>

RCMs

https://nyaspubs.onlinelibrary.wiley.com/doi/10.1111/nyas.13932



Reference

If you use the content of this tutorial, please cite:

Reboita, M., & Ali, S. (2023, novembro 9). How can we download CMIP and CORDEX datasets?. Zenodo. https://doi.org/10.5281/zenodo.10094676