

Climate data processing for climate resilience

Tajikistan and Kyrgyzstan

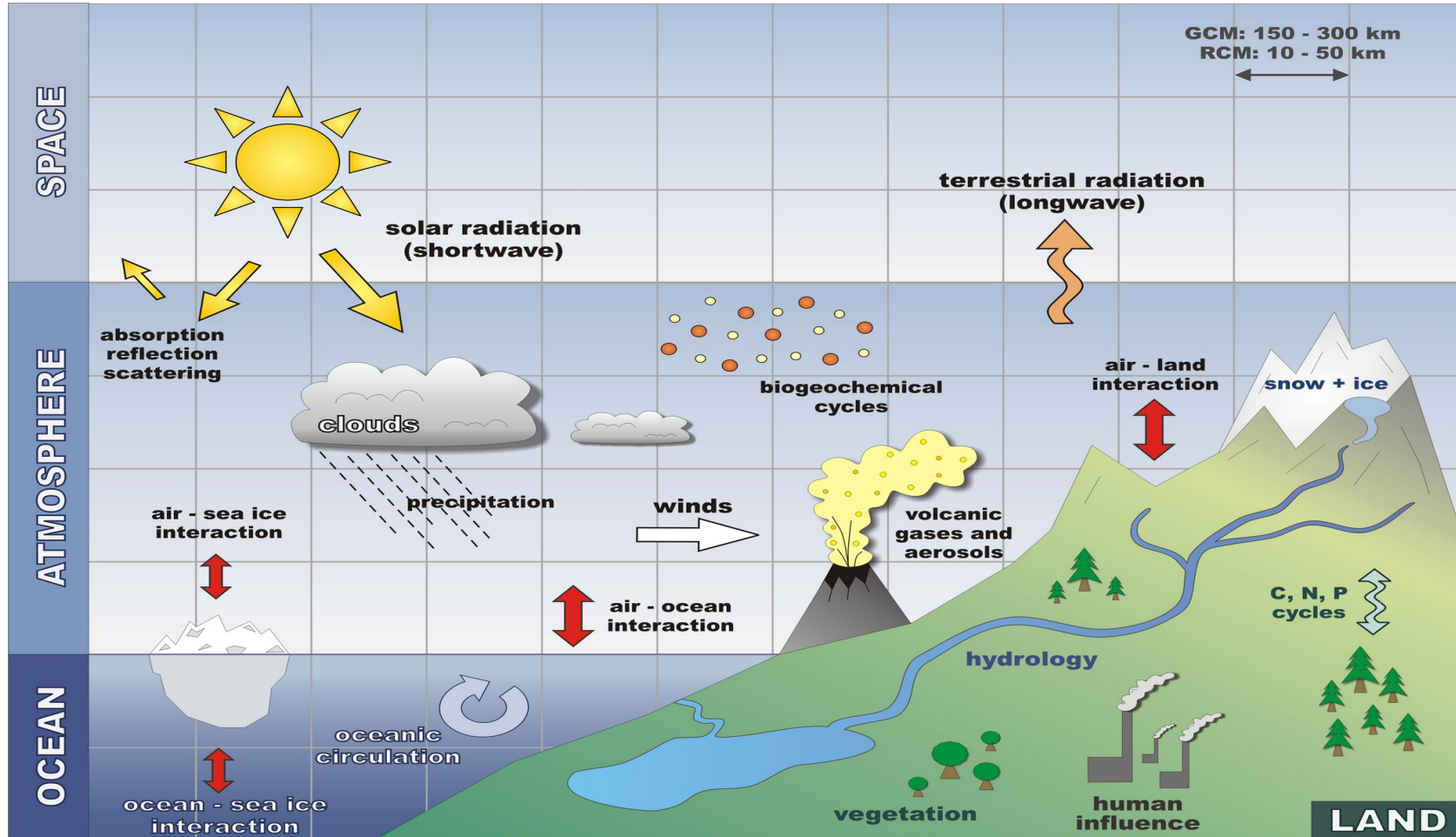
Data access, processing and methodological concepts

Webinar
17. - 27. 11.2020

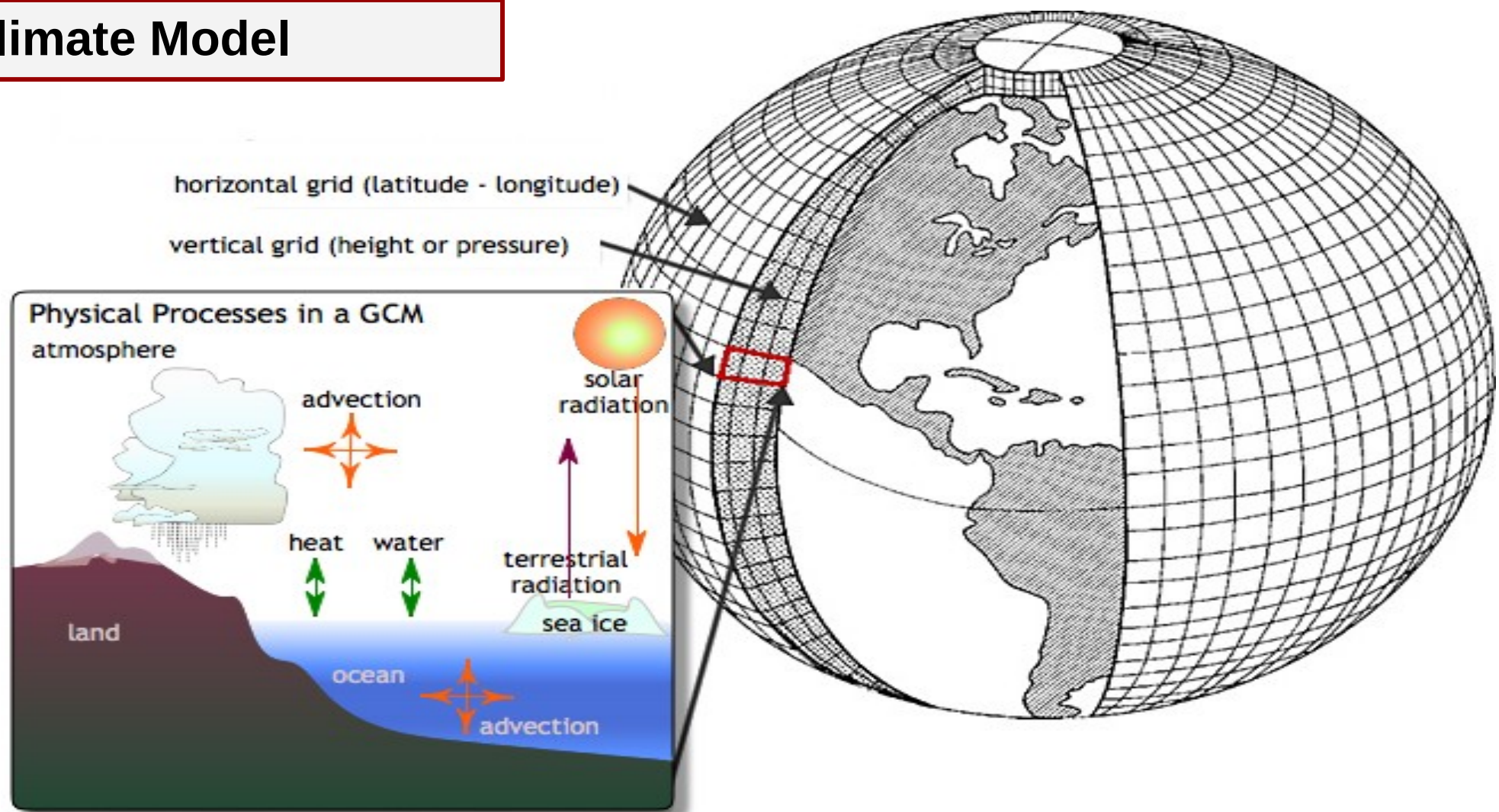
DAY 03
Scenarios of Change



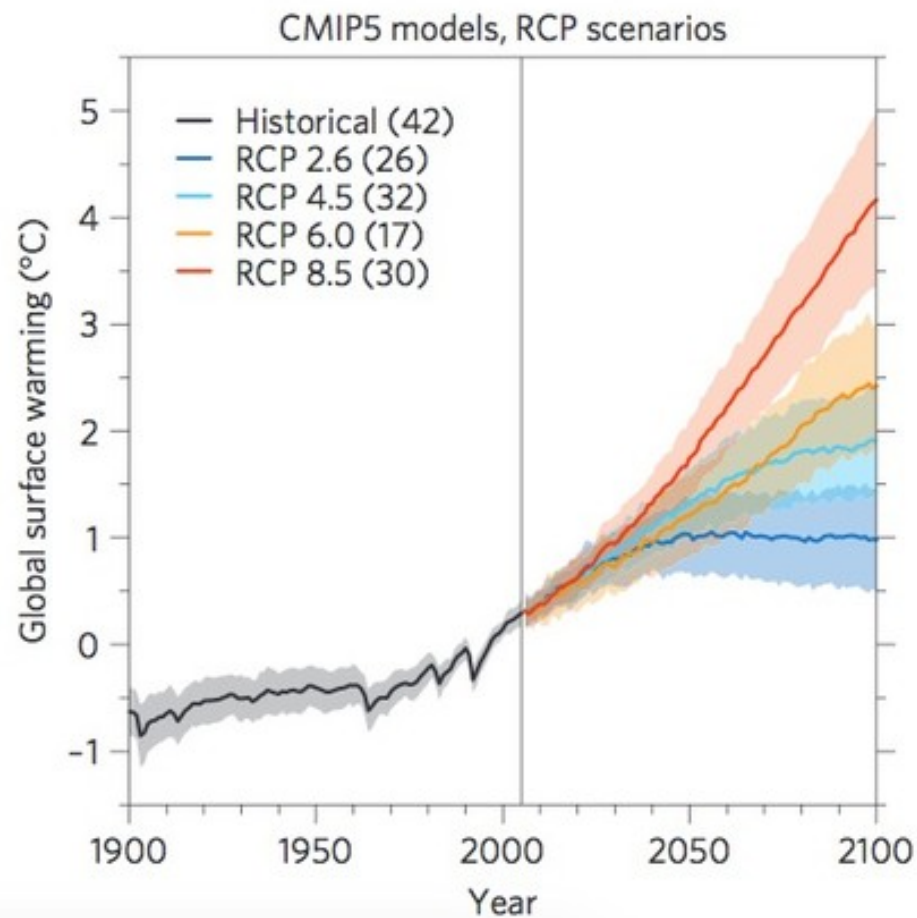
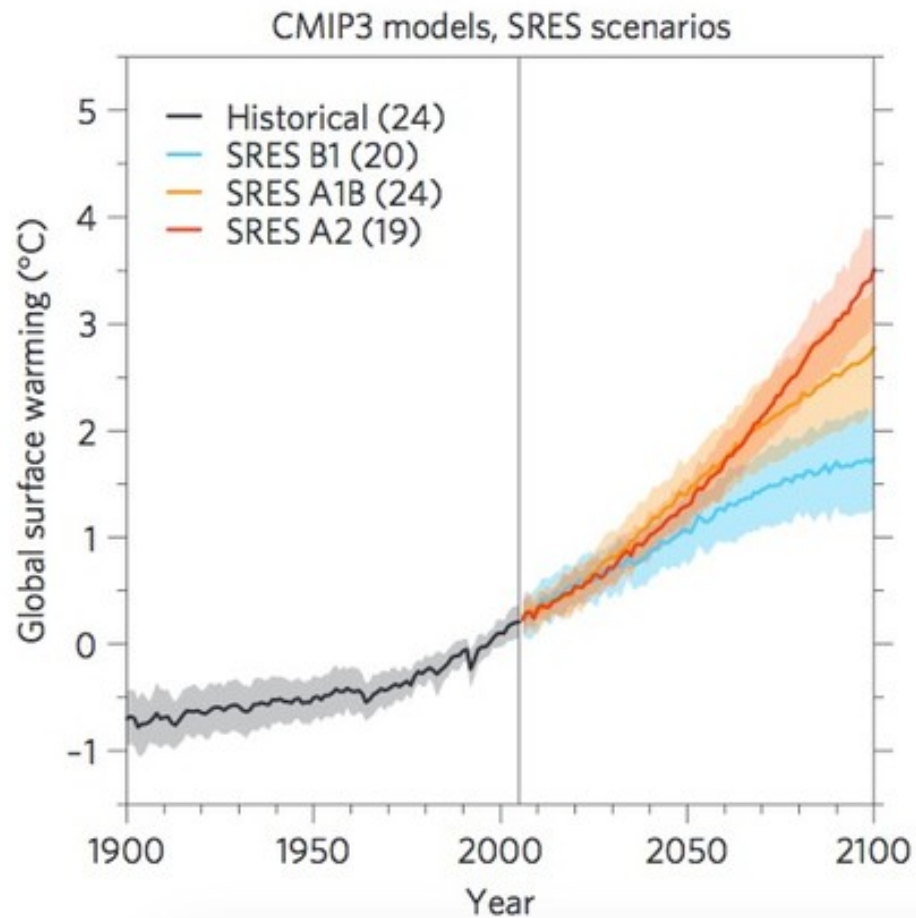
Earth System



Climate Model



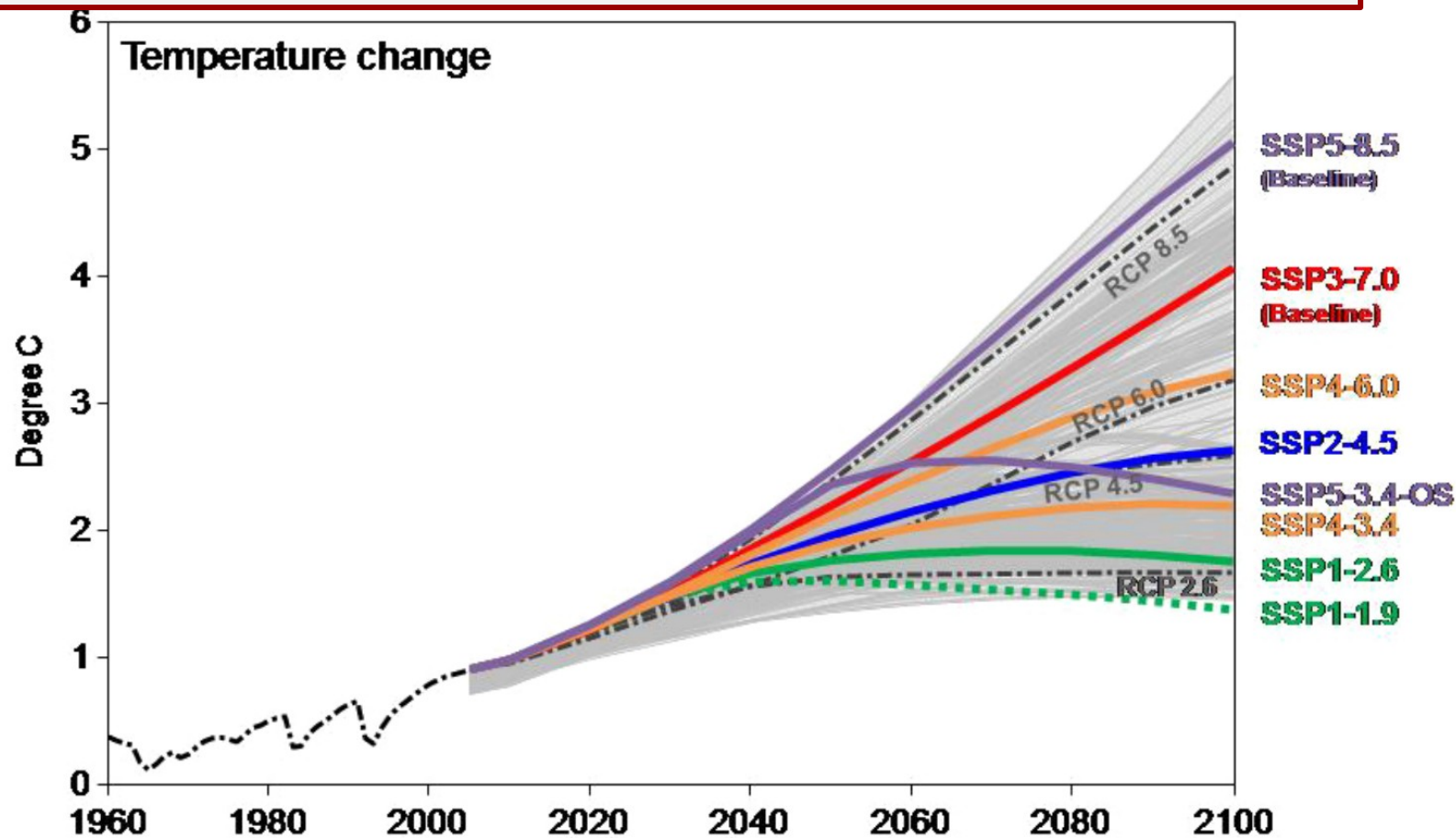
Future predictions



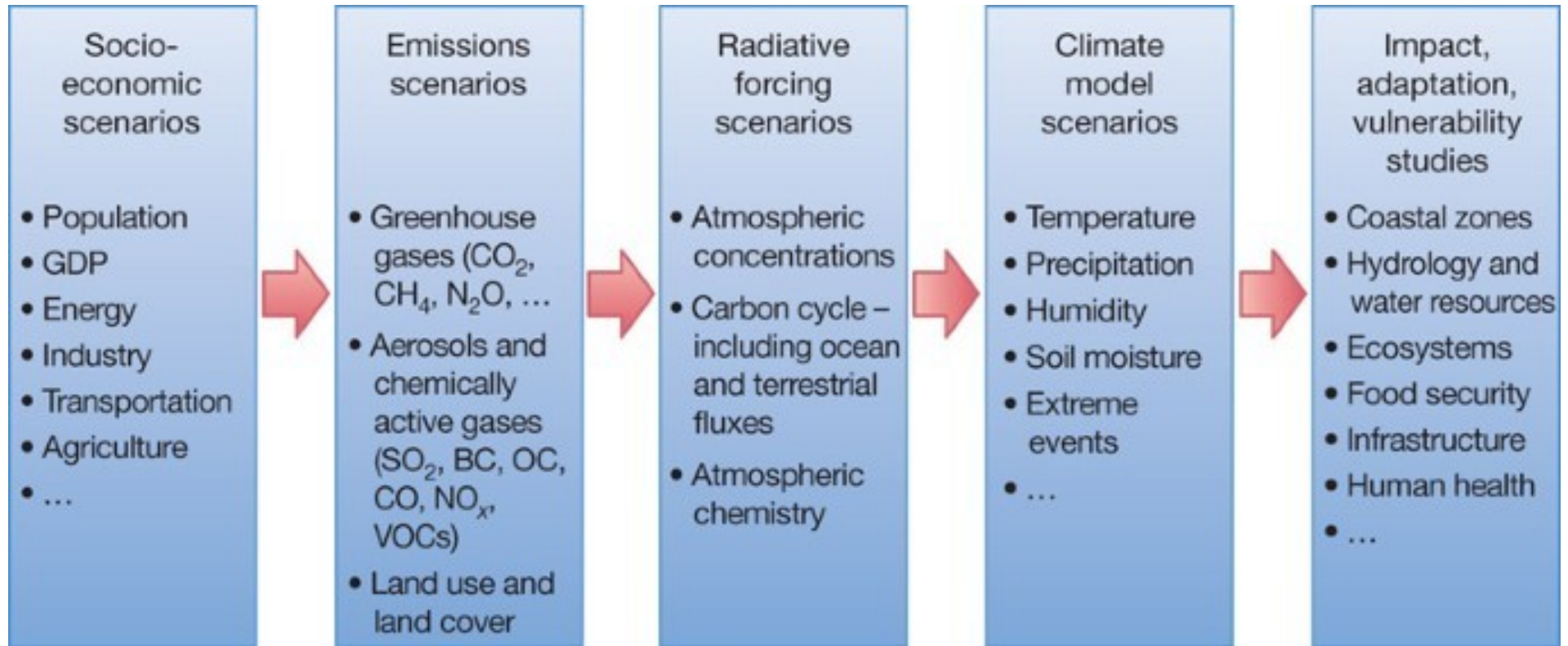
Logic of the Shared sozio-economic Pathways (SSP)



IPCC AR6 Shared Socioeconomic Pathways



Model Chain



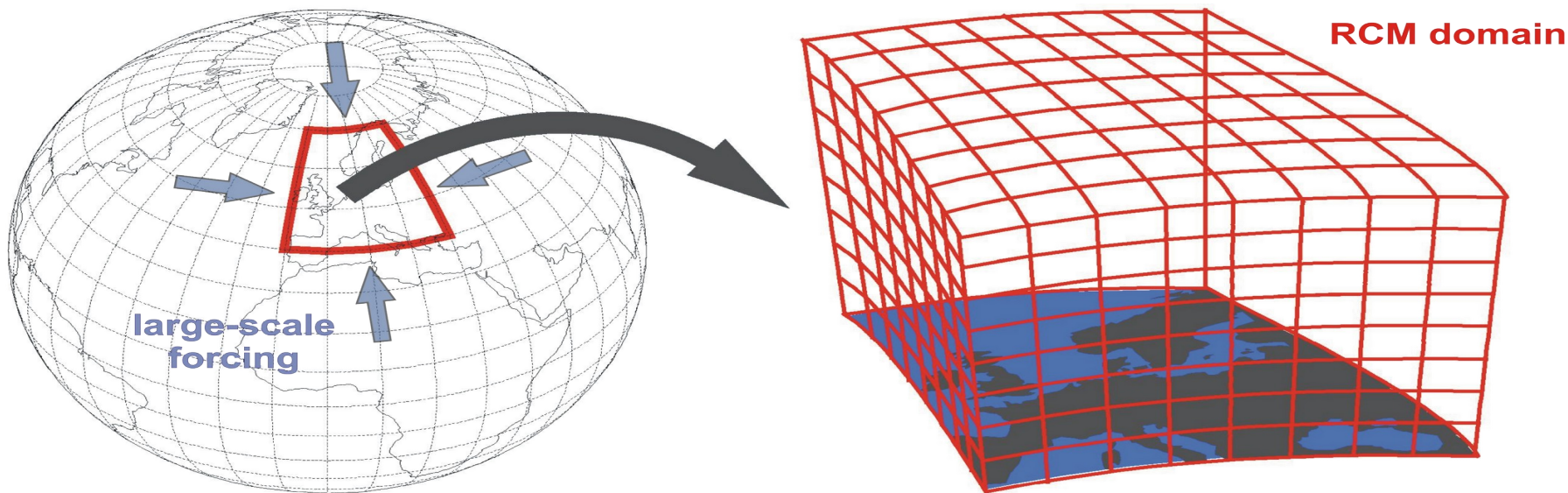
Source: The next generation of scenarios for climate change research and assessment 2010
<https://www.nature.com/articles/nature08823>



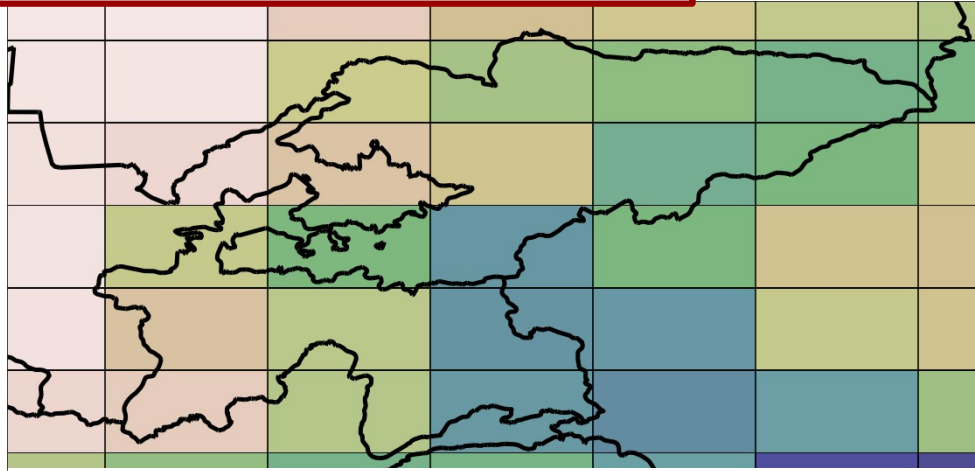
Downscaling

Regional Climate modelling

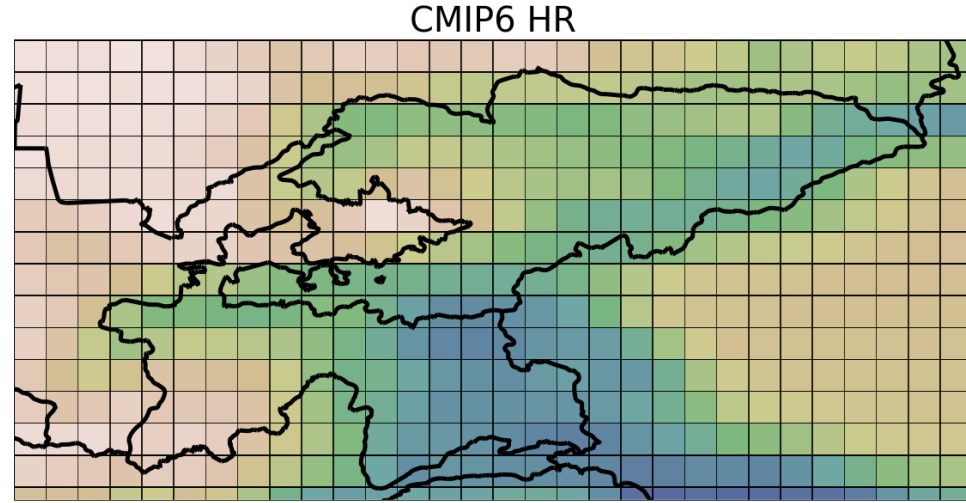
Global Model data as forcing data
Limited model domain
Spatial resolution (up to $\sim 10 \times 10$ km)



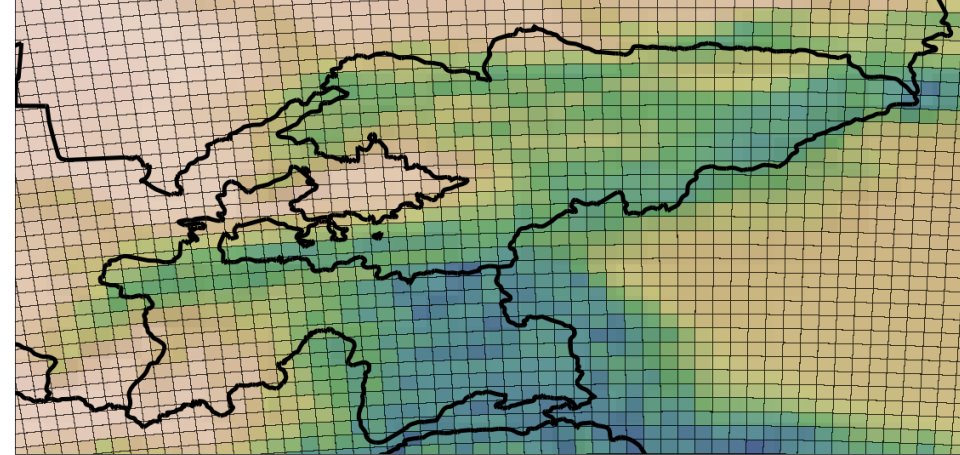
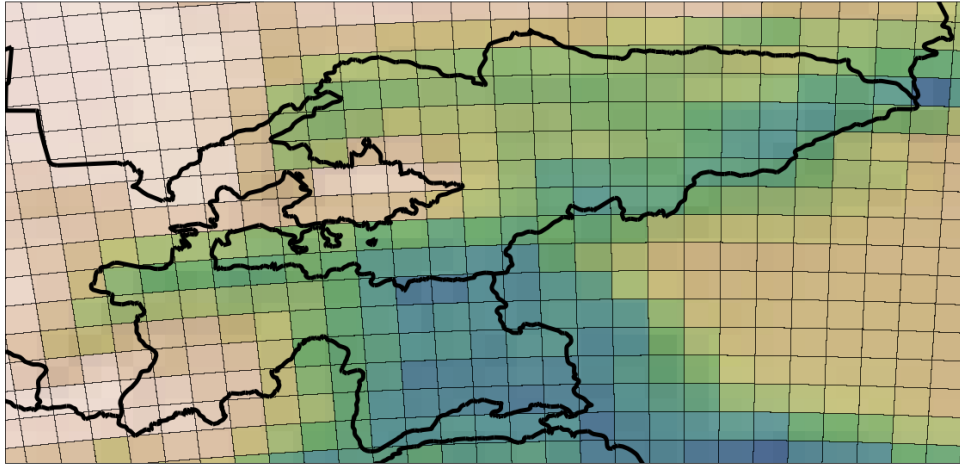
Downscaling



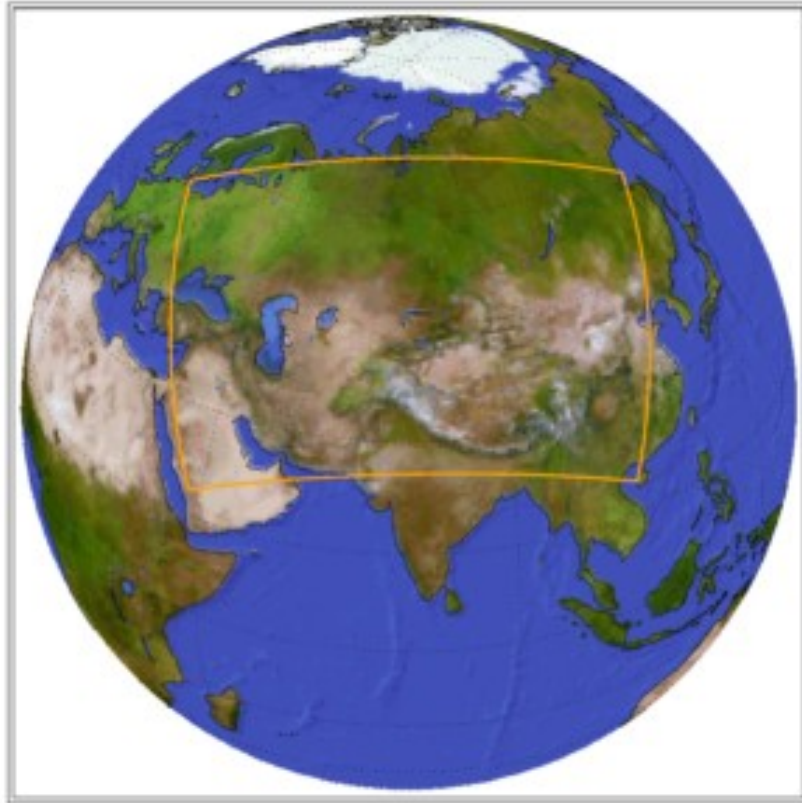
CORDEX CAS-44



CORDEX CAS-22

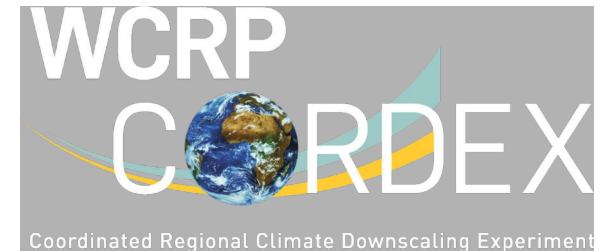


CORDEX Domain CAS



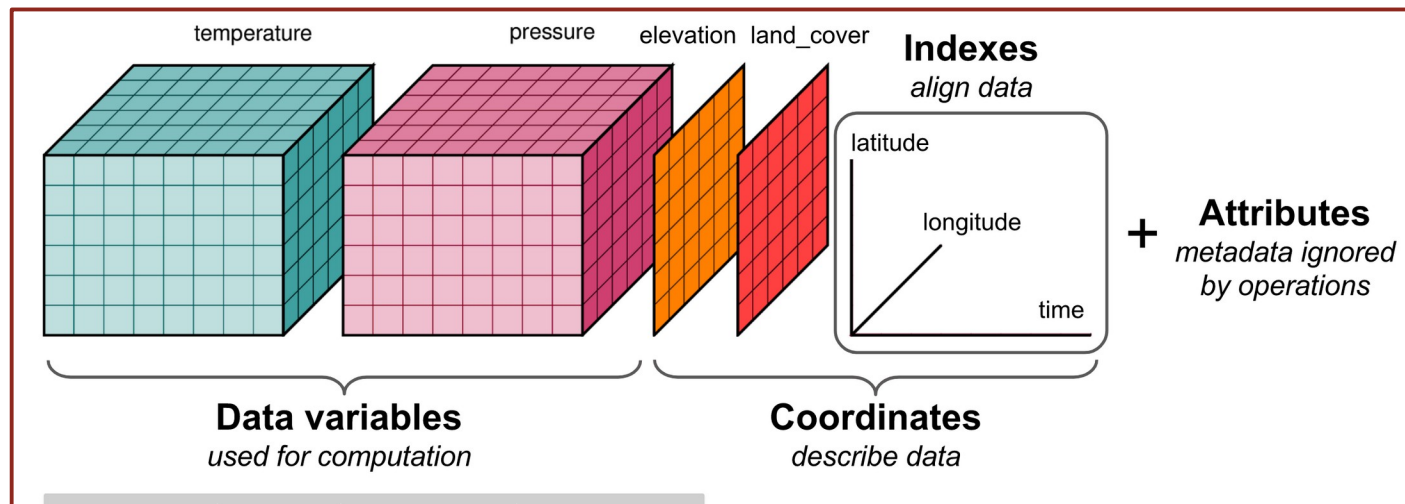
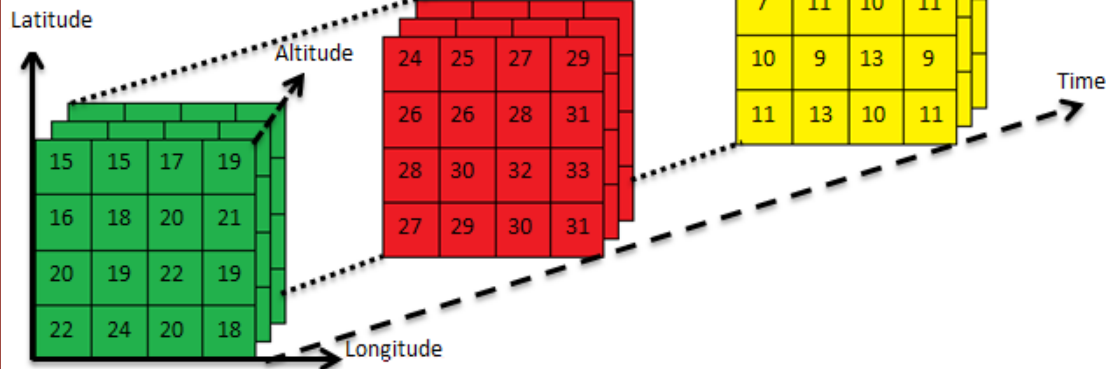
Source:

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



Multidimensional data format netCDF

Air Temperature



netCDF Metadata

```
tas_day_IPSL-CM6A-LR_ssp585_r3i1p1f1_gr_20150101-21001231_sub.nc
tas_day_IPSL-CM6A-LR_ssp585_r4i1p1f1_gr_20150101-21001231_sub.nc
tas_day_IPSL-CM6A-LR_ssp585_r6i1p1f1_gr_20150101-21001231_sub.nc
(base) nils@dove:~/ramboll/paris/data/tas$ ncdump tas_day_IPSL-CM6A-LR_ssp585_r6i1p1f1_gr_20150101-21001231_sub.nc
netcdf tas_day_IPSL-CM6A-LR_ssp585_r6i1p1f1_gr_20150101-21001231_sub {
dimensions:
    time = UNLIMITED ; // (31411 currently)
    lat = 1 ;
    lon = 1 ;
    axis_nbounds = 2 ;
variables:
    float lat(lat) ;
        lat:_FillValue = NaNf ;
        lat:axis = "Y" ;
        lat:standard_name = "latitude" ;
        lat:long_name = "Latitude" ;
        lat:units = "degrees_north" ;
        lat:_ChunkSizes = 143 ;
    float lon(lon) ;
        lon:_FillValue = NaNf ;
        lon:axis = "X" ;
        lon:standard_name = "longitude" ;
        lon:long_name = "Longitude" ;
        lon:units = "degrees_east" ;
        lon:_ChunkSizes = 144 ;
    double height ;
        height:_FillValue = NaN ;
        height:name = "height" ;
        height:standard_name = "height" ;
        height:long_name = "height" ;
        height:units = "m" ;
        height:axis = "Z" ;
        height:positive = "up" ;
    float time(time) ;
        time:_FillValue = NaNf ;
        time:axis = "T" ;
        time:standard_name = "time" ;
        time:long_name = "Time axis" ;
        time:calendar = "gregorian" ;
        time:units = "days since 2015-01-01 00:00:00" ;
        time:time_origin = "2015-01-01 00:00:00" ;
        time:bounds = "time_bounds" ;
        time:_ChunkSizes = 1 ;
    double time_bounds(time, axis_nbounds) ;
        time_bounds:_FillValue = NaN ;
        time_bounds:_ChunkSizes = 1, 2 ;
        time_bounds:coordinates = "height" ;
```

```
tas:interval_write = "1 d" ;
tas:standard_name = "air_temperature" ;
tas:description = "near-surface (usually, 2 meter) air temperature" ;
tas:long_name = "Near-Surface Air Temperature" ;
tas:history = "none" ;
tas:units = "K" ;
tas:cell_measures = "area: areacella" ;
tas:_ChunkSizes = 1, 143, 144 ;
tas:coordinates = "height" ;
tas:missing_value = 1.e+20f ;

// global attributes:
:name = "/ccc/work/cont003/genccmp6/lurtont/IGCM_OUT/IPSLCM6/PROD/ssp585/CM61-LR-scen-ssp585-r6/C
MIP6/ATM/tas_day_IPSL-CM6A-LR_ssp585_r6i1p1f1_gr_%start_date%-_%end_date%" ;
:Conventions = "CF-1.7 CMIP-6.2" ;
:creation_date = "2019-10-22T10:11:29Z" ;
:tracking_id = "hdl:21.14100/48775d11-08bb-4ee6-a33e-82594be14654" ;
:description = "Future scenario with high radiative forcing by the end of century. Following appr
oximately RCP8.5 global forcing pathway but with new forcing based on SSP5. Concentration-driven. As a tier 2 opt
ion, this simulation should be extended to year 2300" ;
:title = "IPSL-CM6A-LR model output prepared for CMIP6 / ScenarioMIP ssp585" ;
:activity_id = "ScenarioMIP" ;
:contact = "ipsl-cmip6@listes.ipsl.fr" ;
:data_specs_version = "01.00.28" ;
:dr2xml_version = "1.16" ;
:experiment_id = "ssp585" ;
:experiment = "update of RCP8.5 based on SSP5" ;
:external_variables = "areacella" ;
:forcing_index = 1 ;
:frequency = "day" ;
:further_info_url = "https://furtherinfo.es-doc.org/CMIP6_IPSL_IPSL-CM6A-LR_ssp585_none_r6i1p1f1"
;

:grid = "LMDZ grid" ;
:grid_label = "gr" ;
:nominal_resolution = "250 km" ;
:history = "none" ;
:initialization_index = 1 ;
:institution_id = "IPSL" ;
:institution = "Institut Pierre Simon Laplace, Paris 75252, France" ;
:license = "CMIP6 model data produced by IPSL is licensed under a Creative Commons Attribution-No
nCommercial-ShareAlike 4.0 International License (https://creativecommons.org/licenses). Consult https://pcmdi.ll
nl.gov/CMIP6/TermsOfUse for terms of use governing CMIP6 output, including citation requirements and proper ackno
wledgment. Further information about this data, including some limitations, can be found via the further_info_url
(recorded as a global attribute in this file) and at https://cmc.ipsl.fr/. The data producers and data providers
make no warranty, either express or implied, including, but not limited to, warranties of merchantability and fi
tness for a particular purpose. All liabilities arising from the supply of the information (including any liabili
ty arising in negligence) are excluded to the fullest extent permitted by law." ;
:mip_era = "CMIP6" ;
```



Hands ON:

Open a netCDF file in panoply

**Plot resolution of CMIP and
CORDEX files**

Time series future prediction

