Country resolved combined emission and socio-economic pathways based on the RCP and SSP scenarios - dataset

1 Recommended citation

Article citation will be added to the repository description (see here) once the article is available.

2 Content

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3 Use of the dataset and full description

Before using the dataset, please read this document and the article describing the methodology, especially the "Discussion and limitations" section.

The article will be referenced in the repository here as soon as it is published.

Please notify us (johannes.guetschow@pik-potsdam.de) if you use the dataset so that we can keep track of how it is used and take that into consideration when updating and improving the dataset.

When using this dataset or one of its updates, please cite the DOI of the precise version of the dataset used and also the data description article which this dataset is supplement to (see above). Please consider also citing the relevant original sources when using the RCP-SSP-dwn dataset. See the full citations in the References section further below.

4 Support

If you encounter possible errors or other things that should be noted or need support in using the dataset or have any other questions regarding the dataset, please contact johannes.guetschow@pik-potsdam.de.

5 Abstract

This dataset provides country scenarios, downscaled from the RCP (Representative Concentration Pathways) and SSP (Shared Socio-Economic Pathways) scenario databases, using results from the SSP GDP (Gross Domestic Product) country model results as drivers for the downscaling process harmonized to and combined with up to date historical data.

6 Files included in the dataset

The repository comprises several datasets. Each dataset comes in a csv file. The file name is constructed from dataset properties as follows: <Source><Bunkers><Downscaling>.csv

6.1 <Source>

The "Source" flag indicates which input scenarios were used.

- **PMRCP:** RCP scenarios downscaled using the SSPs: emissions and socio-economic data; scenarios are available both harmonized to historical data and non-harmonized.
- **PMSSP:** Downscaled SSP IAM scenarios: emissions and socio-economic data; scenarios are available both harmonized to historical data and non-harmonized.

6.2 <Bunkers>

the "Bunkers" flag indicates if the input emissions scenarios have been corrected for emissions from international shipping and aviation (bunkers) before downscaling to country level or not. The flag is "B" for scenarios where emissions from bunkers have been removed before downscaling and "" (no flag) where they have not been removed.

6.3 <Downscaling>

The "Downscaling" flag indicates the downscaling technique used.

- **IE:** Convergence downscaling with exponential convergence of emissions intensities and convergence before transition to negative emissions.
- **IC:** Regional emission intensity growth rates for all countries.
- **CS:** Constant emission shares as a reference case independent of the socio-economic scenario.

All files contain data for all countries and variables. For detailed methodology descriptions we refer to the paper this dataset is a supplement to. A reference to the paper will be added as soon as it is published.

Finally the data description including detailed references is included: RCP-SSP-dwn_v1.0_data_description.pdf (this file).

7 Notes

If you encounter problems with the size of the csv files please let us know, so we can find solutions for future releases of the data.

8 Data format description (columns)

8.1 "source"

For *PMRCP* files source values are

- RCPSSP<Bunkers><Downscaling>: unharmonized downscaled RCP SSP scenarios
- PMRCP<Bunkers><Downscaling>: downscaled RCP SSP scenarios harmonized to and combined with historical data
- PMRCPMISC<Bunkers><Downscaling>: GDP and population data harmonized to and combined with historical data

For *PMSSP* files source values are

- SSPIAM<Bunkers><Downscaling>: unharmonized downscaled SSP IAM scenarios
- PMSSP<Bunkers><Downscaling>: downscaled SSP IAM scenarios harmonized to and combined with historical data
- PMSSPMISC<Bunkers><Downscaling>: GDP and population data harmonized to and combined with historical data

For possible values of <Bunkers> and <Downscaling> please see section above.

8.2 "scenario"

For *PMRCP* files the scenarios have the format <RCP><SSP><group>, where

- <RCP> denotes the RCP scenario. Values are RCP3PD, RCP45, RCP6, and RCP85.
- <SSP> denotes the SSP scenario. Values are SSP1, SSP2, SSP3, SSP4, and SSP5.
- <groups> denotes the SSP basic elements GDP modeling group. Values are IIASA, OECD, and PIK. Not all RCP SSP combinations exist as some SSP storylines are not compatible with all RCP emissions scenarios. For details we refer to the paper this dataset is a supplement to. A reference to the paper will be added as soon as it is published.

For *PMSSP* files the scenarios have the format <SSP><forcing><model> where

- <SSP> denotes the SSP scenario. Values are SSP1, SSP2, SSP3, SSP4, and SSP5.
- <forcing> denotes the radiative forcing level of the scenario. Values are 19, 26, 34, 45, 60, 85, and BL, where 19 stands for $1.9 \text{W}/\text{m}^2$ etc. and BL stands for baseline.
- <model> denotes the Integrated Assessment Model (IAM) used to generate the scenario. Values can be found in Table 1

Table 1: Model codes in scenario names

Value	Model
AIMCGE	AIM-CGE
IMAGE	IMAGE
GCAM4	GCAM
MESGB	MESSAGE-GLOBIOM
REMMP	REMIND-MAGPIE
WITGB	WITCH-GLOBIOM

8.3 "country"

ISO 3166 three-letter country codes or custom codes for groups:

Table 2: Additional "country" codes for country groups.

Code	Region description
EARTH	Aggregated emissions for all countries.
ANNEXI	Annex I Parties to the UNFCCC
NONANNEXI	Non-Annex I Parties to the UNFCCC
AOSIS	Alliance of Small Island States
BASIC	BASIC countries (Brazil, South Africa, India and China)
EU28	European Union

Code	Region description
LDC	Least Developed Countries
UMBRELLA	Umbrella Group

8.4 "category"

Table 3: Category descriptions.

Category code	Description
IPCM0EL ECO	Emissions: National Total excluding LULUCF Economical data
DEMOGR	Demographical data

8.5 "entity"

Gases and gas baskets using global warming potentials (GWP) from either Second Assessment Report (SAR) or Fourth Assessment Report (AR4).

Table 4: Gases / gas baskets and underlying global warming potentials

Code	Description
CH4	Methane (CH_4)
CO2	Carbon Dioxide (CO_2)
N2O	Nitrous Oxide (N_2O)
FGASES	Fluorinated Gases (SAR): HFCs, PFCs, SF_6, NF_3
FGASESAR4	Fluorinated Gases (AR4): HFCs, PFCs, SF_6, NF_3
KYOTOGHG	Kyoto greenhouse gases (SAR)
KYOTOGHGAR4	Kyoto greenhouse gases (AR4)

8.6 "unit"

The following units are used:

Table 5: units

Code	Description
Million2011GKD	Million 2011 international dollars
ThousandPers	Thousand persons
kt	kilotonnes
Mt	Megatonnes
Gg	Gigagrams
MtCO2eq	Megatonnes of CO_2 equivalents using the GWPs defined by "entity"
GgCO2eq	Gigagrams of CO_2 equivalents using the GWPs defined by "entity"

8.7 Remaining columns

Years from 1850-2100.

9 Data Sources

The following data sources were used during the generation of this dataset:

9.1 Scenario data

RCP scenarios website/data: IIASA (2009), Riahi et al. (2011), Thomson et al. (2011), Masui et al. (2011), van Vuuren et al. (2011a), van Vuuren et al. (2011b)

SSP basic elements website/data: IIASA (2018), Leimbach et al. (2017), Dellink et al. (2017), Crespo Cuaresma (2017), KC and Lutz (2017)

SSP IAM scenarios website/data: IIASA (2018), Riahi et al. (2017), Kriegler et al. (2017), Fujimori et al. (2017), Calvin et al. (2017), Fricko et al. (2017), van Vuuren et al. (2017), Rogelj et al. (2018)

SSP CMIP6 scenarios website/data: IIASA (2018), Gidden et al. (2019)

9.2 Historical data

CDIAC data: Boden et al. (2017) Andres et al. (1999) Marland and Rotty (1984)

CEDS CMIP6 data paper/data: Hoesly et al. (2018)

EDGAR version 4.3.2: data, paper: JRC and PBL (2017), Janssens-Maenhout et al. (2019)

IMO GHG report report: Smith et al. (2014)

PRIMAP-hist v2.1 paper, website, data: Gütschow et al. (2016), Gütschow et al. (2019)

PRIMAP-hist SocioEco v2.1 data: Gütschow (2019)

10 Changelog

For future versions

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