

This module supports the CAM project

It allows to analyze other TC track data than UNISYS (e.g. from NCAR), to calculate country risk results¹ and all other analyses as provided by climada.

Further, the module calculates the property damage associated with the hazard event sets.

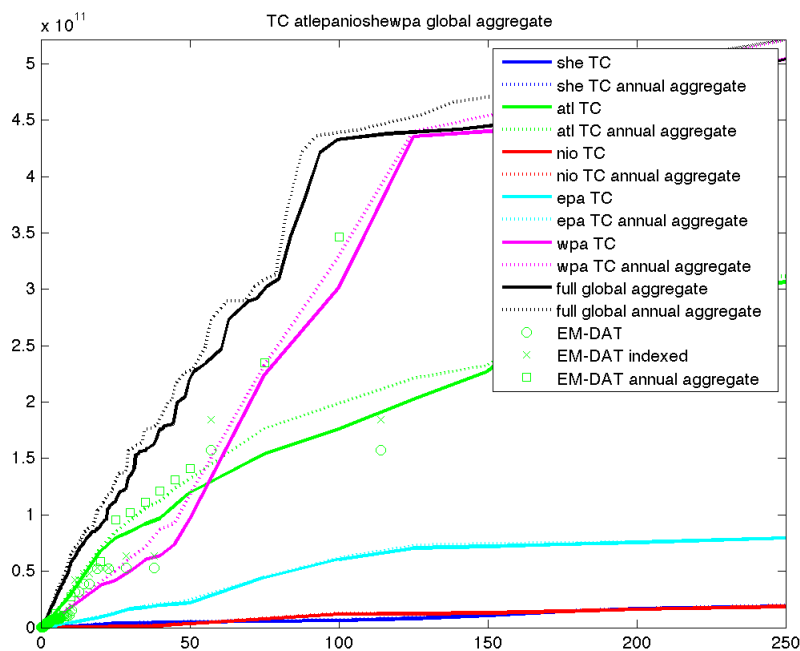


Fig 1: Results based on probabilistic tropical cyclone (TC) tracks (UNISYS, as used in core climada). The abbreviations atl/nio/wpa/epa/she stand for the ocean basins, e.g. Atlantic/North Indian/West Pacific/East Pacific and Southern Hemisphere. The solid lines show the per single event occurrence results (i.e. the damage of single events), the dotted lines the annual aggregate results (i.e. the sum of damages during years). The EM-DAT points show the available historic damage information from the EM-DAT database², indexed means inflated to today's values and annual aggregate means aggregated over each calendar year. Damage functions have been adjusted on a country-basis for those countries where enough EM-DAT data points existed (see code `country_risk_calibrate` in the `country_risk` module). Note the surprisingly good match with EM-DAT data, i.e. the good 'reproduction' of historic tropical cyclone damages over all (the biggest single EM-DAT damage represents hurricane Katrina in the US, order of USD 150 bn, which comes as about the 120 year event, not too bad...possibly a bit on the optimistic side). Since an absolute (actual USD) vertical scale is shown, the results are dominated by the large economies, i.e. US for atl and China for wpa...

Much remains to be done - but above figure shall illustrate that we get the order of magnitude of property damages right.

¹ Therefore, the present module relies heavily on https://github.com/davidnbresch/climada_module_country_risk

² See climada function `emdat_read` in module `country_risk`.

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CAM module – basics

The module mainly supports tropical cyclone (TC) tracks from other sources than UNISYS. Please first have a look at the code `selected_countries_CAM`, which runs all required steps as a batch code.

Function reference

Use `help {function name}` to get a detailed description and input/output specification

Top level functions

`selected_countries_CAM`: batch code to run all in one

`cam_entity_value_GDP_SSP_one`: Scale one entities assets to values corresponding to either present or future GDP projections

`cam_entity_value_GDP_SSP`: caller for `cam_entity_value_GDP_SSP_one` to process multiple entities (e.g. all country entities of the CAM project).

Plotting functions

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Support-level functions

`climada_tc_read_cam_ibtrac_v02`: read netCDF file with TC tracks, called by e.g. `centroids_generate_hazard_sets` from `climada` module `country_risk`.

Also useful

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Notes on assets

The assets distributions are obtained from satellite night light intensity, which is available on a global 1x1 km resolution. For practical reasons, nightlight intensity is aggregated into 10x10 km

cells (as we cover essentially the whole globe and 1x1 km resolutions has heavy calculation implications, but is technically possible with climada). Nightlight distribution is then non-linearly scaled to obtain the relative asset distribution, all described in detail in documentation of climada module `GDP_entity`³ (and some further comments in module `country_risk`⁴). Finally, assets are then scaled (see code `cam_entity_value_GDP_SSP_one`) based on a country's estimated total asset value, based on an SSP scenario and for a target year. First, asset values are normalized to one for any given country, then multiplied by $GDP \cdot PPP \cdot SCL$, where

- GDP comes from the SSP data file for any given (future) year, available are 2000:5:20100 (i.e. 200, 2005, 2010 .. 2095,2100), either for the `Ssp3Db` or `Ssp5Db` scenarios (see `SSP_data_file` in the CAM module's data folder: `SSP_country_data_2013-06-12_OECDOnly.xls`). Values are order of (many) billions of USD.
- PPP, the purchase power parity conversion comes from tab "conversion rate" in `SSP_data_file`. Values are order of 1.
- SCL, the `scale_up_factor` based on income group comes from the core climada `economic_data_file` (see `economic_indicators_mastertable.xls` in core climada's data/system folder). Value is in the range 2 to 5, 2 for low(est) income countries, factor 5 for top income economies (based on World Bank figures).

Notes on damage functions

The default damage function as provided by climada is nothing more than a starting point. Please consider at least the rough first-order calibration as offered by `country_risk_calibrate` in the `country_risk` module⁵.

³ https://github.com/davidnbresch/climada_module_GDP_entity

⁴ https://github.com/davidnbresch/climada_module_country_risk

⁵ https://github.com/davidnbresch/climada_module_country_risk