

Ordering WindRiskTech Tropical Cyclone Sets

March, 2022

To provide you with tropical cyclone data sets quickly and efficiently, we need specification of the number of events, their location, and the global climate analyses and/or climate models you would like us to use to perform the downscaling. These are described in more detail below.

1. **Location:** There are three alternative ways to specify your regions of interest:
 - a. **Basin:** This is the broadest category and includes all tropical cyclones that form within a specified ocean basin. We use 5 basins: North Atlantic, eastern North Pacific, western North Pacific, North Indian Ocean, and the whole of the southern hemisphere. The definitions of these basins closely correspond with the definitions used in historical tropical cyclone databases, such as IBTrACS. You can also specify the whole globe.
 - b. **Circular region:** This specification includes only those tropical cyclones that pass within X kilometers of a given geographic point specified by its latitude and longitude. You provide that point and the distance X; our standard distance is 150 km.
 - c. **Line segments:** This is perhaps the most general way of bounding the locations of tropical cyclone tracks. You specify the end points (in latitudes and longitudes) of a series of line segments, which may or may not be connected. We deliver only those storm tracks whose centers cross over at least one of the line segments. In the special case of line segments that form a closed polygon, we also include tracks that form within and stay within the polygon, in addition to any tracks that pass over its boundaries. A commonly used filter is a set of line segments along a coastline. An easy way to create a set of line segments is to use the “add path”¹ tool in *Google Earth* to draw the lines. You must create one *.kml* file for each contiguous set of line segments, numbered according to <MyFileName>n.kml, where n = 1,2,3.... Just send us the *.kml* files.

¹ Please do not use “add polygon”

2. **Intensity:** Specify the minimum intensity (in knots) you want us to include in the tropical cyclone sets. For the basin filter, this is the minimum value of the lifetime maximum intensity. For the circular filter, each storm must have at least this intensity somewhere within the circle. In the case of the line segment filter, each storm must have at least this intensity as it crosses over any of the line segments. (If it crosses over two or more segments, it must have this intensity as it passes over at least one of the segments.) Our standard minimum intensity is 40 kts.
3. **Number of events:** WindRiskTech events are created by a random seeding process. Tropical cyclone seedlings are inserted randomly in space and time, and those that do not achieve tropical storm strength are discarded. We keep seeding until a pre-specified number of storms has been achieved. The ratio of successful to failed seeds tells us the annual frequency of storms. We deliver to you that frequency for each year of the event set. You just need to tell us how many total events you want. You can start with a modest number and just order more events if you decide you need them.
4. **Reanalyses and/or climate models to downscale:** Please consult the document *Available Model and Reanalyses*. This provides a complete set of climate reanalyses and climate models we currently can downscale. The model has been optimized to some degree using the standard (original version) of the NCAR/NCEP reanalyses, and although they are available from 1949 to a year or two before present, we recommend using only 1979 and later. For future climate scenarios, we recommend using at least 4 climate models to help bound the uncertainties associated with climate models.
5. **Period of time:** Specify the span of years you want us to use. Unless directed otherwise, we will distribute the total number of events you order evenly over each year. We recommend at least 20 years to cover many natural climate oscillations, such as ENSO. See the document *Available Model and Reanalyses* for the years available for each reanalysis and climate model.
6. **Output:** We deliver tropical cyclone sets as MATLAB binary files, Excel spreadsheets, or in NETCDF format. MATLAB is preferred as we supply a large toolkit of analysis scripts. Also, quantities involving rain require MATLAB.

Sample Orders:

1. Please send us 2,000 tropical cyclone tracks downscaled from NCEP reanalyses over the period 1979-2018, using the attached *.kml* file containing line segments along the coast of Japan, with a minimum intensity of 40 kts. Please deliver as MATLAB binaries.
2. Please send 3,000 tracks downscaled from each of the EC-Earth, HadGEM, IPSL and MIROC models of the CMIP6 generation, from each of the historical simulations, 1991-2010 and the SSP585 simulations, 2081-2100. Each of the events should pass within 150 km of Cancun, Mexico, with wind speeds of at least 50 kts. Deliver as NETCDF files.