WindRiskTech MATLAB Event Set Contents

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This document provides descriptions of the variables contained in raw WindRiskTech event sets. It is divided into three parts: Event set parameters, and the output variables themselves, and new variables created after running *prep.m* or *prepfilter.m*.

Event set parameters: (Note not all of these parameters are given in every event set. For example, 'polyfile' is not given if a circular filter was used to create the set.)

bas (character scalar): The ocean basin for this track set.

city_radius (scalar): Used for circular filtering, this is the distance, in kilometers, from a specified point of interest that tracks must pass within to be included in this set. Not used in line-segment or polygon filtering.

clat (scalar): The latitude of the point of interest, used in circular filtering.

clong (scalar): The longitude of the point of interest, used in circular filtering.

factor (scalar): (not currently used).

flavor (character): Type of input data (e.g. *reanal* for re-analysis data)

gmeth (character): The genesis method used for this track set. *clim* denotes genesis by random draws from a best-track-based genesis climatology, while *rand* denotes random seeding and natural selection.

model (character): Name of the input global gridded data set. For example, ERA5 for ERA5-reanalysis-driven output.

polyfile (character): The name of the file containing the set of line segments used to filter the data. Not provided if circular filter used.

shape (character): The filtering type used for this track set; *circ* denotes circular filtering, while *poly* denotes series of line segments or closed polygon.

vcrit (character): The critical maximum wind speed (knots) used in creating the Event Set. For circular or closed polygon filters, each tropical cyclone must have maximum winds of at least this value when within the circle or polygon. For line-segment filters, each tropical cyclone must have maximum winds of at least this value when crossing at least one of the line segments.

Output variables: [*Convention***:** In the descriptions below, the index *n* refers to the event number, while the index *m* refers to the 2-hour records of each event. For example, *latstore (n,m)* is an array containing *n* tracks each of which has *m* two-hour observations. (The arrays are padded with zeros between the end of each track and the end of the file.)

freq (scalar): The annual frequency of all the events in the event set. For all subsets of size *x*, the annual frequency of the subset is just *x/n*.

daystore (n x m array): The day of the month of 2-hour points along each track.

hourstore (n x m array): The Greenwich Mean Time of 2-hour points along each track.

latstore (n x m array): The latitude of 2-hour points along each track.

longstore (n x m array): The longitude of 2-hour points along each track.

monthstore (n x m array): The calendar month of 2-hour points along each track.

pstore (n x m array): The central surface pressure (hPa) of 2-hour points along each track.

rhstore (n x m array): Relative humidity (%) of the environment at 600 hPa at each 2-hour point along each track.

rmstore (n x m array): The radius (km) of maximum circular wind of 2-hour points along each track.

rmsestore (n x m array): The radius (km) of maximum circular wind of any secondary wind maxima present (0 if absent), of 2-hour points along each track. Set to zero of there are no secondary eyewalls.

shearstore (n x m array): The magnitude of the 850-250 hPa environmental wind shear (m/s) at each 2-hour point along each track.

T600store (n x m array): Temperature (K) of the environment at 600 hPa at each 2-hour point along each track.

u850store (n x m array): The zonal component of the 850 hPa environmental wind speed (knots) at each 2-hour point along each track (not provided in all event sets).

v850store (n x m array): The meridional component of the 850 hPa environmental wind speed (knots) at each 2-hour point along each track (not provided in all event sets).

vpstore (n x m array): The potential intensity (knots) at each 2-hour point along each track.

vstore (n x m array): The maximum circular wind speed at each 2-hour point along each track. Note that this is not the maximum 10 m wind speed, only the circular component. One needs to use *vnet* for the maximum surface winds (see entry above).

vsestore (n x m array): The maximum circular wind speed of maximum circular wind of any secondary eyewalls that may be present, at each 2-hour point along each track. Set to zero of there are no secondary eyewalls. Note that a fraction of the translation speed is generally added to this to define the actual maximum wind speed, interpreted as a one-minute average at 10 m altitude.

yearstore (1 x m array): This file is only present in event sets spanning multiple years. It contains the year of the first datum of each event.

Some potentially useful variables created by running *prep.m* or *prepfilter.m*:

router (n x m array): The outer radius (km) of each event. This is the radius at which the circular wind vanishes.

ut (n x m array): Zonal component of the storm translation velocity (knots).

uinc (n x m array): Zonal component of the background surface wind (knots) one should add to the zonal component of the circular wind speed to get total zonal wind.

vinc (n x m array): Meridional component of the background surface wind (knots) one should add to the meridional component of the circular wind speed to get total meridional wind.

vt (n x m array): Meridional component of the storm translation velocity.

vmax (1 X n array): This array contains the maximum 10-m ground relative wind (including the effects of background flow) in knots, at the point-of-interest when a circular filter is used, or the maximum along the set of line segments in *poly.in* if a poly filter is used. But if the radius of the circular filter is greater than 2000 km, typical of basin-wide event sets, then *vmax* is the same as *vnetmax*, described below.

vnet (n x m array): This array contains the maximum 10-m ground relative wind (including the effects of background flow) in knots. One should use this variable, and not *vstore*, for maximum surface winds comparable to best track data.

vnetmax (1 x n array): The maximum along each track of *vnet.mat* described just above. Created by running *prep.m*. Note: $vnet = vmax + \sqrt{uinc^2 + vinc^2}$

The following variables are only produced if line segment or closed polygon filtering is used.

jint (n x 10 array): Number index of line segment crossed when line-segment filtering is used. This will be 1 if the track crosses the first line segment in the polyfile, 2 if it crosses the second line segment in the polyfile, etc. The second dimension denotes the k^{th} crossing of a particular track. So, for example, *jint* (28,2) is the index of the line segment that storm 28 crosses after it has already passed another line segment. This second index is padded with zeros. Should a particular storm cross more than 10 segments, such crossings are omitted.

kint (n x 10 array): Along track index of line-segment crossings. For example, *vnet (i, kint(i,2))* would be the maximum surface wind speeds in storm i as it makes its second crossing of the set of line segments. The second index is padded with zeros beyond the last segment crossing of each track.

kfrac (n x 10 array): The fraction of the 2-hour interval between the last point on a track before line segment crossing and the first point after the crossing. For example, a simple linear interpolation to find the storm's maximum wind at the point it crosses a line segment (following the example in *kint* above) yields *vnet (i, kint(i,2)) x (1-kfrac(I,kint(I,2))+vnet(I,kint(I,2+1) x kfrac(I,kint(I,2))*.

xint (n x 10 array): Longitudes of the intersection points of tracks with line segments.

yint (n x 10 array): Latitudes of the intersection points of tracks with line segments.