

# superBT-V04 ([.docx](#) [.html](#))

## a super Best Track (BT) for Tropical Cyclone (TC) forecasting and research

[GitHub - tenkiman/superBT-V04: first release of the superBT - V04](#)

Mike Fiorino  
George Mason University  
[mfiorino@gmu.edu](mailto:mfiorino@gmu.edu)  
21 October 2023

### What is a superBT?

The superBT is a TC-centric superposition of reanalysis (***NWP-dynamics***) and precipitation (***thermodynamics***) datasets onto TC track data from the two US operational forecasting centers: the Joint Typhoon Warning Center (JTWC), Pearl Harbor HI and the National Hurricane Center (NHC), Miami FL. The superBT can be thought of as a Best Track dataset with additional variables related to TC intensity and structure change (e.g., vertical wind shear).

A special property of the superBT is that it includes a curated and unique set of both ***developing*** (**9Xdev**) and ***non-developing*** (**9Xnon**) pTCs<sup>1</sup>. Furthermore, genesis is defined either as the first TC position in the track or the first warning/advisory as both JTWC and NHC are required to issue warnings on a system analyzed to be a TC regardless of initial intensity (maximum surface wind speed). Unlike IBTrACS, or the JTWC/NHC best tracks, the superBT TC (**NN** - 0-50) includes positions from the pTC that became the TC (**9Xdev**).

### V04 - initial beta version

- **2007-2022 – 16-y data set**
- **Global - NHEM & SHEM** basins
- **JTWC/NHC** - best tracks (“bdeck”) & aid files (“adeck”)
- **NN** - operationally designated TCs
- **9Xdev** - pre/potential TC (pTC) that developed into **NN** or TC (developers)
- **9Xnon** - pre/potential TC (pTC) that did **not** develop (non-developers)
- **ERA5 reanalysis forecasts** for storm and large-scale diagnostics
- **Three global high-resolution precipitation** analyses: **CMORPH, GsMAP & IMERG**

### Technical Description

The superBT consists of three .csv data files and three metadata files describing the contents of the data files. Technically the superBT is consistent with IBTrACS ([International Best Track Archive for Climate Stewardship \(IBTrACS\) | National Centers for Environmental Information \(NCEI\) \(noaa.gov\)](#)). The data can be accessed by any application that reads .csv files. An obvious data interface would be [pandas - Python Data Analysis Library \(pydata.org\)](#). The

---

<sup>1</sup> pre/potential TCs designated as **9XB** operationally where **B** is the basin code

superBT also includes python2 code in the [py2](#) directory of the [github repository](#) for analysis and display<sup>2</sup>. My development environment is [Linux/Anaconda/openGrADS](#).

The table below gives a description of the data files (the links open the file):

file name	description	# of lines-header
<a href="#">all-md3-2007-2022-MRG.csv</a>	positions for NN/9Xdev/9Xnondev	107050 # posits
<a href="#">sum-md3-2007-2022-MRG.csv</a>	summary of each storm	5233 # of storms
<a href="#">sbt-v04-2007-2022-MRG.csv</a>	superBT	86595 # posits
<a href="#">h-meta-md3-vars.csv</a>	metadata for all-md3-*.csv	32 variables
<a href="#">h-meta-md3-sum-vars.csv</a>	metadata for sum-md3-*.csv	25 variables
<a href="#">h-meta-sbt-v04-vars.csv</a>	metadata for sbt-v04*.csv	66 variables

NB: the number of positions in the all-md3\* file does not equal the number of positions in the superBT file because of duplicates in the full storm positions (9X+NN). There is a superBT position for all unique positions.

## Data Sources

The three main data sources are: 1) JTWC/NHC archives; 2) ERA5 reanalysis 00/12 UTC 10-d forecasts; and 3) three near global satellite rainfall analyses.

The table below gives more details:

Source	Name	Description	Availability	Link
JTWC	adeck	ATCF aids/operational info	partial	<a href="#">ucar.edu adecks open</a>
	bdeck	ATCF best track	open	<a href="#">JTWC best tracks</a>
NHC	adeck	ATCF aids/operational info	open	<a href="#">NHC public adecks</a>
	bdeck	ATCF best track	open	<a href="#">NHC Data Archive</a>
<b>ECMWF</b>	<b>ERA5</b>	<b>00/12 UTC 10-d forecasts</b>	<b>not open</b>	<a href="#">ECMWF Reanalysis v5</a>
NCEP	CMORPH	near-global satellite precipitation	open	<a href="#">CMORPH Precipitation</a>
JAXA	GsMAP	near-global satellite precipitation	open	<a href="#">JAXA Global Rainfall Watch (GSMaP)</a>
NASA	IMERG	near-global satellite precipitation	open	<a href="#">IMERG: Integrated Multi-satellitE Retrievals for GPM</a>

NB: most of the data sets are open except for the ERA5 twice daily 10-d global model forecasts. The superBT 9Xdev and 9Xnon come from an archive of .zip files for all changes to the a/bdecks in real-time since 2007.

## Links:

In: <a href="https://tenkiman.github.io/superBT-v04/">https://tenkiman.github.io/superBT-v04/</a> )	description
<a href="#">sbt-tccodes-subbasin-codes.txt</a>	codes for TC state and subbasin
<a href="#">tc-superBT-20230310.pptx</a>	powerpoint talk for huracan project
<a href="#">ATCF</a>	Automated Tropical Cycle Forecast system used at JTWC/NHC to maintain TC track data
<a href="#">ATCF a/bdecks</a>	format of the JTWC/NHC data files

<sup>2</sup>I'm an old-dog programmer...learning new tricks is getting more difficult. I leave it to the user to convert to python3 and/or setup to run in both python2 & 3. The Anaconda python distro (5.1) I use runs in both python2 and python3 mode. My development platform is Linux/openGrADS

## **Questions and What's next?**

Please contact me at [mfiorino@gmu.edu](mailto:mfiorino@gmu.edu) if you have any questions and/or comments. More processing and documents will be added soon...and a journal article is in the works