superBT-V04

a super Best Track for Tropical Cyclone forecasting and research

[GitHub - tenkiman/superBT-V04: first release of the superBT -- V04](https://github.com/tenkiman/superBT-V04)

Mike Fiorino

George Mason University

[mfiorino@gmu.edu](mailto:mfiorino@gmu.edu)

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**V04 – initial beta version**

* **2007-2022 – 16 y data set**
* **Global** – **NHEM** & **SHEM** basins:
  + **L** – north at**L**antic
  + **E** – **E**astern north Pacific
  + **C** – **C**entral north Pacific
  + **W** – **W**estern north Pacific
  + **I** – northern **I**ndian ocean both **A** & **B**
  + **B** – **B**ay of Bengal
  + **A** – **A**rabian sea
  + **H** – southern **H**emisphere both **S** & **P**
  + **S** – **S**outhern indian ocean
  + **P** – south-west **P**acific
* **JTWC/NHC** – best tracks (bdeck) & aid files (adeck)
* **NN** – operationally designated TCs
* **9Xdev** –pre/potential TC (pTC) that developed into **NN** or TC
* **9Xnon** – pre/potential TC (pTC) that did ***not*** develop
* **ERA5 reanalysis forecast**s for storm and large-scale diagnostics
* **Three** **global** high-resolution **precipitation** analyses: **CMORPH, GsMAP & IMERG**

**What is a superBT?**

The superBT is a cyclone-centric superposition of reanalysis (NWP-dynamics) and precipitation (thermodynamics) datasets onto TC data from the two US operational forecasting centers – Joint Typhoon Warning Center (JTWC) and the National Hurricane Center (NHC). 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**[[1]](#footnote-1). 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**).

**Technical Description**

The superBT consists of three .csv data & metadata files and is technically consistent with IBTrACS ([International Best Track Archive for Climate Stewardship (IBTrACS) | National Centers for Environmental Information (NCEI) (noaa.gov)](https://www.ncei.noaa.gov/products/international-best-track-archive). 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)](https://pandas.pydata.org/)

The table below gives a description of the data files:

|  |  |  |
| --- | --- | --- |
| file name | description | # of lines-header |
| **all-md3-2007-2022-MRG.csv** | **positions for NN/9Xdev/9Xnondev** | **107050 #posits** |
| **sum-md3-2007-2022-MRG.csv** | **summary of each storm** | **5233 # of storms** |
| **sbt-v04-2007-2022-MRG.csv** | **superBT** | **86595 # posits** |
| **h-meta-md3-vars.csv** | **metadata for all-md3-\*.csv** | **32 variables** |
| **h-meta-md3-sum-vars.csv** | **metadata for sum-md3-\*.csv** | **25 variables** |
| **h-meta-sbt-v04-vars.csv** | **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 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](https://www.nrlmry.navy.mil/atcf_web/docs/database/new/abdeck.txt) | [ATCF](https://www.nrlmry.navy.mil/atcf_web/index1.html) aids/operational info | partial | [ucar.edu adecks\_open](https://hurricanes.ral.ucar.edu/repository/data/adecks_open/) |
| [bdeck](https://www.nrlmry.navy.mil/atcf_web/docs/database/new/abdeck.txt) | [ATCF](https://www.nrlmry.navy.mil/atcf_web/index1.html) best track | open | [JTWC best tracks](https://www.metoc.navy.mil/jtwc/jtwc.html?best-tracks) |
| NHC | [adeck](https://www.nrlmry.navy.mil/atcf_web/docs/database/new/abdeck.txt) | [ATCF](https://www.nrlmry.navy.mil/atcf_web/index1.html) aids/operational info | open | [NHC public adecks](https://ftp.nhc.noaa.gov/atcf/aid_public/) |
| [bdeck](https://www.nrlmry.navy.mil/atcf_web/docs/database/new/abdeck.txt) | [ATCF](https://www.nrlmry.navy.mil/atcf_web/index1.html) best track | open | [NHC Data Archive](https://www.nhc.noaa.gov/data/#hurdat) |
| ***ECMWF*** | ***ERA5*** | ***00/12 UTC 10-d forecasts*** | ***not open*** | [ECMWF Reanalysis v5](https://www.ecmwf.int/en/forecasts/dataset/ecmwf-reanalysis-v5) |
| NCEP | CMORPH | near-global satellite precipitation | open | [CMORPH Precipitation](https://www.cpc.ncep.noaa.gov/products/janowiak/cmorph.shtml) |
| JAXA | GsMAP | near-global satellite precipitation | open | [JAXA Global Rainfall Watch (GSMaP)](https://sharaku.eorc.jaxa.jp/GSMaP/index.htm) |
| NASA | IMERG | near-global satellite precipitation | open | [IMERG: Integrated Multi-satellitE Retrievals for GPM](https://gpm.nasa.gov/data/imerg) |

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.

**Questions and What’s next?**

Please contact me at [mfiorino@gmu.edu](mailto:mfiorino@gmu.edu) if you have any questions and comments. More processing and documents will be added in the near future…

1. pre/potential TCs designated as **9XB** operationally where **B** is the basin code [↑](#footnote-ref-1)