superBT-V04

a super Best Track for Tropical Cyclone forecasting and research

GitHub - tenkiman/superBT-V04: first release of the superBT -- V04

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27 September 2023

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]. 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**).

[1] pre/potential TCs designated as **9XB** operationally where **B** is the basin code

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). 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 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	ATCF aids/operational info	partial	ucar.edu adecks_open
	bdeck	ATCF best track	open	JTWC best tracks
NHC	adeck	ATCF aids/operational info	open	NHC public adecks
	bdeck	ATCF best track	open	NHC Data Archive
ECMWF	***ERA5***	***00/12 UTC 10-d forecasts***	***not open***	ECMWF Reanalysis v5
NCEP	CMORPH	near-global satellite precipitation	open	CMORPH Precipitation
JAXA	GsMAP	near-global satellite precipitation	open	JAXA Global Rainfall Watch (GSMaP)
NASA	IMERG	near-global satellite precipitation	open	IMERG: Integrated Multi-satellitE Retrievals for GPM

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 if you have any questions and comments. More processing and documents will be added in the near future…