



# Hurricane and Tropical Storm data at NCEI

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# Hurricane and Tropical Storms @ NCEI



- Best Track data (Position & Intensity) - IBTrACS
- Satellite data (IR Imagery) - HURSAT
- Seasonal and global summaries - NCEI Climate monitoring





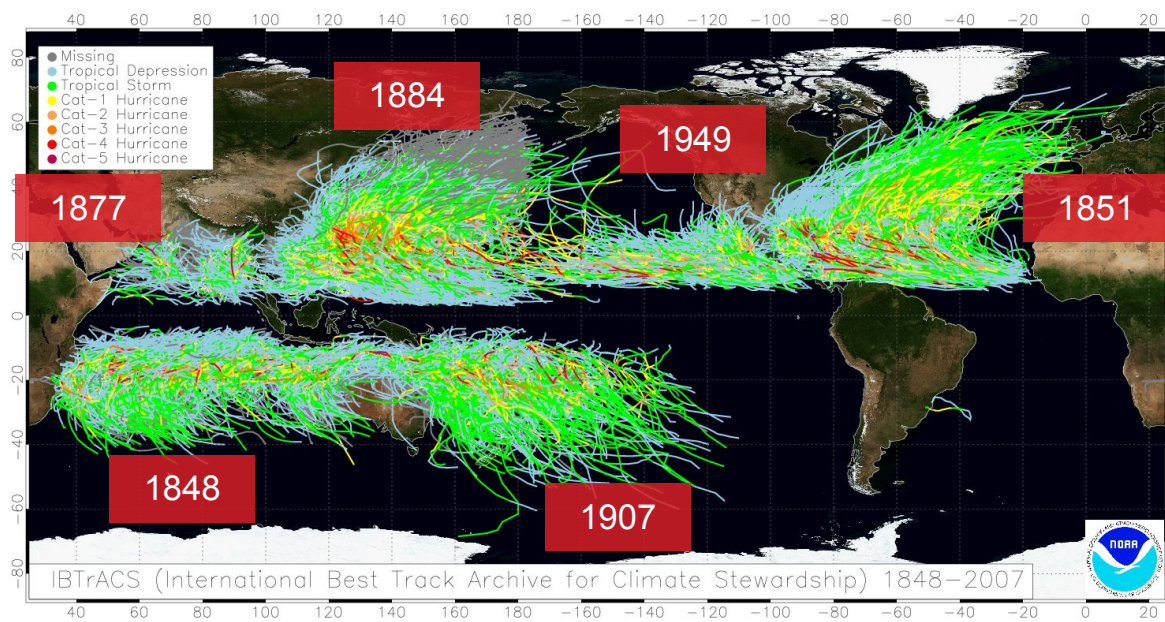
# IBTrACS:

## International Best Track Archive for Climate Stewardship

Collect data from dozens of sources

- 8 WMO regional forecast centers (NHC, Japan, India, Australia, ...)
- 4 other forecast centers (China, JTWC, HKO, Korea)
- 4 Historic datasets - Atlases, reanalyses, ...
- 3 real time datasets - NHC, JTWC, ...

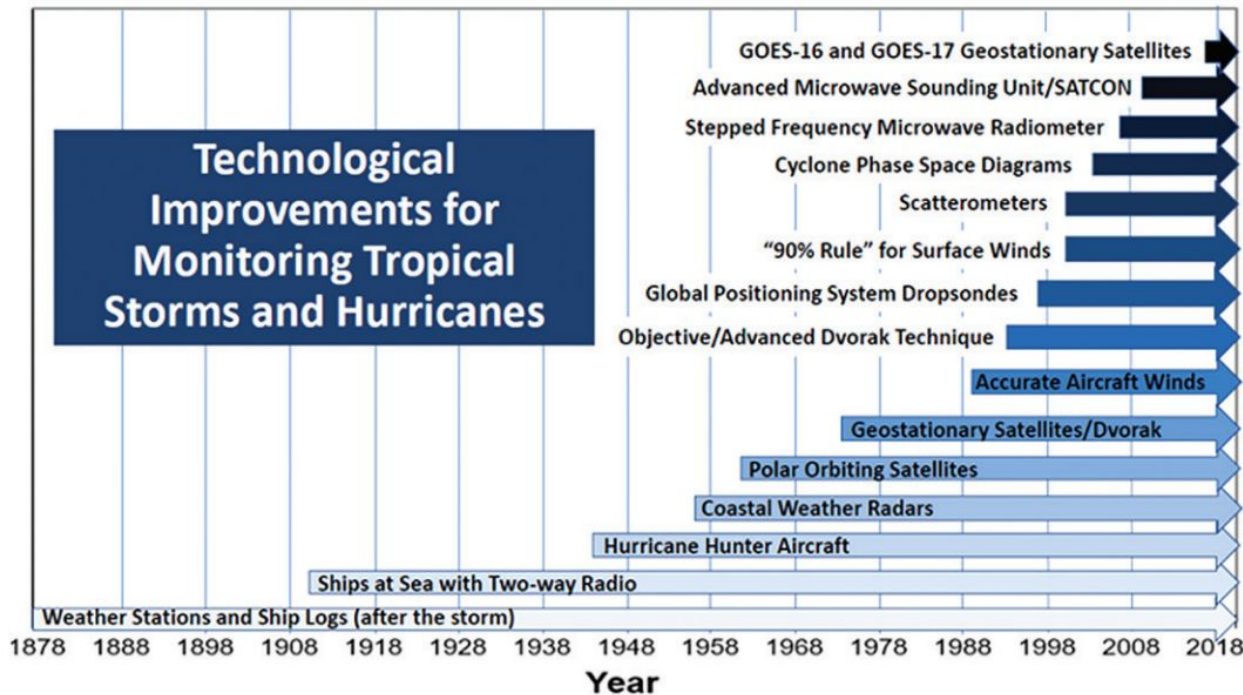
37,500+ tracks from all sources → 13,700+ individual TCs  
 Packaged for easy access





# IBTrACS: Observation methods and uncertainty

## North Atlantic TC Observation Record



Source: C. Landsea, NHC

**Table 1** - Qualitative uncertainty level for intensity in wind speed (knots). Blank boxes imply the level of uncertainty is too difficult to quantify (and possibly larger than 30 knots).

Period	SI	NI	SP	WP	EP	NA
pre1950						±30
1950-1965				±30		±30
1965-1973	±30	±30	±30	±20		±20
1973-1978	±20	±20	±20	±20	±20	±20
1978-1984	±15	±20	±20	±20	±20	±15
1984-1987	±15	±20	±15	±10	±20	±10
1987-1995	±15	±15	±15	±15	±15	±10
1995-2000	±10	±15	±15	±10	±15	±10
2000- now	±10	±10	±10	±10	±10	± 7

Source: NCEI, IBTrACS Documentation



# IBTrACS Parameters



Reports what the agency reports...

- Location (lat, lon)
- Intensity - Maximum sustained winds, Minimum central pressure
- Storm Type
- Wind extent & storm size - *Radius of Gales, ROCI, ...*
- Gusts
- Eye diameter
- Satellite-derived intensity parameters
- Landfall
- ...
  
- Storm movement - Direction & Speed





# IBTrACS: best track vs. provisional data



## Best Track data

- updated annually
- represent reanalysis of the storm - long after it occurred
- produced by forecast agencies
- improved accuracy of storm attributes



## Provisional data

- updated weekly
- working best track
- replaced by best track (reanalysis)





# IBTrACS data access

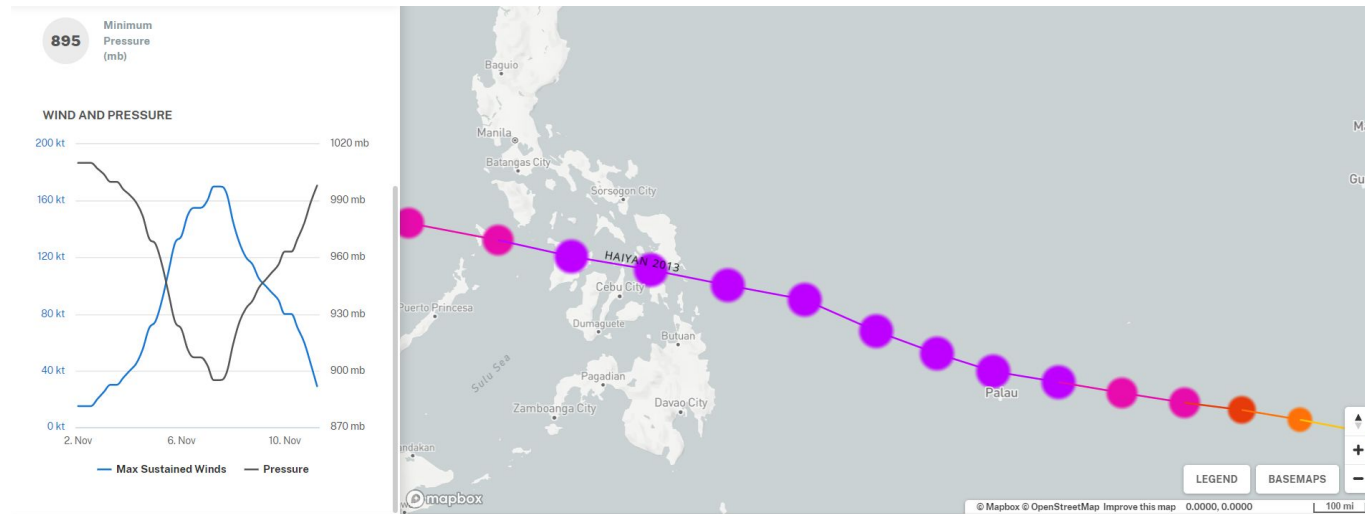
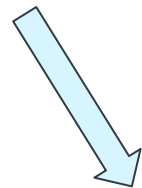
Weekly updates  
 Community forum and emails  
 Formats

- CSV, netCDF, Shapefiles

Online: <https://ncics.org/ibtracs/>

Historical Hurricane Mapper: <https://coast.noaa.gov/hurricanes>

WP	21:00:00	TS	8.43	133.55			100	901	110	900	121	910	142	891
WP	2013-11-07 00:00:00	TS	8.70	132.77	115	905	155	907	115	905	126	910	145	895
WP	03:00:00	TS	8.98	131.96			157	905	115	905	129	907	145	895
WP	06:00:00	TS	9.32	131.08	115	905	160	903	115	905	132	905	145	895
WP	09:00:00	TS	9.78	130.11			165	899	120	900	138	900	145	895
WP	12:00:00	TS	10.20	129.08	125	895	170	895	125	895	145	895	145	895
WP	15:00:00	TS	10.43	128.01			170	895	125	895	148	892	150	892
WP	18:00:00	TS	10.60	126.93	125	895	170	895	125	895	151	890	155	890
WP	21:00:00	TS	10.81	125.86			167	897	117	902	145	895	147	895
WP	2013-11-08 00:00:00	TS	11.02	124.78	110	910	165	899	110	910	139	900	140	900
WP	03:00:00	TS	11.21	123.65			155	906	100	925	122	915	132	905
WP	06:00:00	TS	11.40	122.55	90	940	145	914	90	940	106	930	125	910
WP	09:00:00	TS	11.62	121.55			137	920	90	940	103	935	122	912
WP	12:00:00	TS	11.85	120.50	90	940	130	926	90	940	101	940	120	915
WP	15:00:00	TS	12.11	119.21			125	929	90	940	94	945	115	920
WP	18:00:00	TS	12.33	118.00	90	940	120	933	90	940	87	950	110	925
WP	21:00:00	TS	12.35	117.18			117	935	90	940	87	950	105	930
WP	2013-11-09 00:00:00	TS	12.45	116.48	90	940	115	937	90	940	87	950	100	935
WP	03:00:00	TS	12.88	115.61			110	940	90	940	87	950	100	935
WP	06:00:00	TS	13.45	114.73	90	940	105	944	90	940	87	950	100	935
WP	09:00:00	TS	13.65	113.87			100	946	87	940	87	950	97	937





# Voice of users for the community



**IBTrACS**



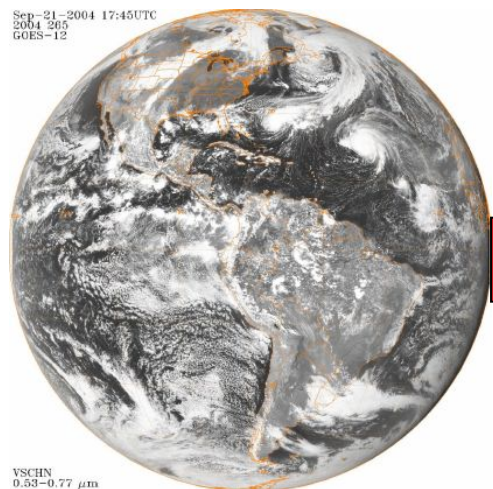




# HURSAT: Hurricane Satellite Data



## Raw Satellite Data



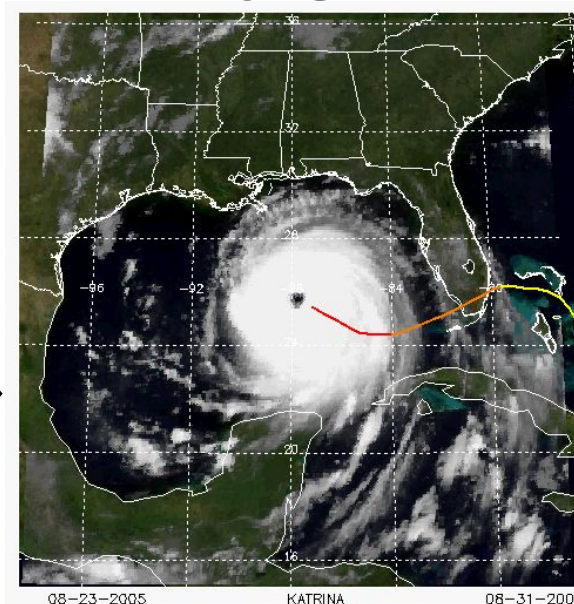
### Geostationary Imagers

- Infrared window
- Visible
- Infrared water vapor

### Polar orbit instruments

- AVHRR
- SSM/I

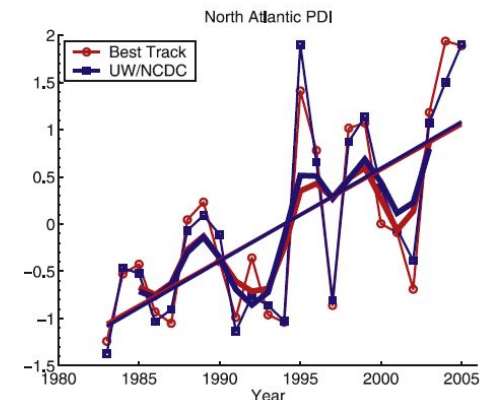
## HURSAT



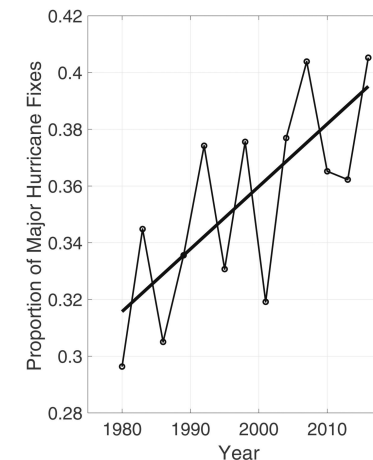
### HURSAT

- Brightness Temperatures
- netCDF
- TC-centric
- 1100 km from storm center
- 1980- present
- Global

## N. Atlantic Analysis



Intensity estimates (e.g., Kossin et al. 2007)



Major Hurricanes (e.g., Kossin et al. 2020)





# Climate Monitoring Reports

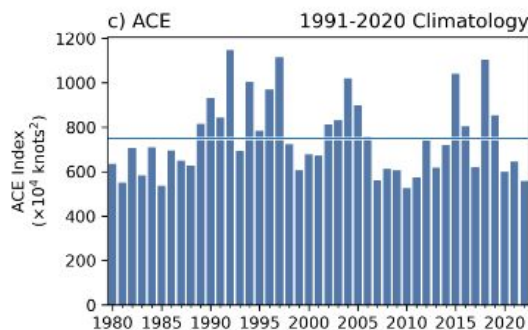
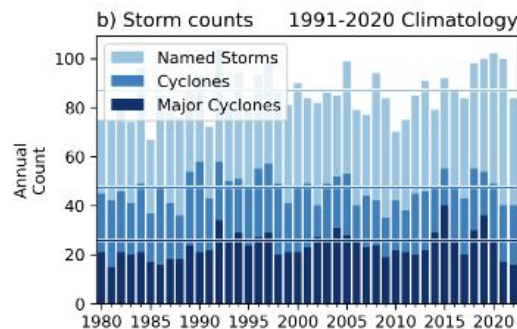
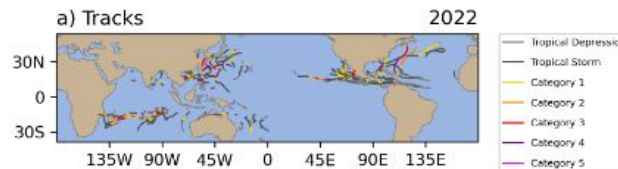


Analysis

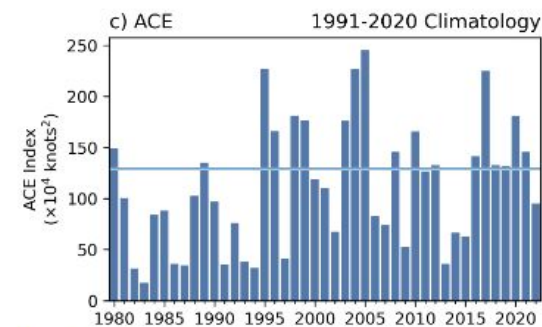
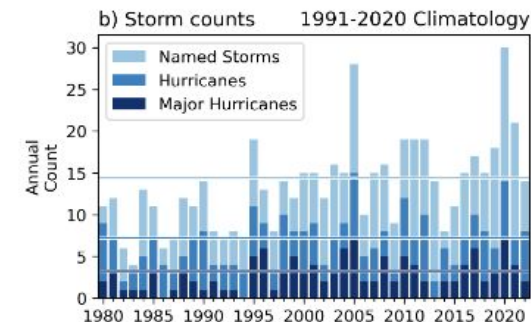
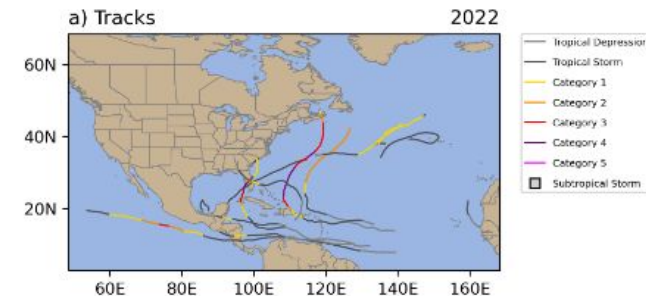
Context

Rankings

Monthly & Annual Reports



[Map of 2022 global tropical cyclone tracks and annual statistics for global tropical cyclone activity. Horizontal lines represent the 1991-2020 climatology.](#)



[Map of 2022 North Atlantic tropical cyclone tracks and annual statistics for the North Atlantic. Horizontal lines represent the 1991-2020 climatology.](#)





# In closing...



- IBTrACS provides storm characteristics
  - NCEI acts as collector and distributor of data
- HURSAT provides storm imagery for analysis
  - NCEI acts as data producer
- Climate monitoring
  - NCEI provides analysis and context

