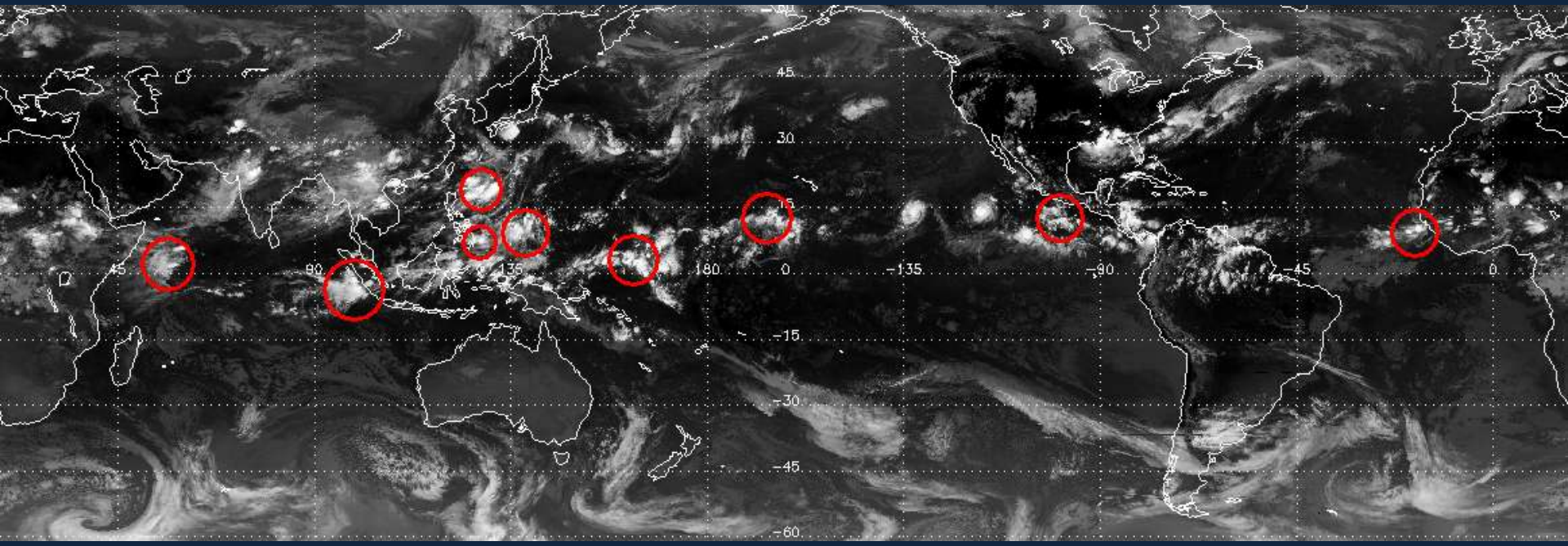
Climatology of Tropical Cloud Clusters



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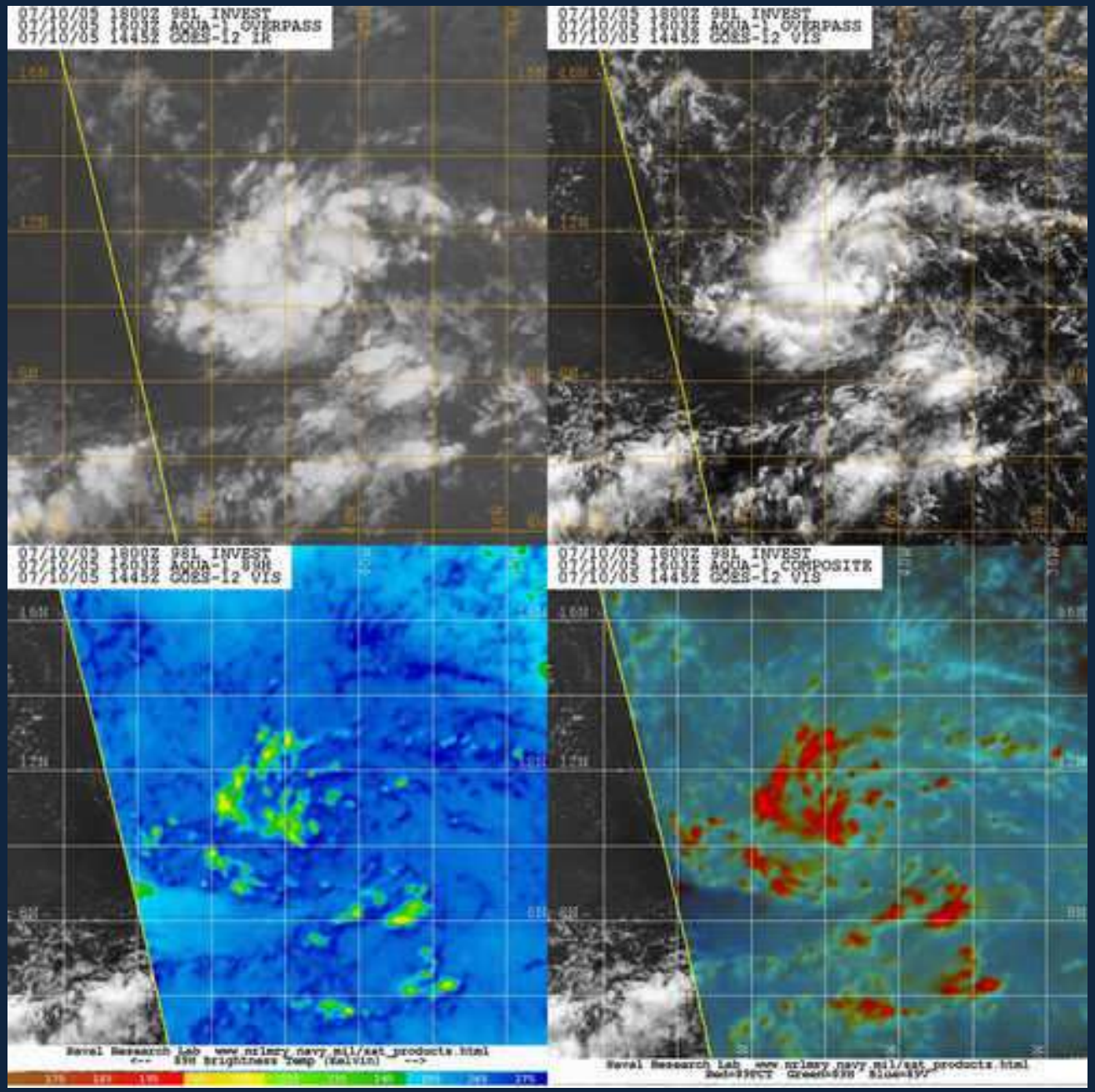
24th Conference on Climate Variability and Change, New Orleans, LA

IR

VIS

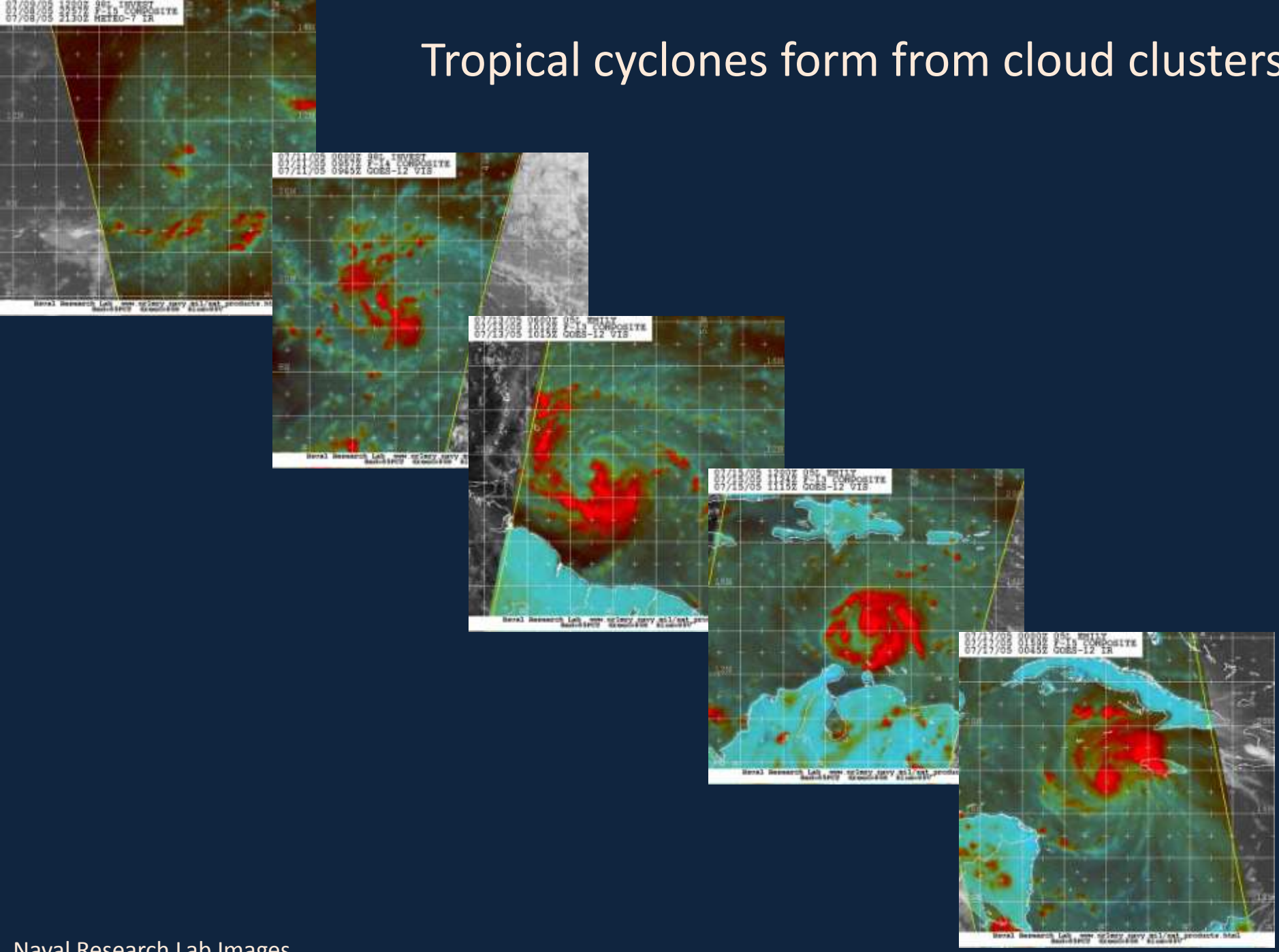
MW

MW



Naval Research Lab Image

Tropical cyclones form from cloud clusters



Naval Research Lab Images

Research Questions

- Establish climatological means for cloud cluster frequency and intensity
- Examine how cloud clusters have been changing over the last 30 years
- Identify key differences between cloud clusters that develop into tropical cyclones vs. those that do not

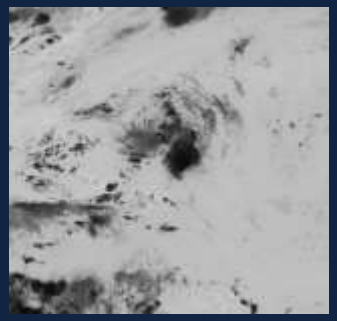
Identify Candidates

Get IR Satellite Data

Apply Brightness Temperature Thresholds

Remove areas of convection smaller than the minimum cluster size

TCC candidates



Filter

Remove TCC candidates located over land

Check for independence

Match TCC candidate to existing track or create a new track

Check for persistence

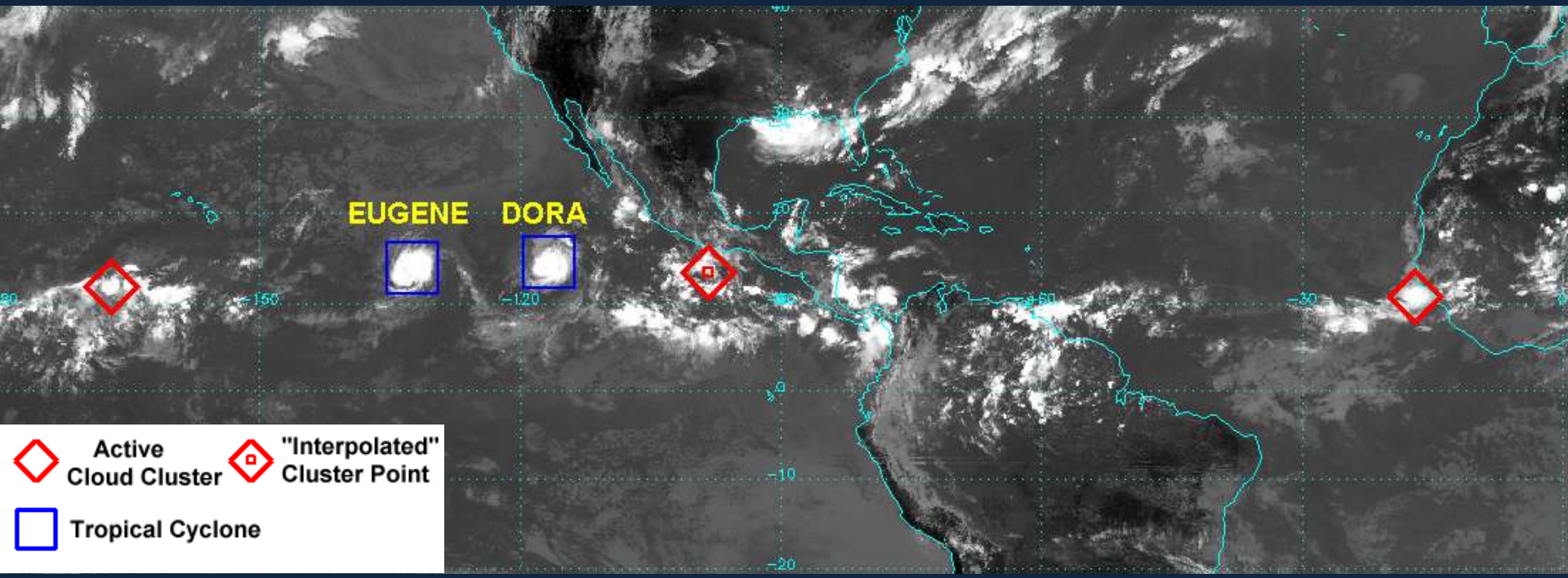
Final Processing

Interpolate missing points

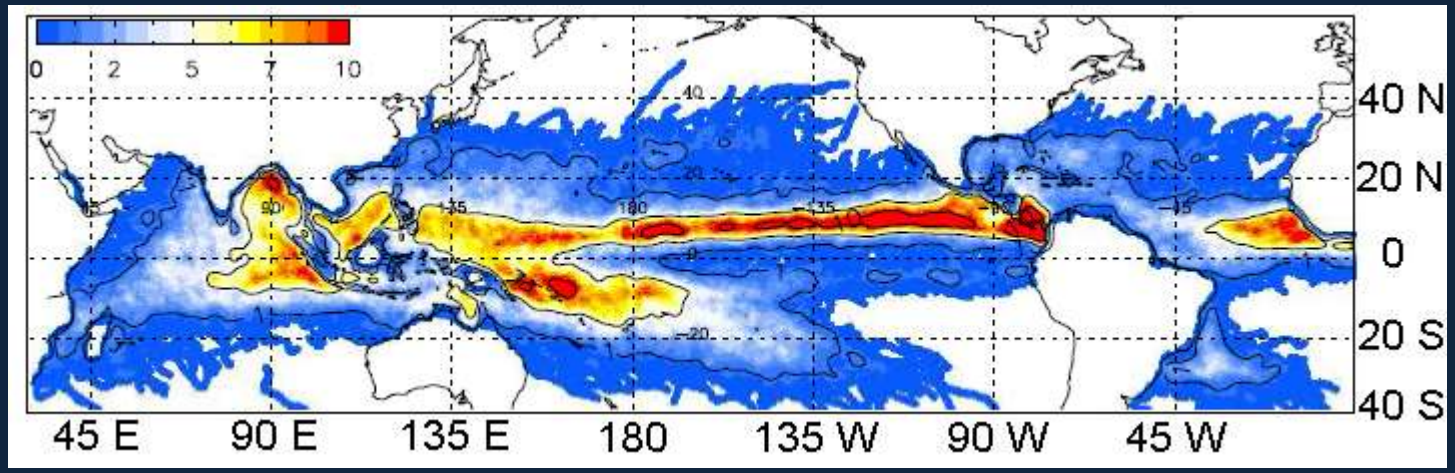
Get IBTrACS data and check for developing clusters

Create final output

Hennon et al., 2010



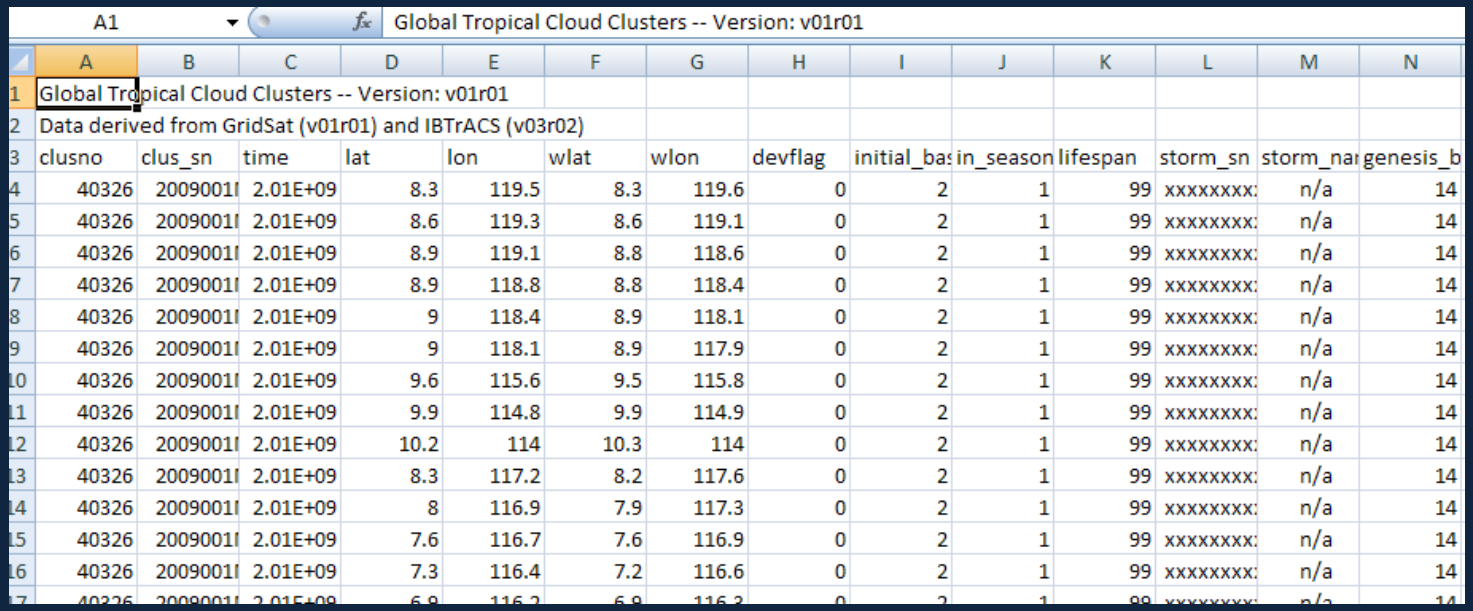
TCC Density (1998-2007)



#TCCs / year within 55 km of a grid point

Cloud Cluster Dataset Is Comprehensive

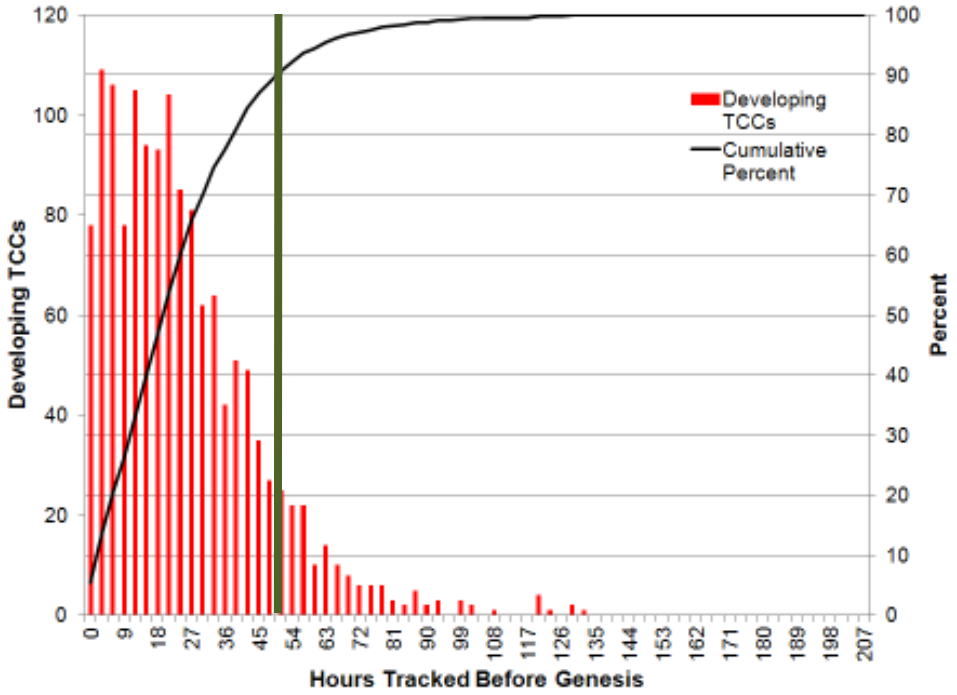
- 28 years of global data (1982-2009), 45,000+ tracks
- Many variables, including cloud top temperature, motion vector, QC flags
- netCDF or CSV format



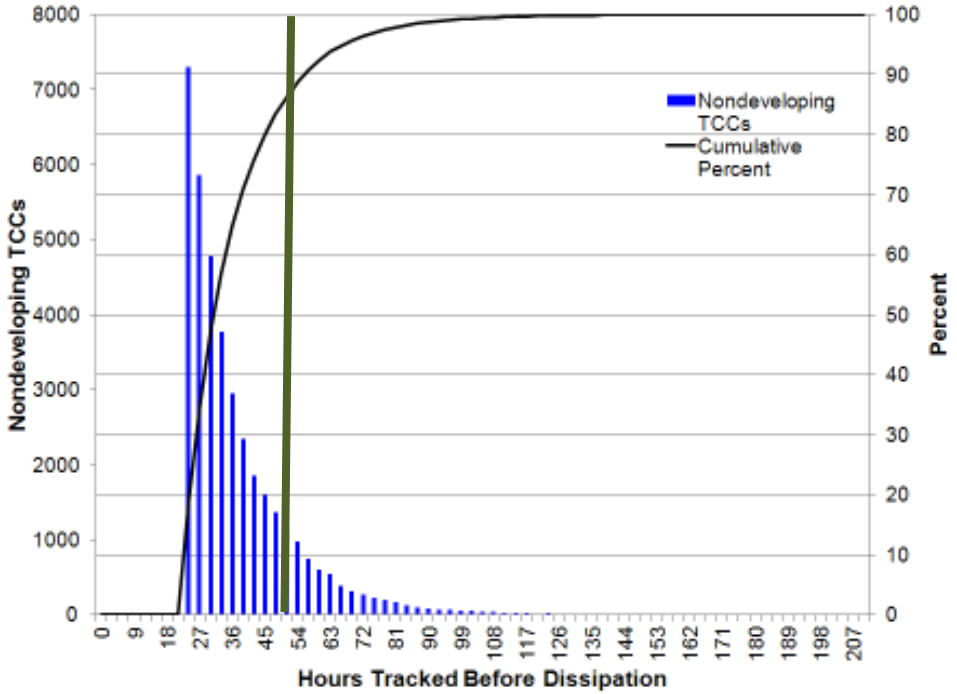
A1 | Global Tropical Cloud Clusters -- Version: v01r01

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Global Tropical Cloud Clusters -- Version: v01r01													
2	Data derived from GridSat (v01r01) and IBTrACS (v03r02)													
3	clusno	clus_sn	time	lat	lon	wlat	wlon	devflag	initial_bas	in_season	lifespan	storm_sn	storm_nar	genesis_b
4	40326	2009001I	2.01E+09	8.3	119.5	8.3	119.6	0	2	1	99	xxxxxxxx:	n/a	14
5	40326	2009001I	2.01E+09	8.6	119.3	8.6	119.1	0	2	1	99	xxxxxxxx:	n/a	14
6	40326	2009001I	2.01E+09	8.9	119.1	8.8	118.6	0	2	1	99	xxxxxxxx:	n/a	14
7	40326	2009001I	2.01E+09	8.9	118.8	8.8	118.4	0	2	1	99	xxxxxxxx:	n/a	14
8	40326	2009001I	2.01E+09	9	118.4	8.9	118.1	0	2	1	99	xxxxxxxx:	n/a	14
9	40326	2009001I	2.01E+09	9	118.1	8.9	117.9	0	2	1	99	xxxxxxxx:	n/a	14
10	40326	2009001I	2.01E+09	9.6	115.6	9.5	115.8	0	2	1	99	xxxxxxxx:	n/a	14
11	40326	2009001I	2.01E+09	9.9	114.8	9.9	114.9	0	2	1	99	xxxxxxxx:	n/a	14
12	40326	2009001I	2.01E+09	10.2	114	10.3	114	0	2	1	99	xxxxxxxx:	n/a	14
13	40326	2009001I	2.01E+09	8.3	117.2	8.2	117.6	0	2	1	99	xxxxxxxx:	n/a	14
14	40326	2009001I	2.01E+09	8	116.9	7.9	117.3	0	2	1	99	xxxxxxxx:	n/a	14
15	40326	2009001I	2.01E+09	7.6	116.7	7.6	116.9	0	2	1	99	xxxxxxxx:	n/a	14
16	40326	2009001I	2.01E+09	7.3	116.4	7.2	116.6	0	2	1	99	xxxxxxxx:	n/a	14
17	40326	2009001I	2.01E+09	6.9	116.2	6.9	116.3	0	2	1	99	xxxxxxxx:	n/a	14

Lifecycle Climatology



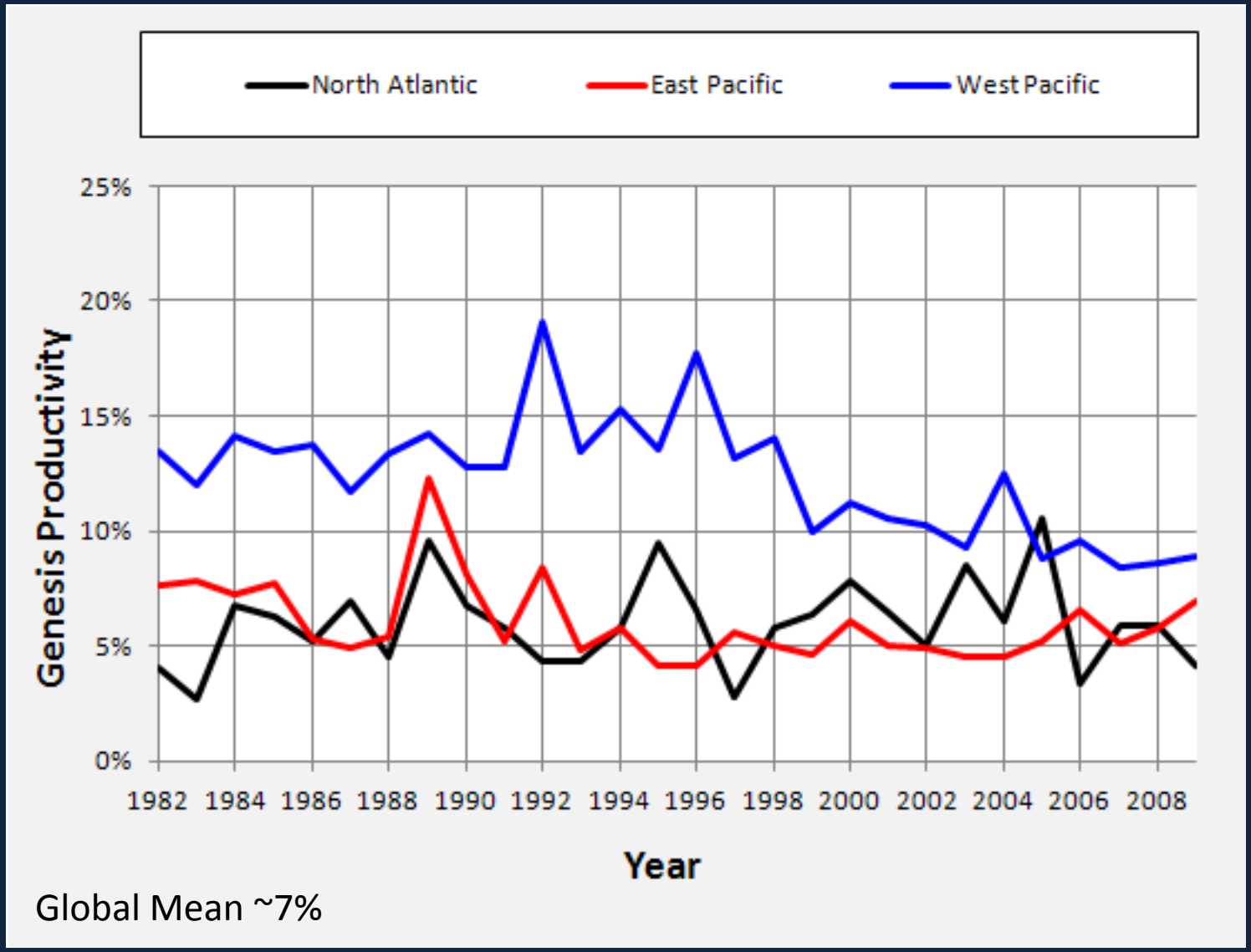
~90% of cloud clusters that develop into TCs do so within 48 hours



~90% of cloud clusters that do not develop into TCs dissipate within 48 hours

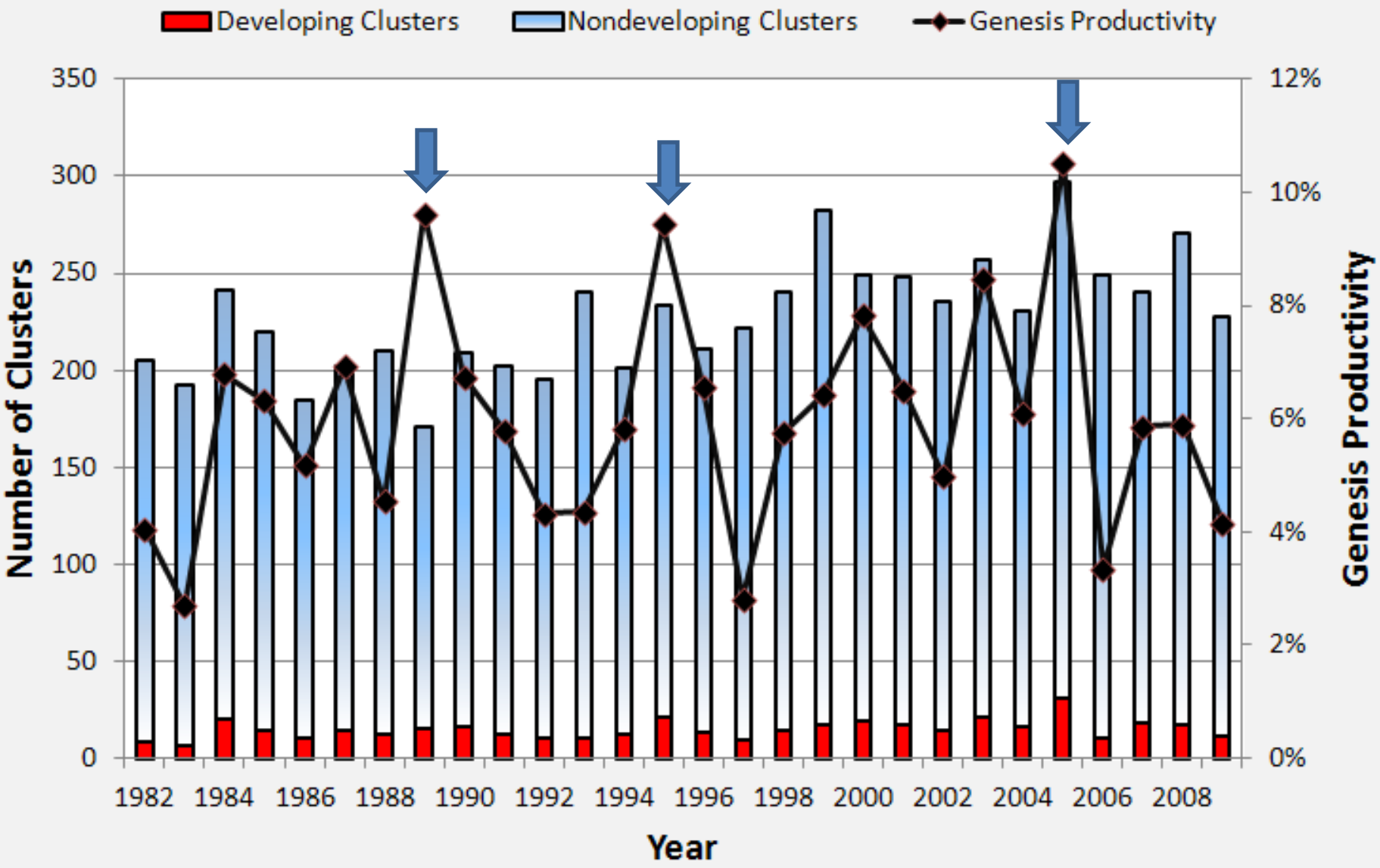
Genesis Productivity

Percentage of cloud clusters that develop into tropical cyclones

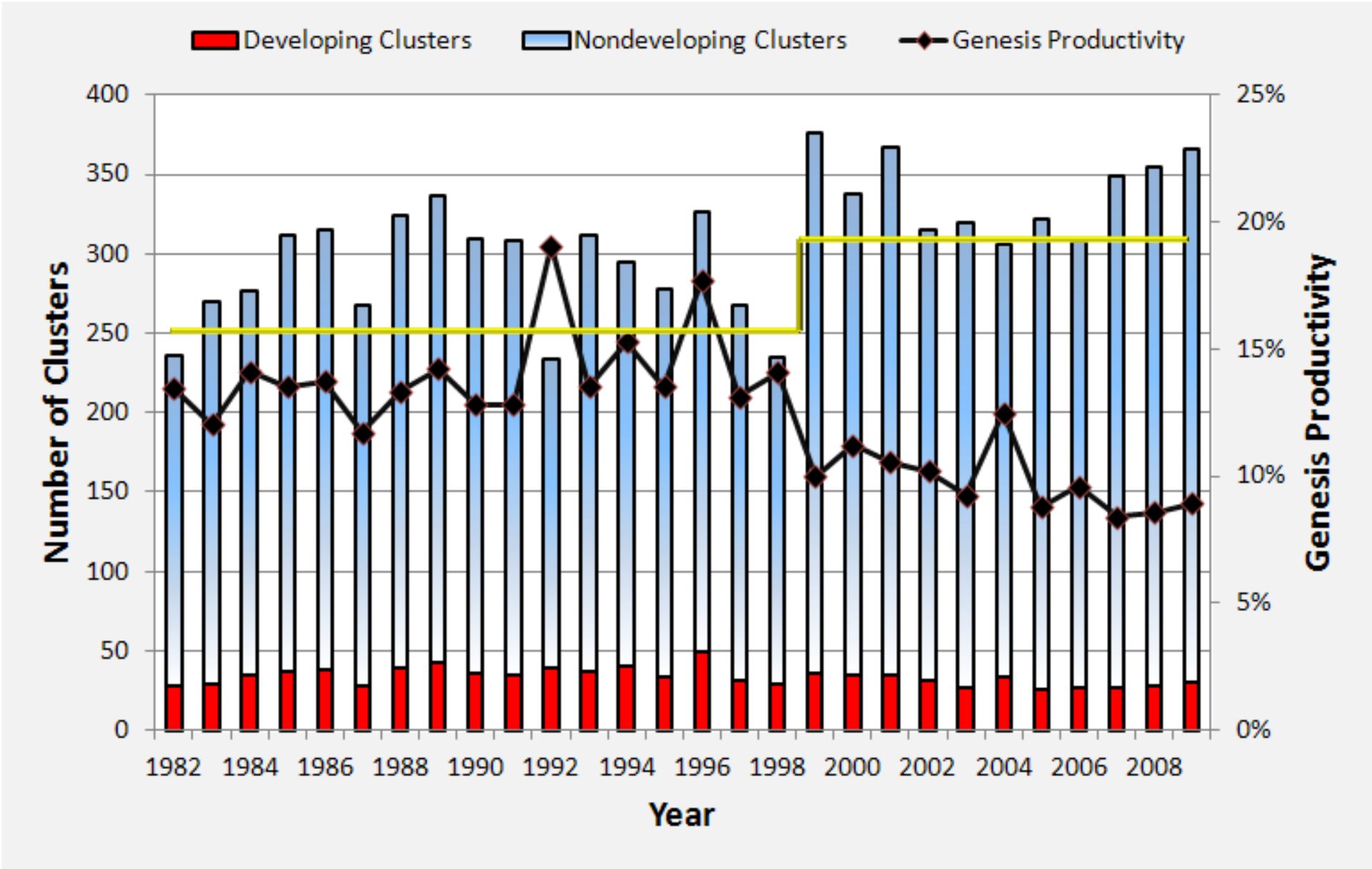


Global Mean ~7%

Atlantic Basin



Western Pacific



Take Home Message

- 28-year, global data set of tropical cloud clusters is available for analysis
  - Climate
  - Tropical cyclogenesis
  - Global and regional variability

Data available at: http://tinyurl.com/cloudcluster