

# **THE GLOBAL ACTIVITY OF CATEGORY 5 TROPICAL CYCLONES (1980-2017)**

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**WC Climate Change  
Sep 13-15, 2018, Rome, Italy**

# THE CONTEXT

- **The category 5 cyclones produce sustained winds at 140 knots and gusts at more than 170 knots.**
- **Some cyclones like Haiyan (2013), Irma (2017) or Maria (2017) have been treated in the media as a direct consequence of global warming.**
- **Model projections found an increase in the number of the very intense cyclones (125 knots and more) late in this century (Knutson et al., 2015).**

# SCIENTIFIC QUESTIONING

**Is there already an increase in the global number of the category 5 cyclones ?**

# PLAN

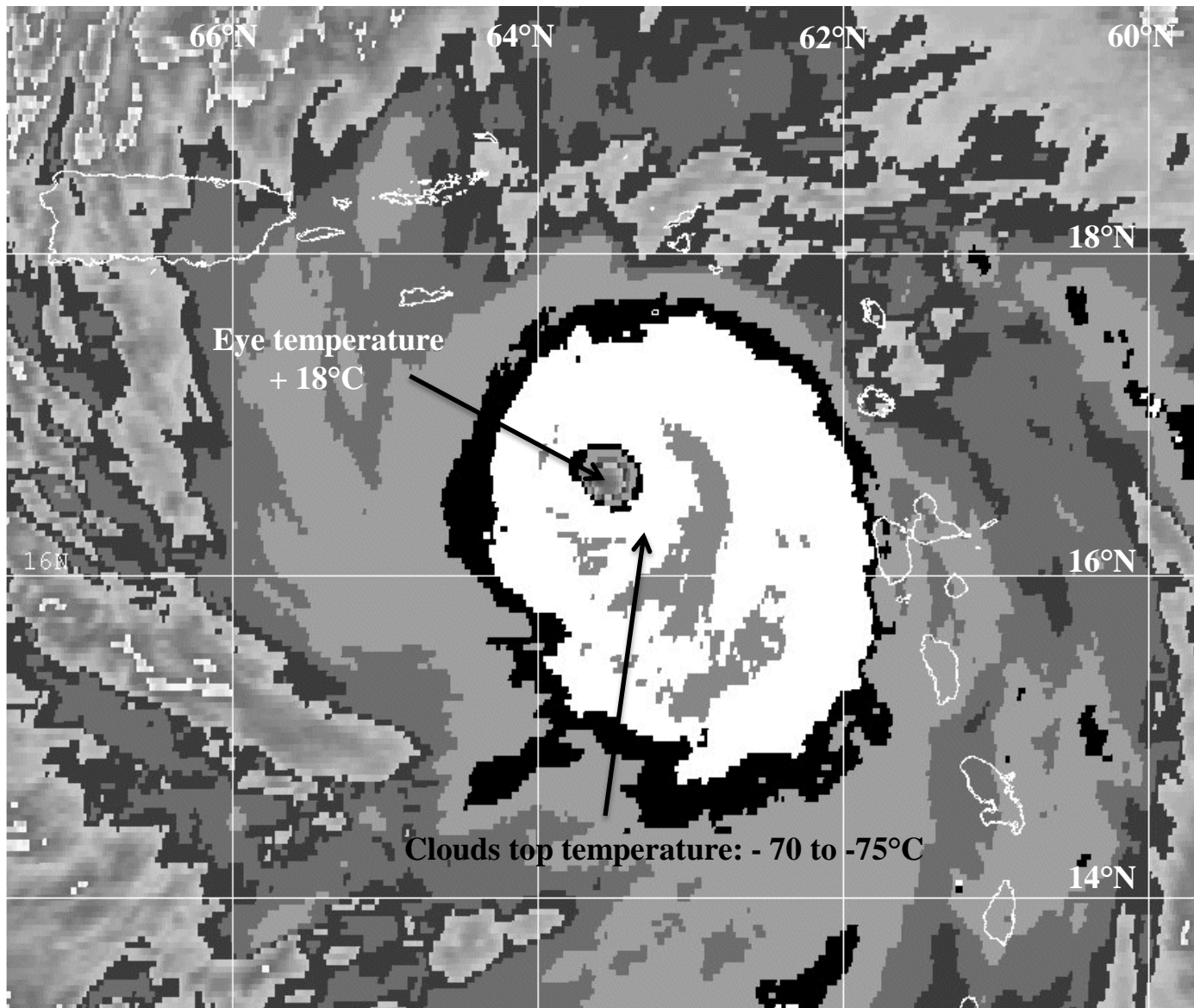
**1 – The variation of number of category 5 cyclones.**

**2 – Possible explanations.**

## **Part 1**

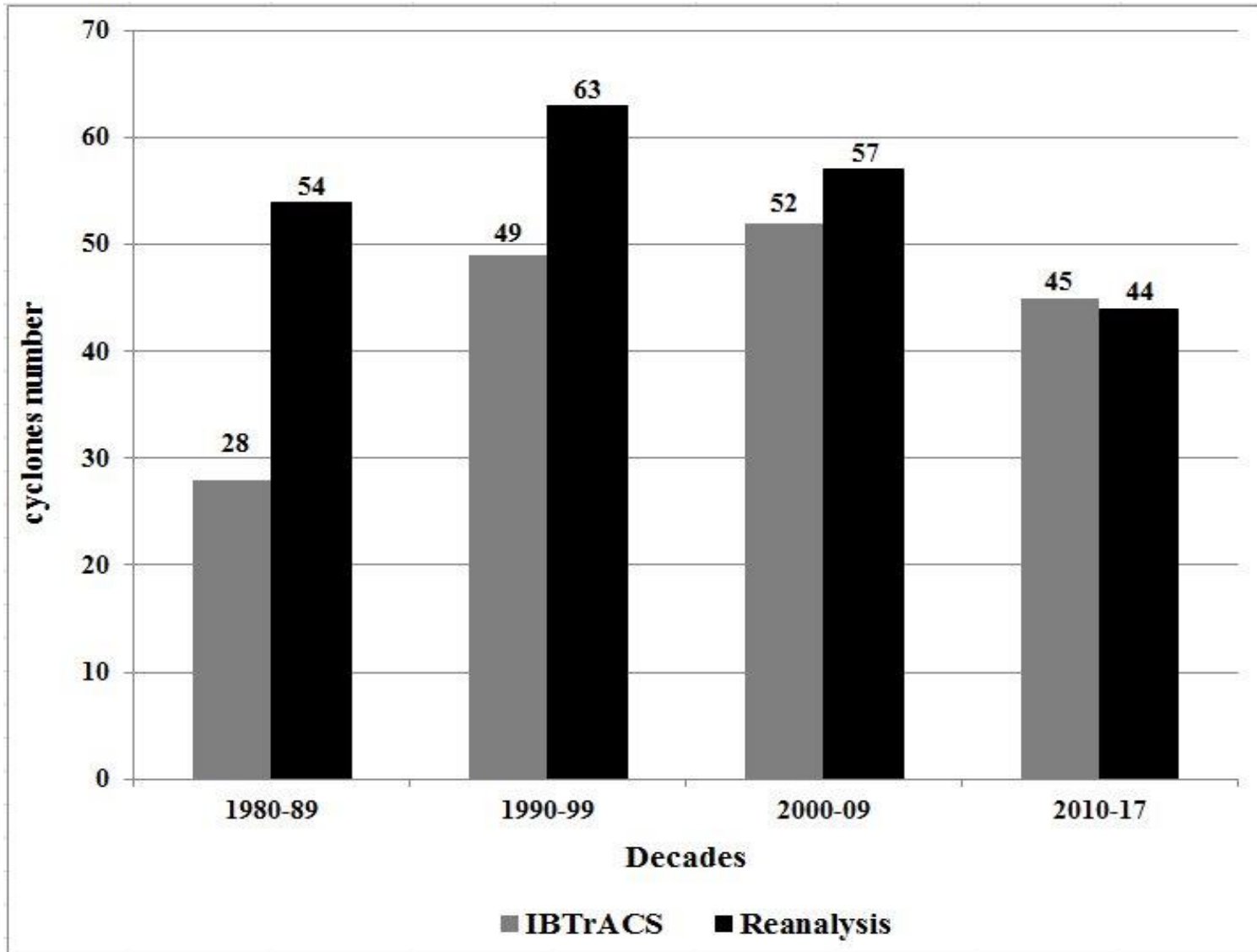
**The variation of number of category 5 cyclones**

# Category 5 Hurricane Maria in the northern Atlantic on 19 september 2017 at 17h45 UTC

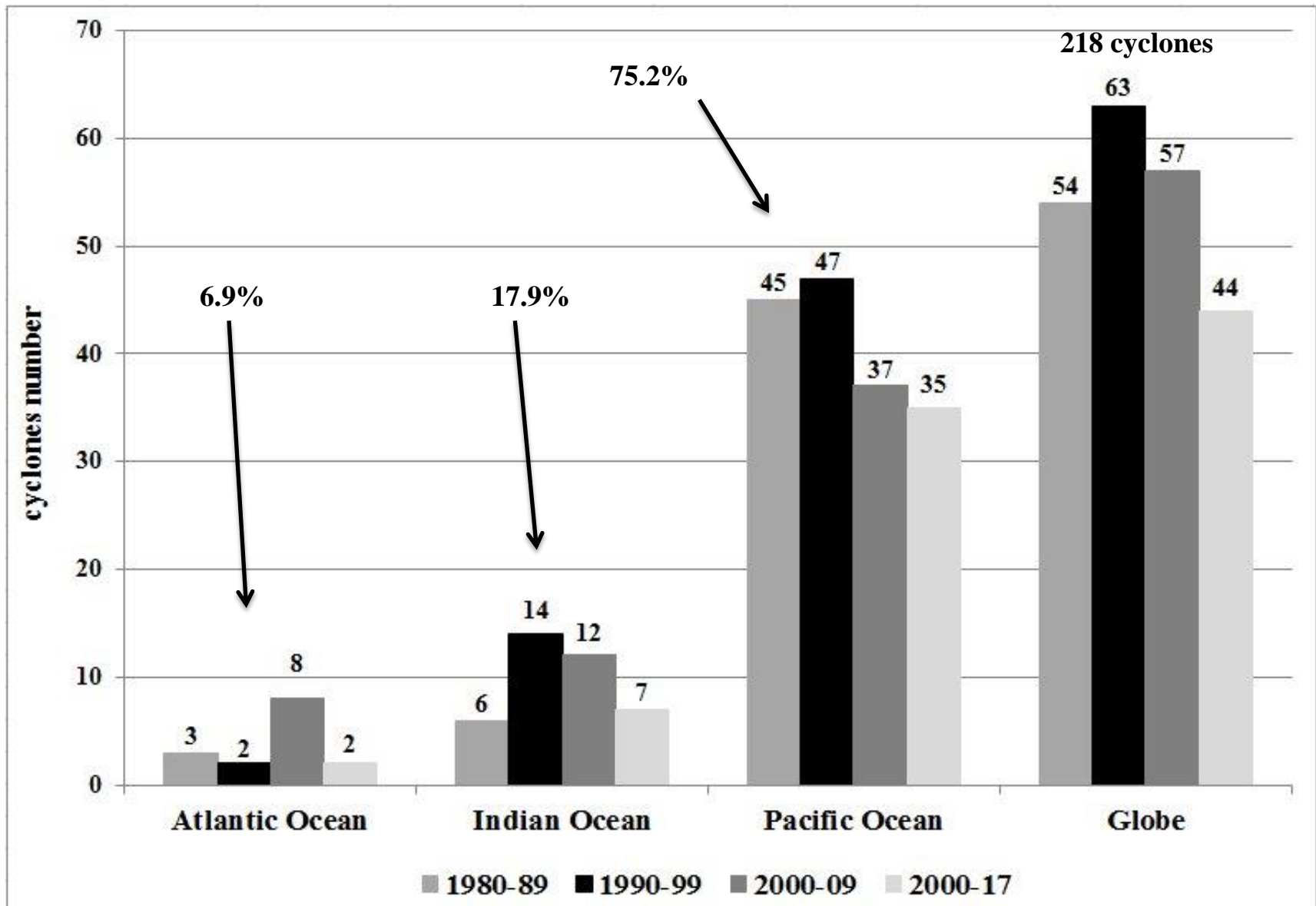


Source: Naval Research Laboratory, Monterey.

**Comparison between the archives data (IBTrACS, International Best Track Archives for Climate Stewardship) and the reanalysis data in the global number of category 5 cyclones**

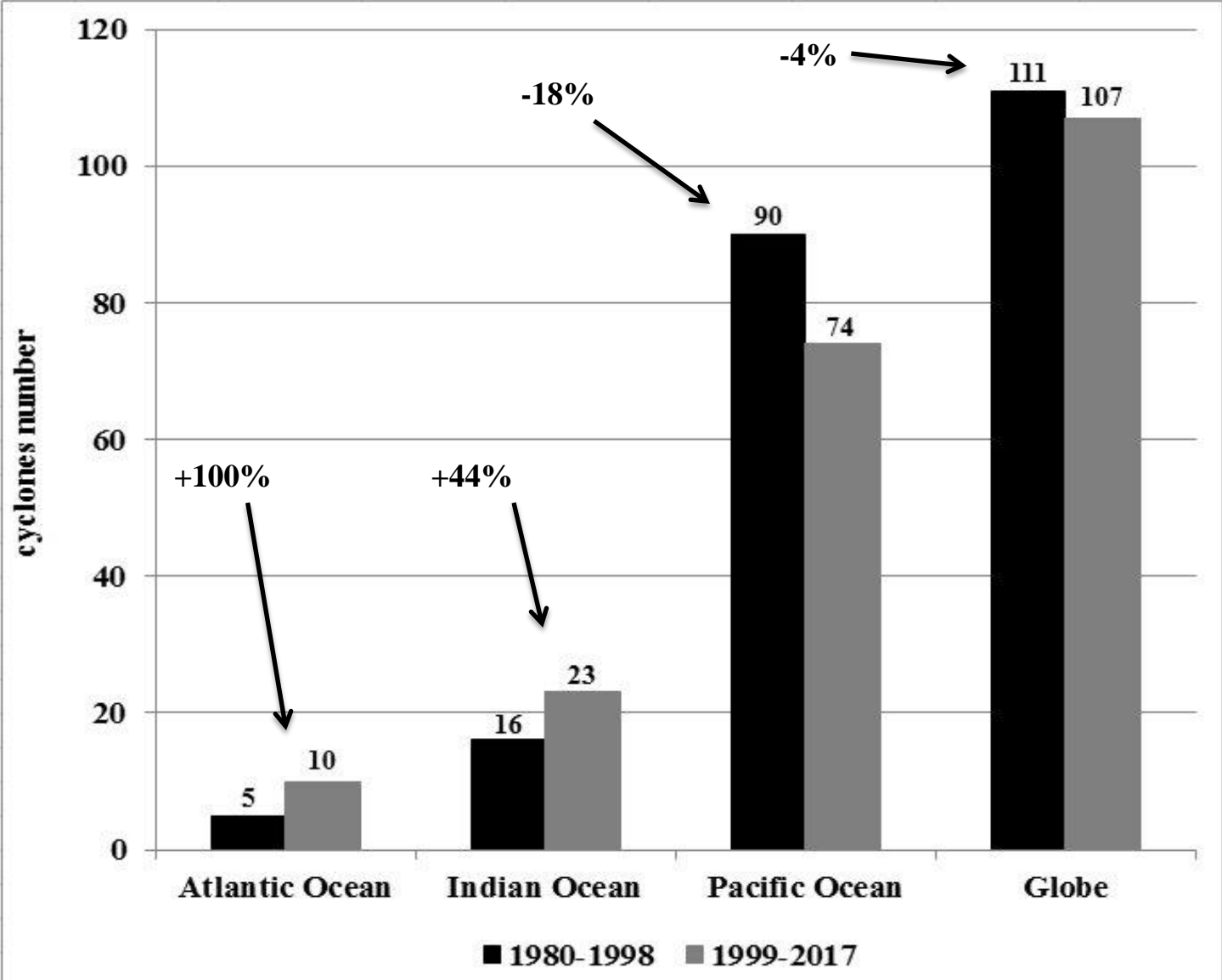


# The decadal number of category 5 cyclones from 1980 to 2017 in the different oceans

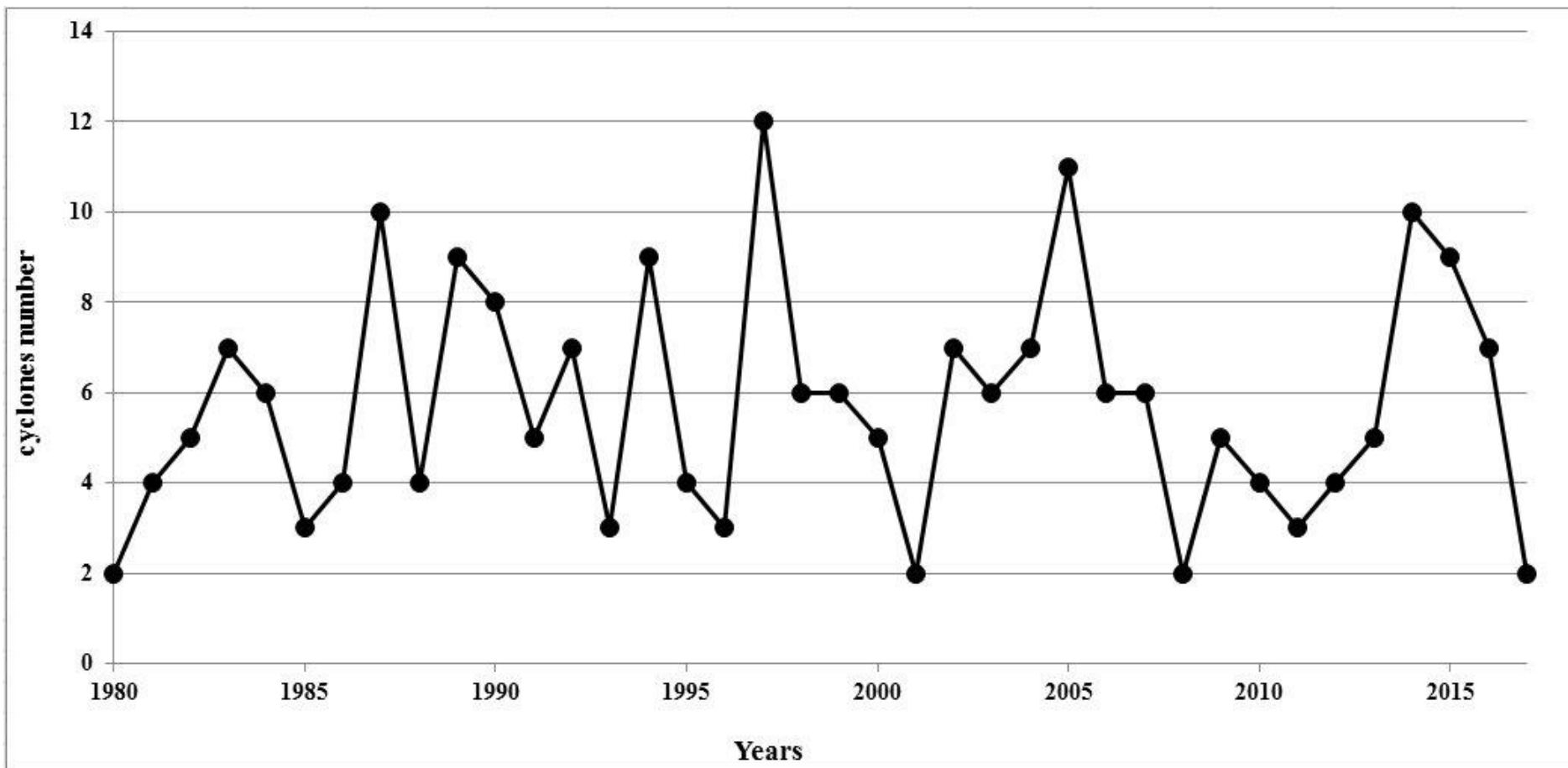




# The change in the number of category 5 cyclones for the 19-years periods 1980-1998 and 1999-2017 in the different oceans



# The annual number of category 5 cyclones from 1980 to 2017



## **Part 2**

### **Possible explanations**

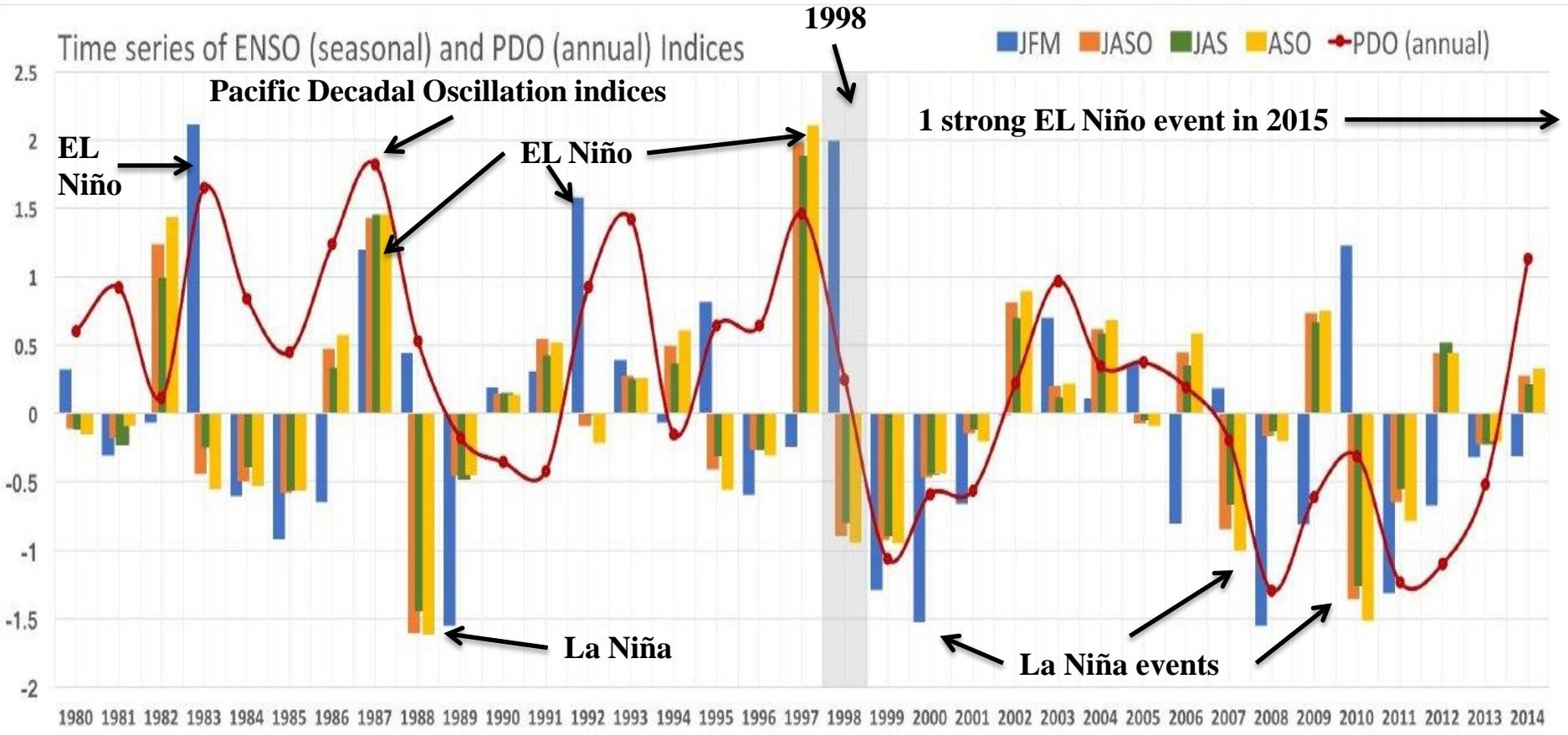
**The averaged number per year of category 5 cyclone during  
the 5 strongest El Niño and La Niña.**

<b>Basin</b>	<b>Averaged number per year</b>		
	<b>Niño</b>	<b>Niña</b>	<b>38 years</b>
<b>Pacific</b>	<b>8.2</b>	<b>1.8</b>	<b>4.3</b>
<b>Indian</b>	<b>0.6</b>	<b>1.8</b>	<b>1.0</b>
<b>Atlantic</b>	<b>0.0</b>	<b>1.0</b>	<b>0.4</b>
<b>Global</b>	<b>8.8</b>	<b>4.6</b>	<b>5.7</b>

**El Niño** : 1982, 1987, 1991, 1997, 2015.

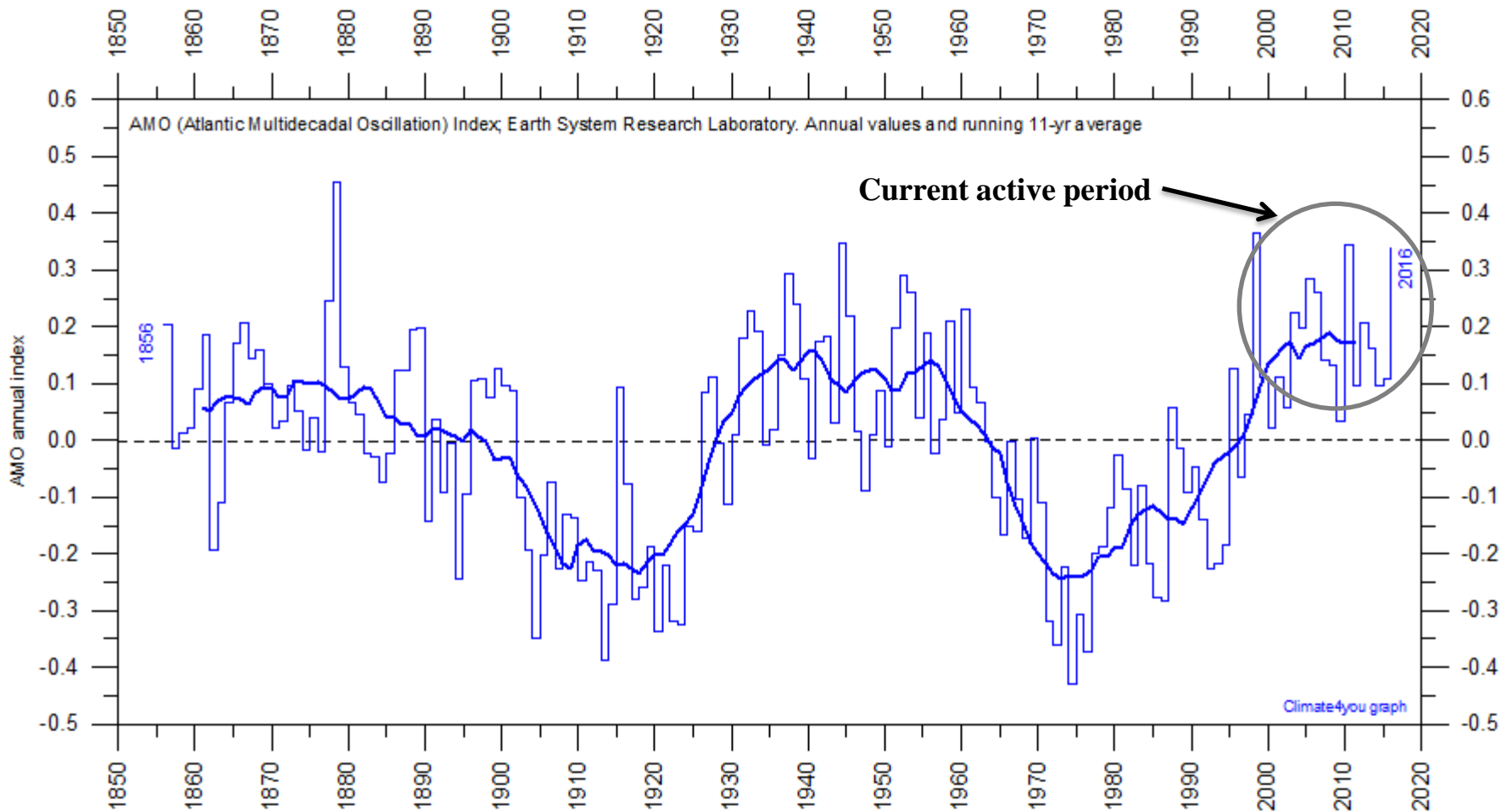
**La Niña** : 1988, 1998, 1999, 2007, 2010.

# The time series of Pacific Decadal Oscillation (PDO), EL Niño, and La Niña indices from 1980 to 2014.



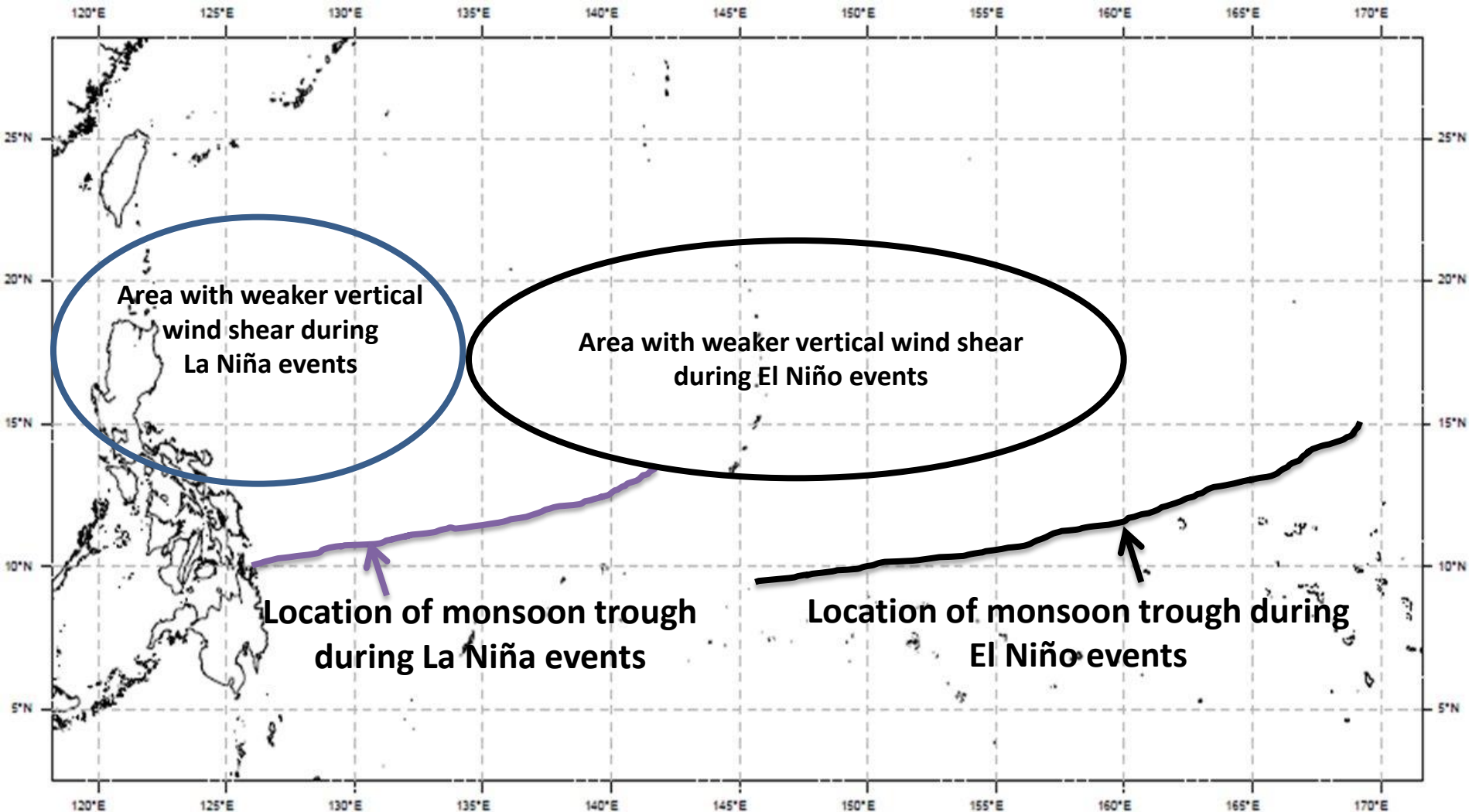
Source: Sharmila and Walsh (2018).

# The Atlantic Multidecadal Oscillation (AMO) index from 1856 to 2016



Source: NOAA Hurricane Research Division

# The change of location for 2 main dynamical factors of cyclone genesis in the western North Pacific during the El Niño and La Niña events



Source: from Chan (2008), and Liu and Chan (2013).

# Conclusion

- **There is not yet an increase in the global number of Cat 5 cyclones.**
- **The interannual and multidecadal variations seem still to be the main factors of the strongest cyclones activity.**
- **The current warming of oceans is not yet sufficient to have a significant influence on the intense cyclones.**



**Hurricane IRMA on 5 september 2017 at 23h03 UTC**  
**Infrared picture from NOAA 18**  
**Source: NRL Monterey**

**21° N**

**19° N**

**17° N**

**15° N**

**Thanks for your attention**

**64° W**

**62° W**

**60° W**

**58° W**

**56° W**

**13° N**