

**Tropical cyclones and their  
associated precipitation under  
climate change conditions from a set  
of RCA projections over Central and  
North America**

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**October, 2019**

- To evaluate the representation of Tropical Cyclones (TCs) on the RCA simulations.
- Identify processes involved on the good (or bad) representation of the spatial distribution of TCs.
- To identify climate change signals from the ensemble of GCM and RCA projections, which are related to changes on the distribution of TCs and their associated precipitation.
- To assess changes in the contribution of TCs-induced precipitation to total precipitation.

## **GCM simulations**

### **List of GCMs**

- CanESM2
- CSIRO-Mk3-6-0
- CNRM-CM5
- EC-Earth
- GFDL-ESM2M
- HadGEM2-ES
- IPSL-CM5A-MR
- MIROC5
- MPI-ESM-LR
- NorESM1-M

### **Forcings:**

- Historical simulation.
- RCP8.5 (2.6,4.5,6,8.5)

### **Periods analyzed:**

- Historical: 1976-2005.
- RCP8.5: 2071-2100.

# Tropical Cyclones tracker



kyklop-climate / kyklop

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Code Issues 0 Pull requests 0 Projects 0 Pulse Graphs

No description, website, or topics provided.

5 commits 1 branch 2 releases 0 contributors MIT

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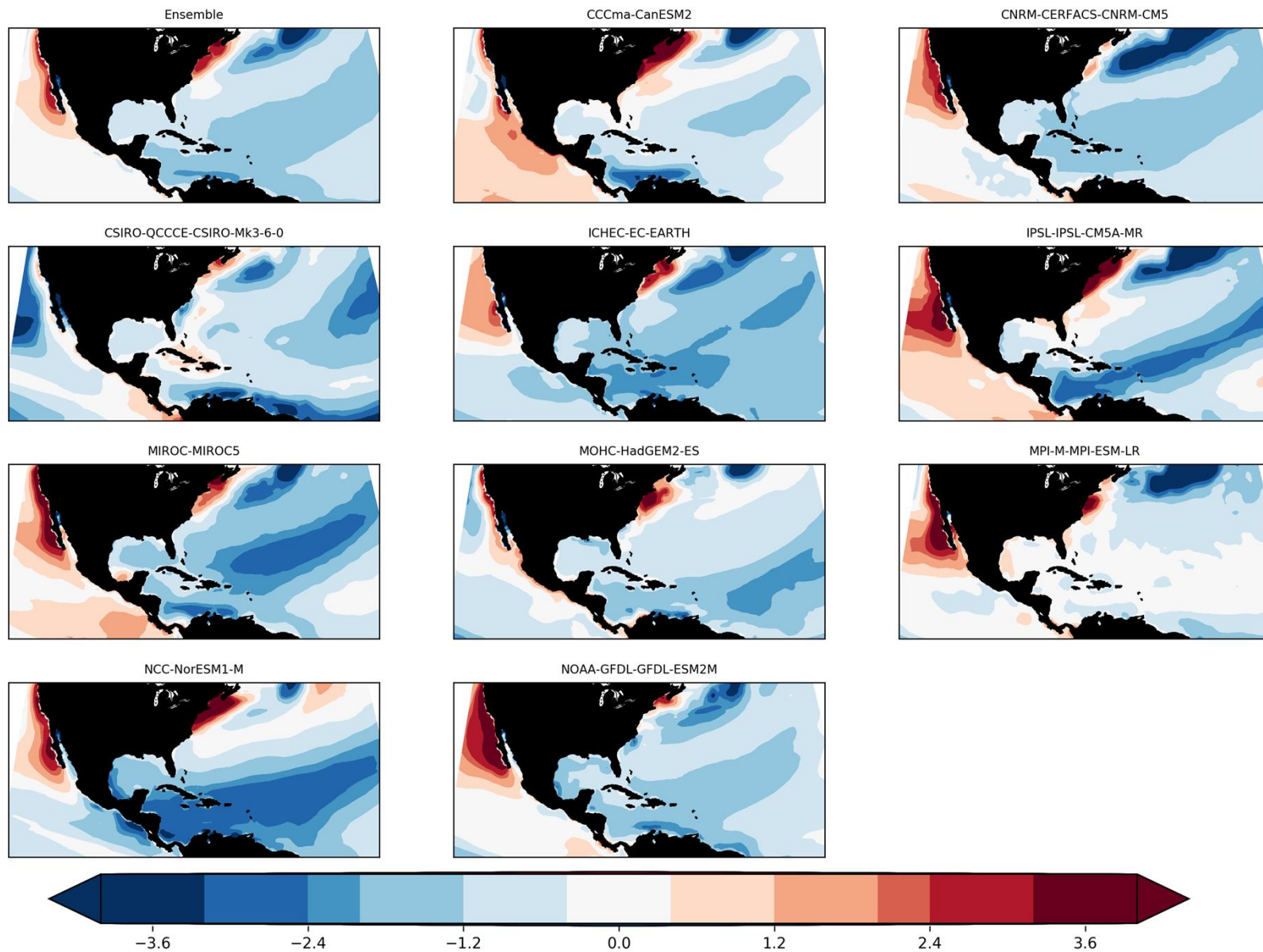
Ramon Fuentes Franco Removed basemap from setup.py requirements. Latest commit f45e19b on Jun 24, 2016

kyklop	Renamed project to kyklop to avoid name clash.	9 months ago
.gitignore	Updated .gitignore.	9 months ago
LICENSE	Initial commit.	a year ago
README.md	Renamed project to kyklop to avoid name clash.	9 months ago
setup.py	Removed basemap from setup.py requirements.	9 months ago

<https://github.com/kyklop-climate/kyklop>

Historical period (1976-2005)

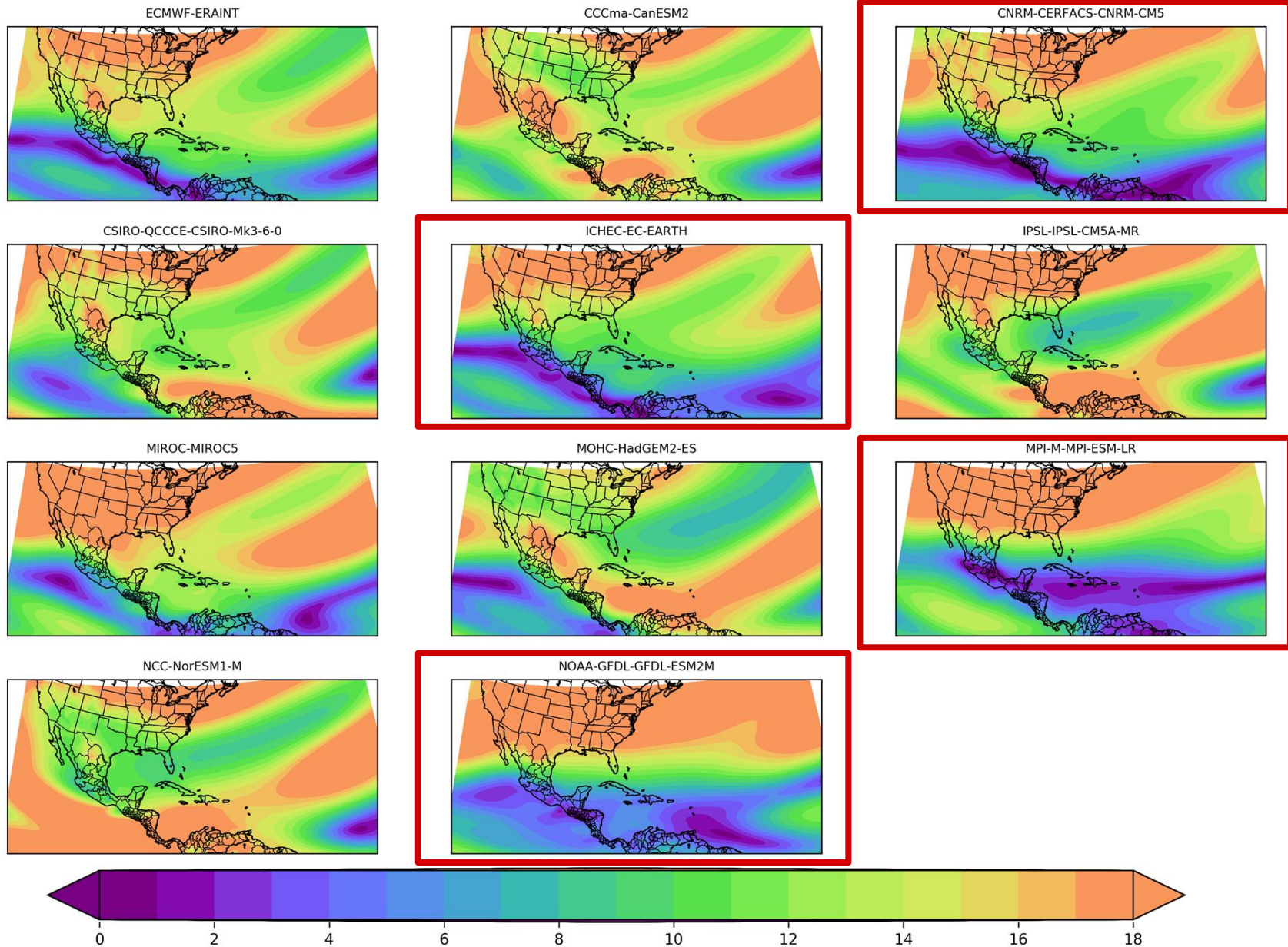
# SST bias for MJJASON (GCMs minus ERA-Interim) **SMHI**





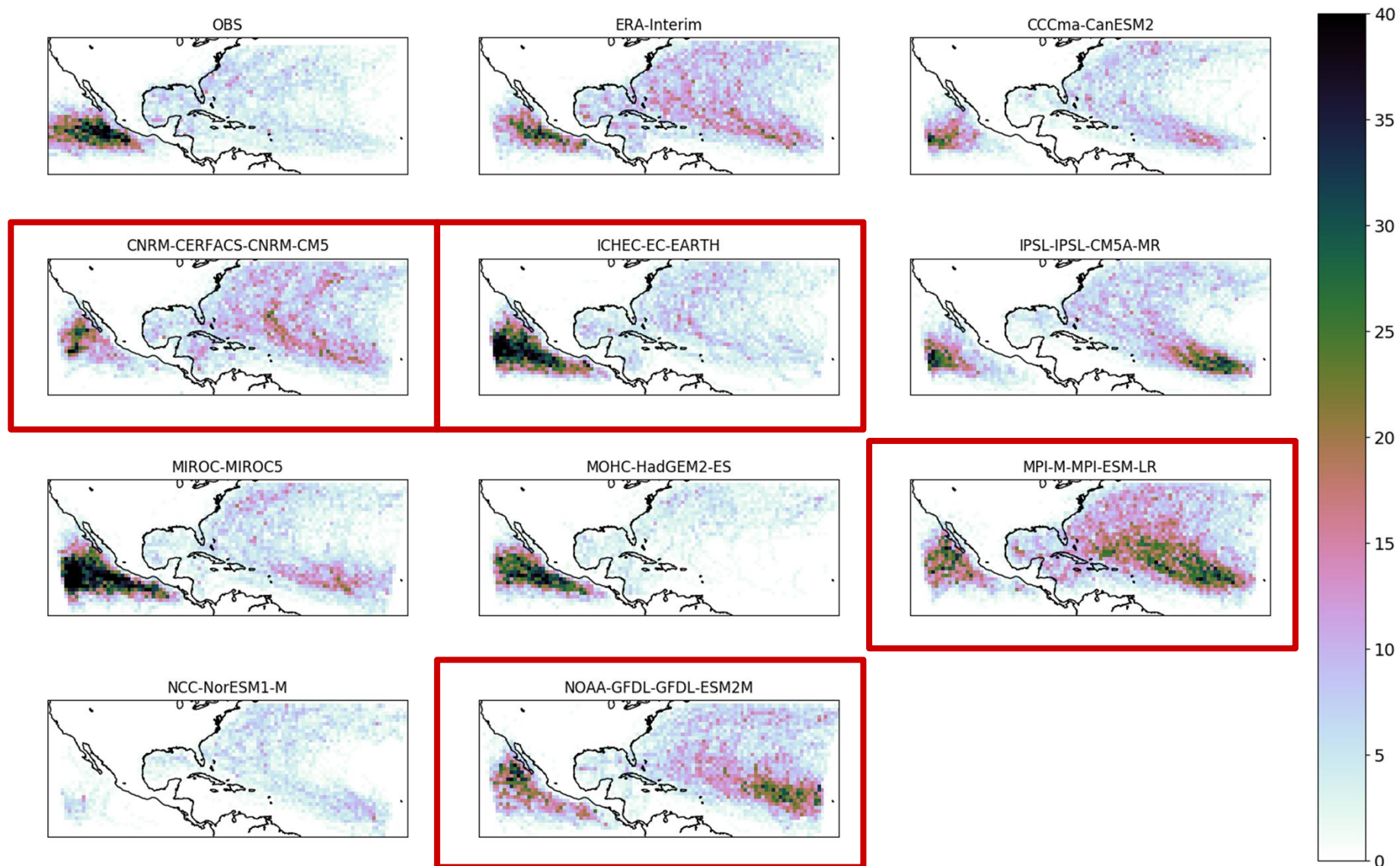
# Mean wind shear MJJASON (U200 – U850) on GCM driven RCA historical simulations

**SMHI**



# TCs in RCA (1976-2005)

SMHI

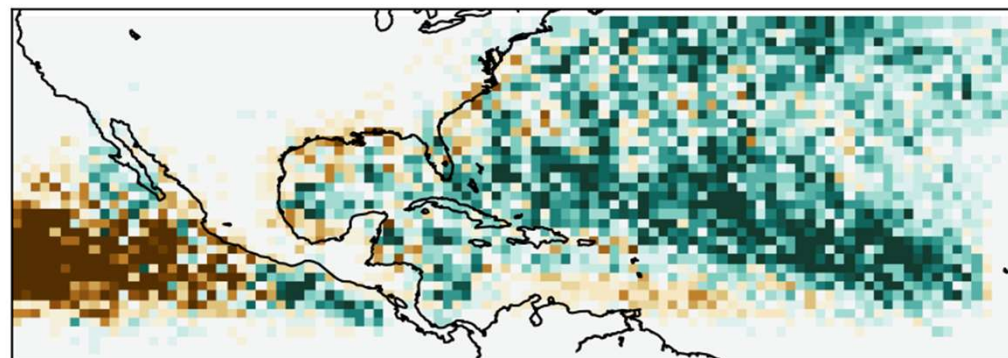




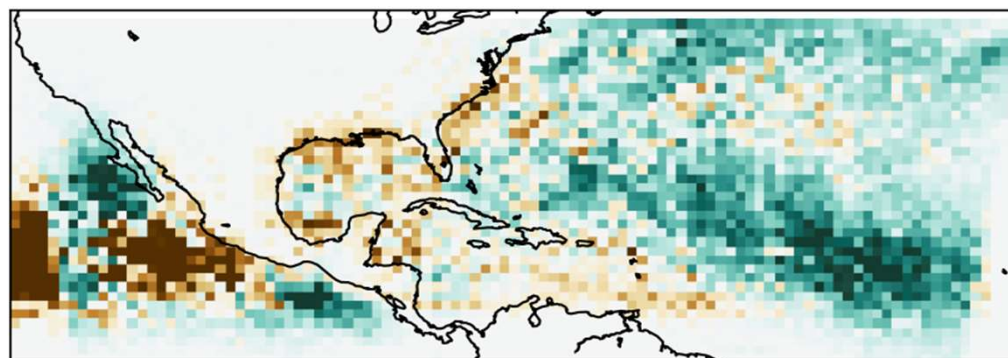
# **Biases of TCs in RCA compared with observations**

**SMHI**

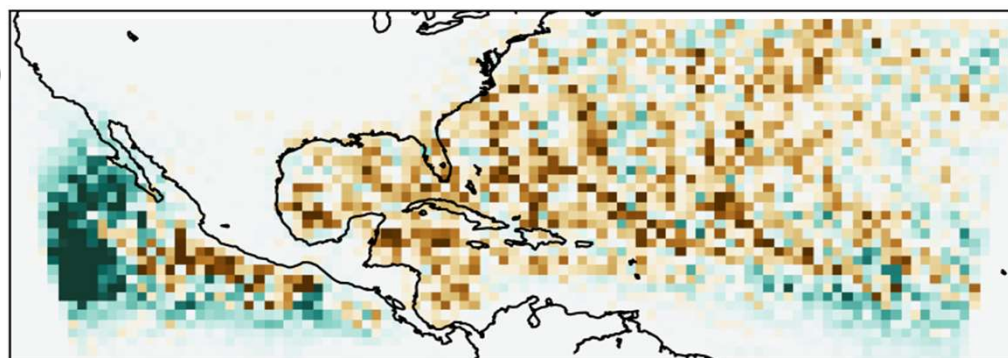
RCA (EIN) - OBS



RCA (ENSEMBLE)  
- OBS



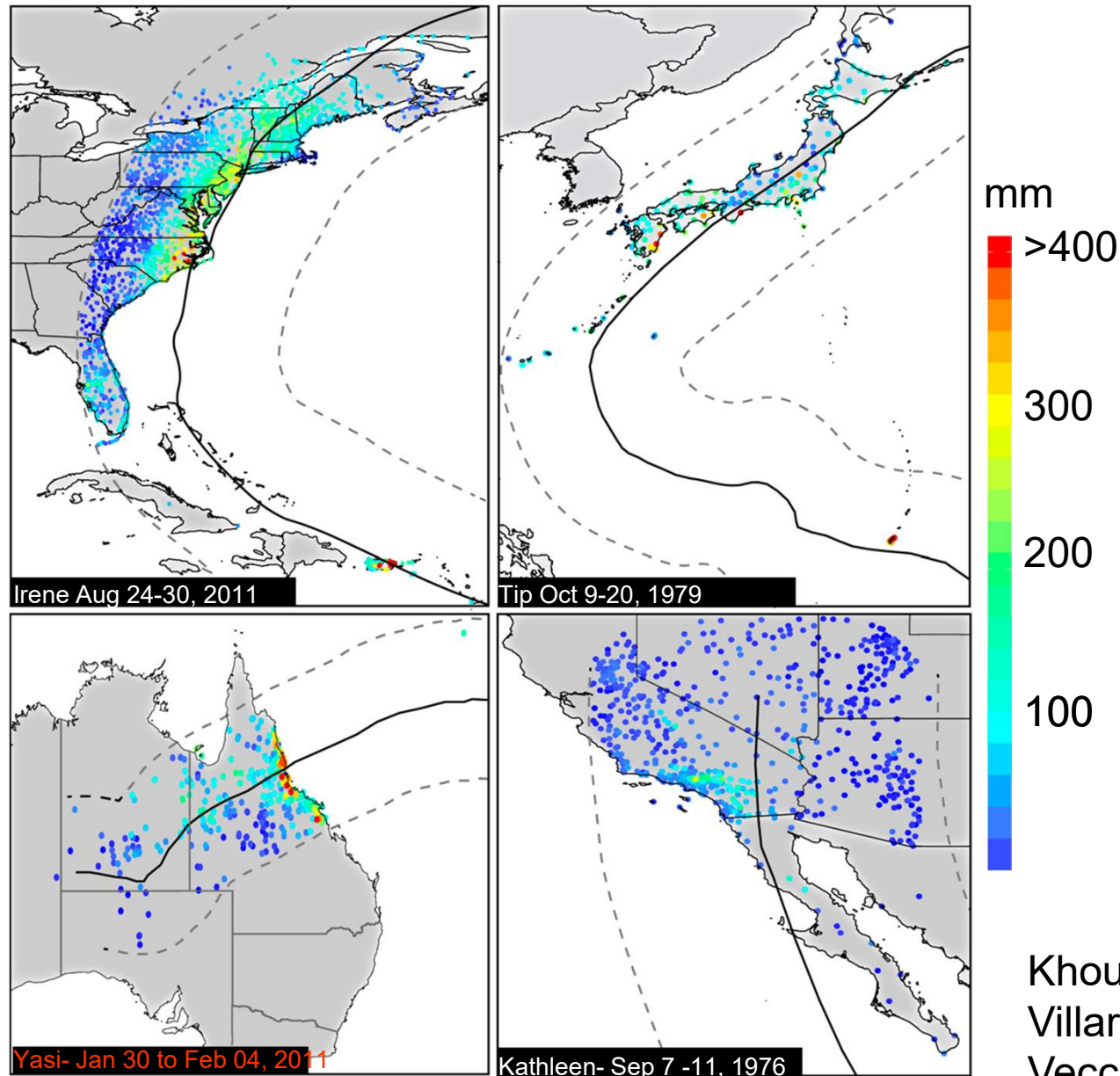
RCA (ENSEMBLE)  
- RCA (EIN)



# Precipitation associated to tropical cyclones

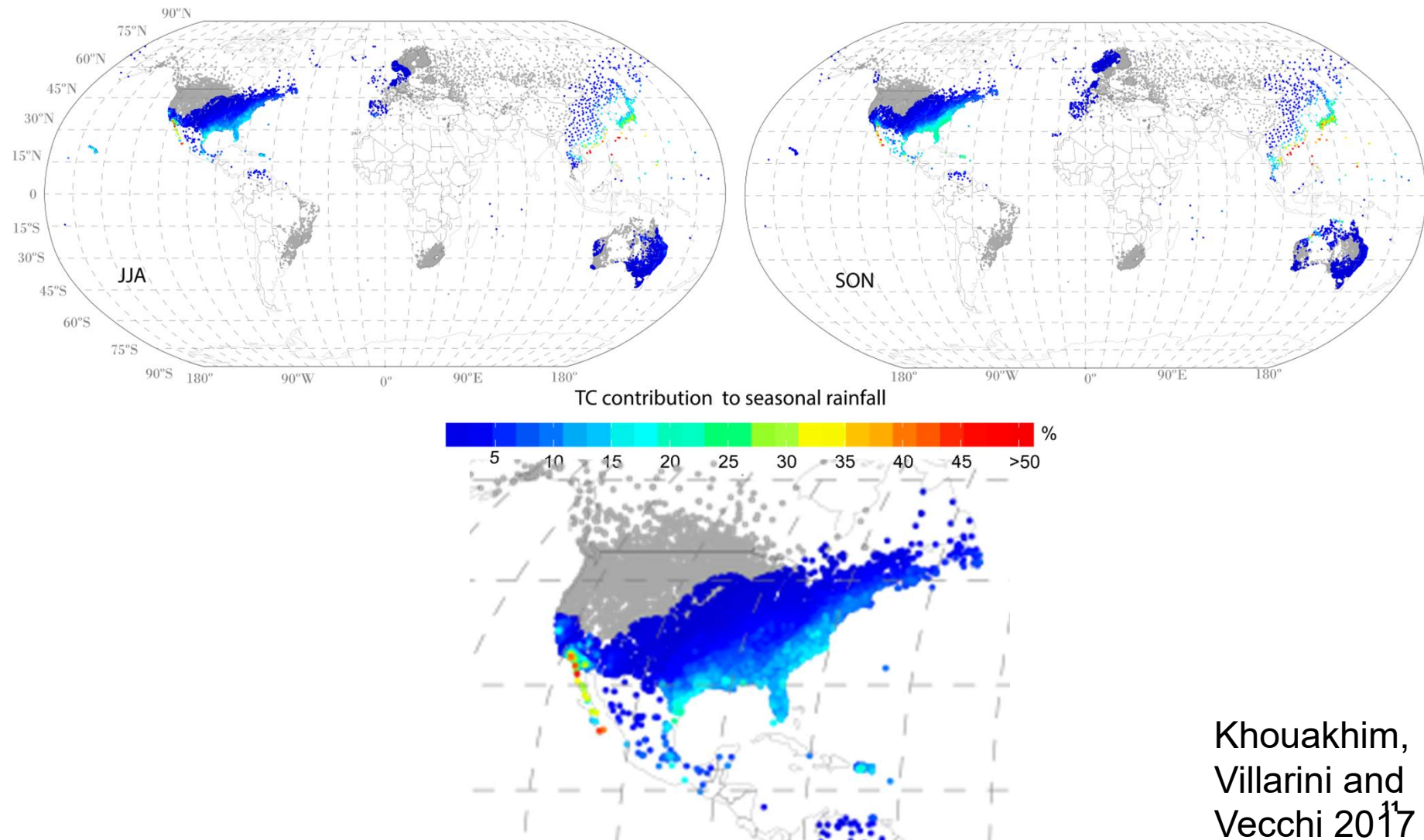
SMHI

Examples of TCs and their induced rainfall totals (mm). Each panel shows the TC track (black line) and the recorded amount of rain (colors) at stations located within 500 km (dashed line) from the center of each storm track.



Khouakhim,  
Villarini and  
Vecchi 2017

# **Relative contribution of TCs to the mean seasonal rainfall ( $100 * \text{TC precipitation} / \text{Total precipitation}$ )**

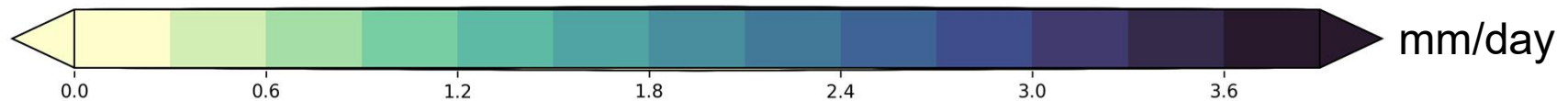
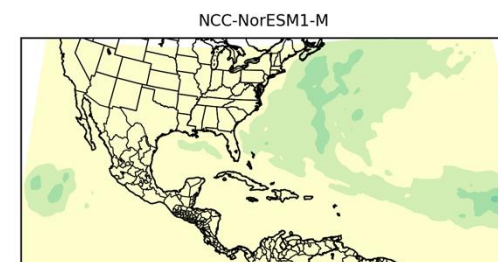
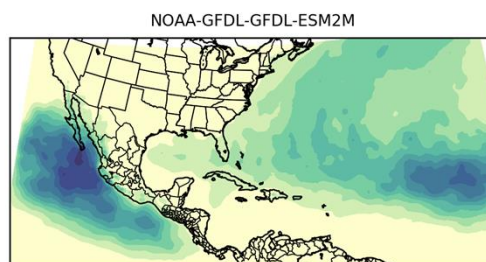
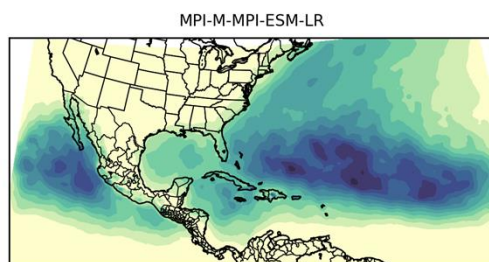
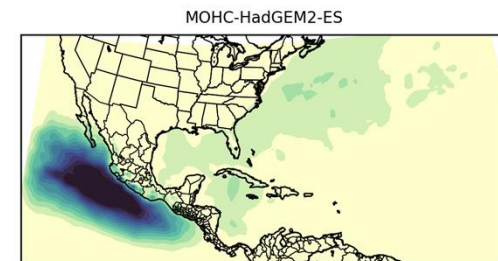
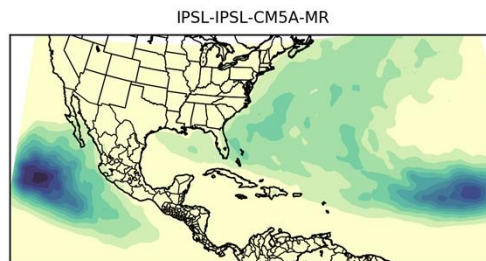
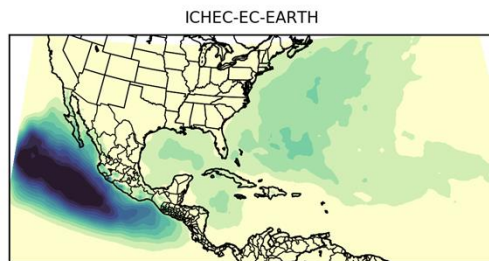
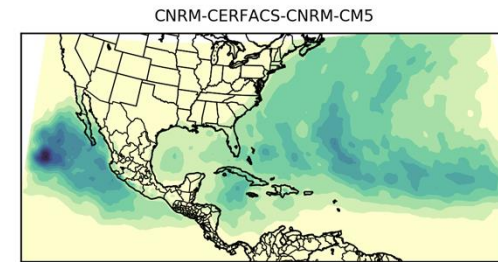
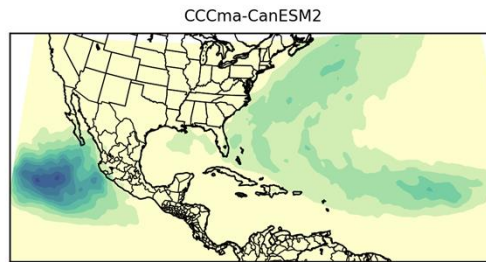
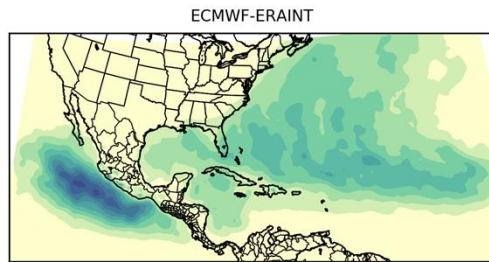


Khouakhim,  
Villarini and  
Vecchi 2017



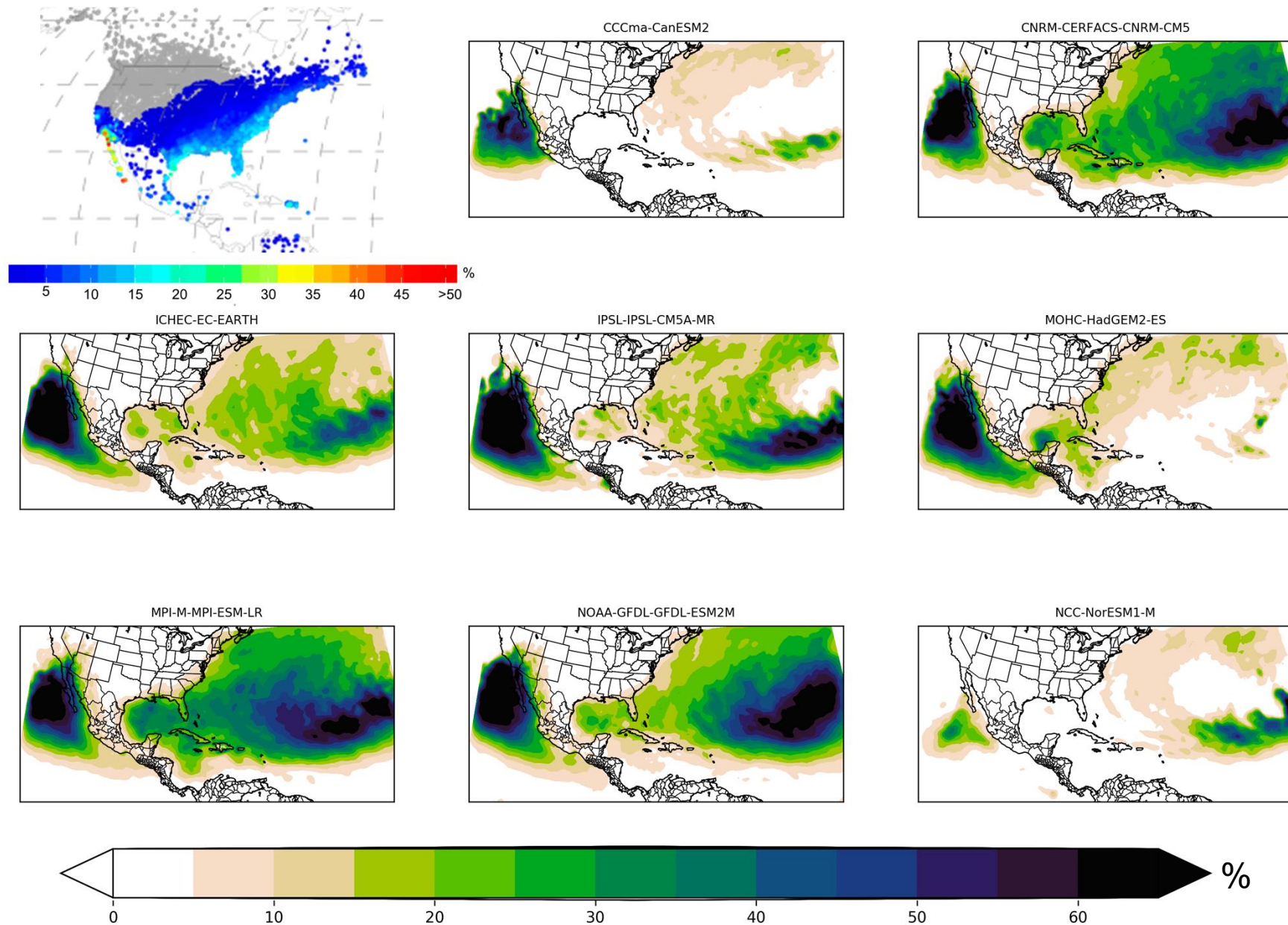
# Mean precipitation associated to tropical cyclones in RCA (1976-2005)

**SMHI**



# Relative contribution of TCs to the mean seasonal rainfall ( $100 * \text{TC precipitation} / \text{Total precipitation}$ )

**SMHI**

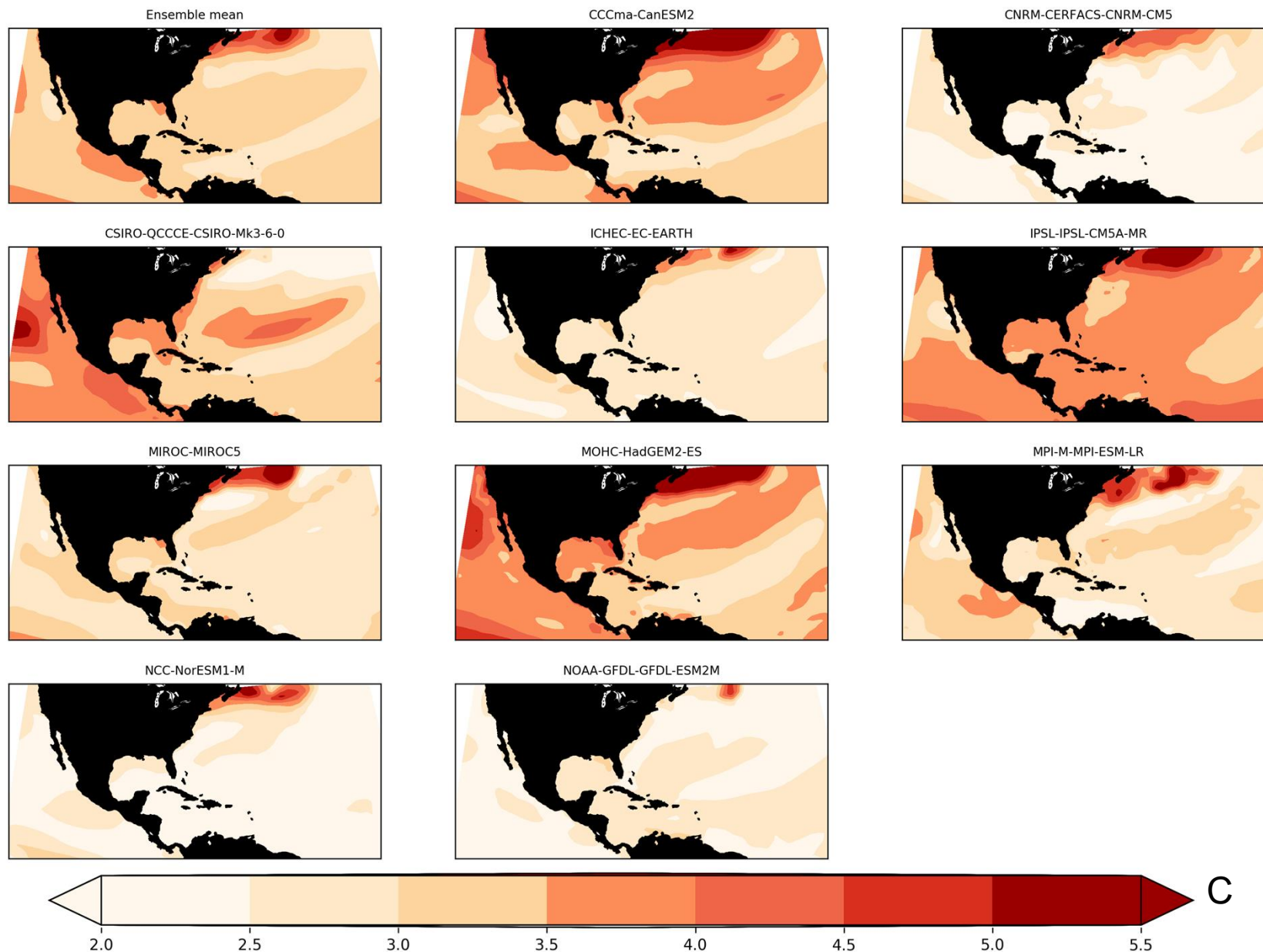




Future period (2071-2100)

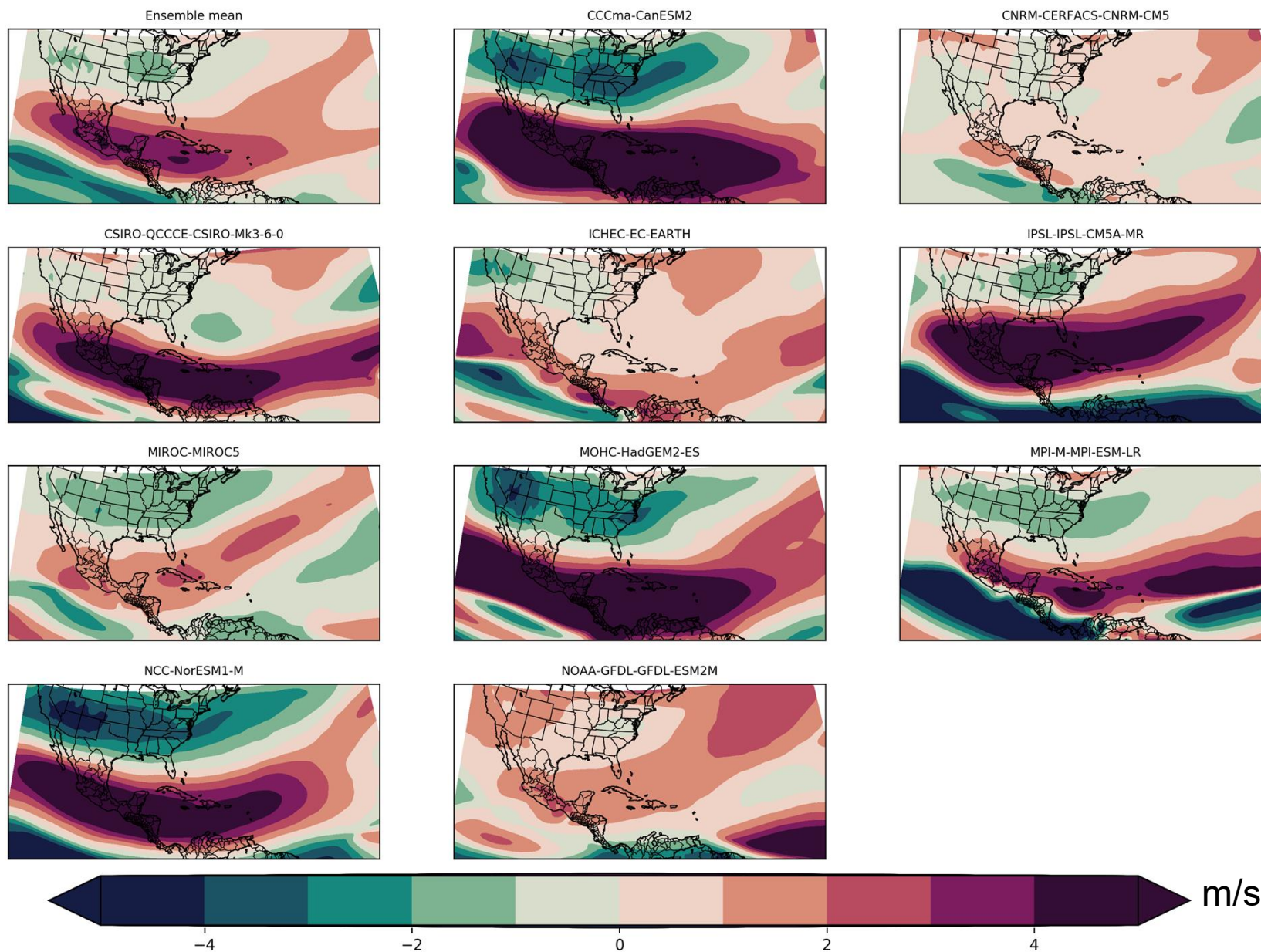
# SST change (2071-2100 minus 1976-2005)

SMHI



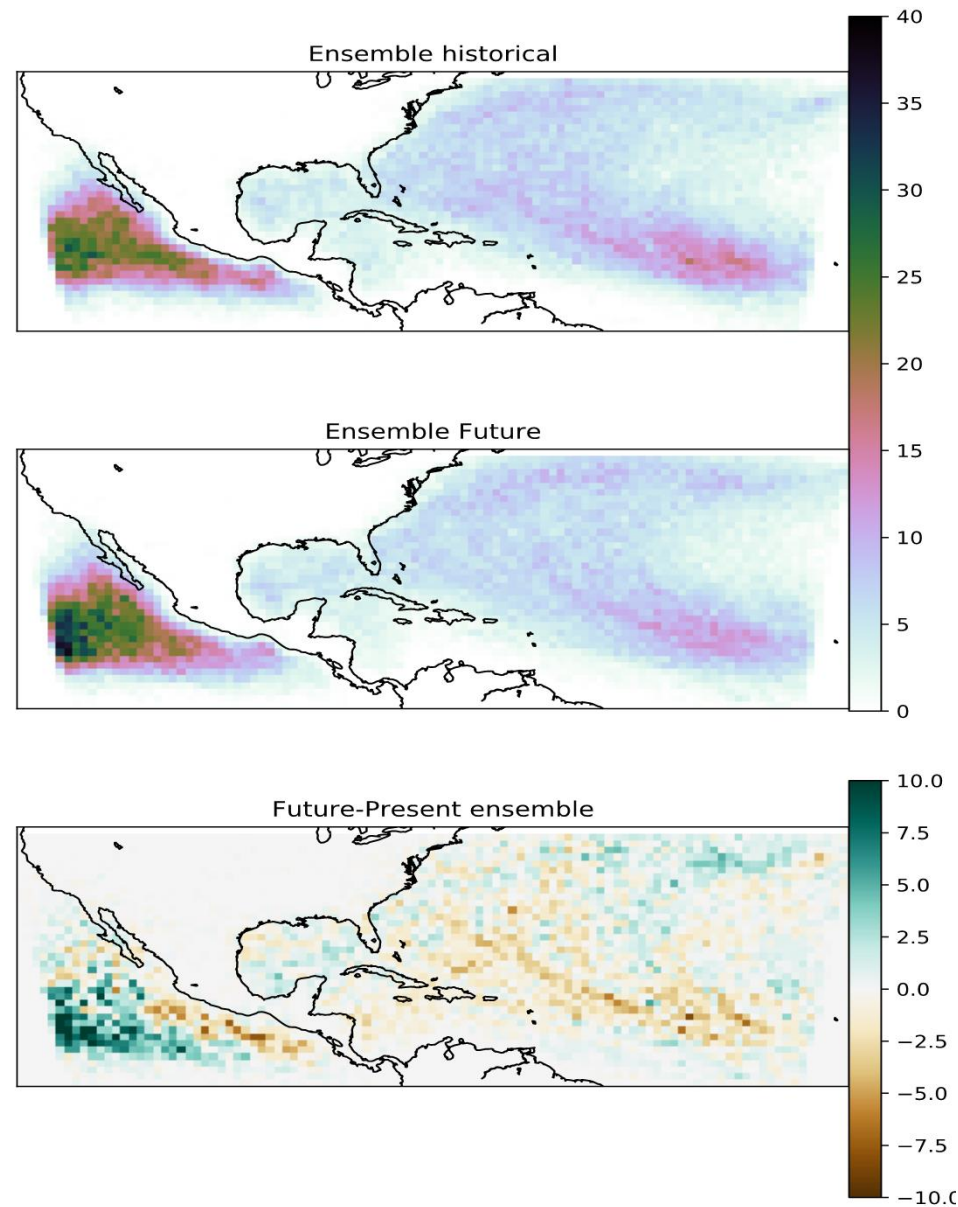
# Wind shear change (2071-2100 minus 1976-2005)

SMHI



# TCs density and its change Future(2071-2100)- Hist (1976-2005)

SMHI

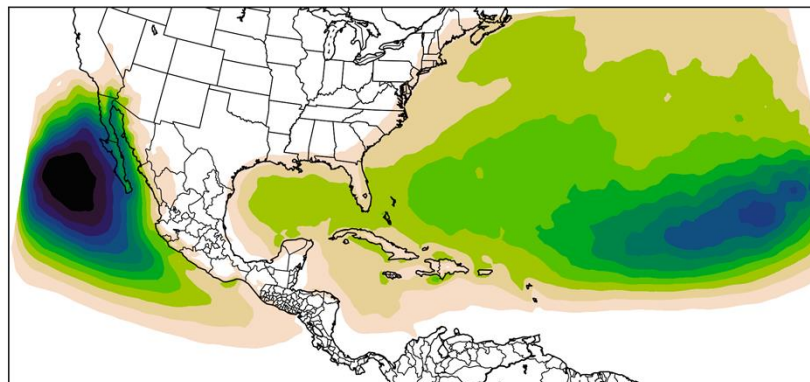




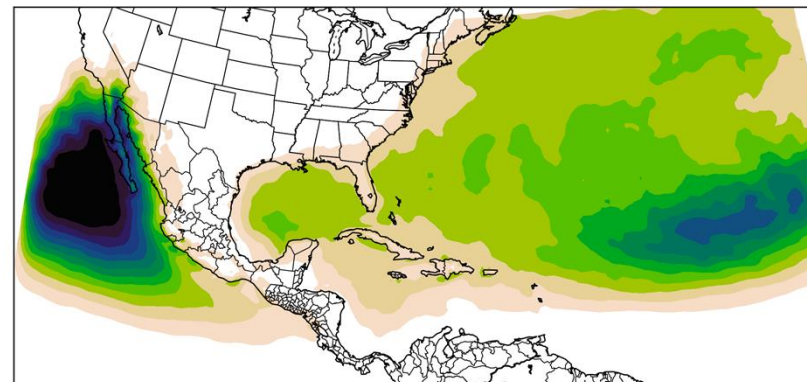
# Ratio TCs precipitation

**SMHI**

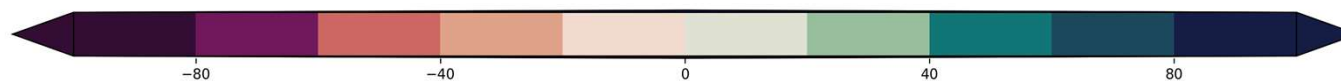
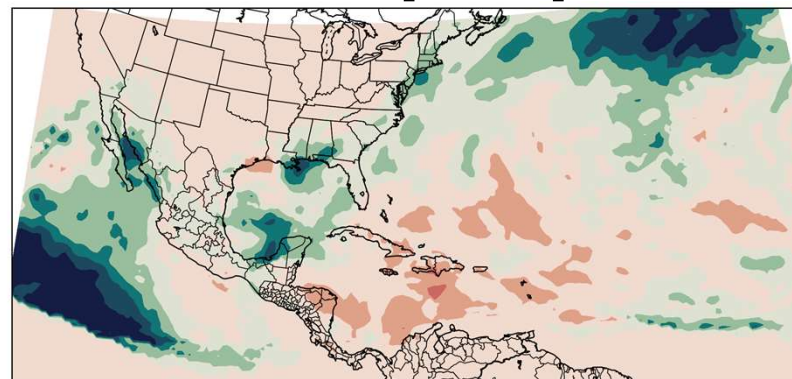
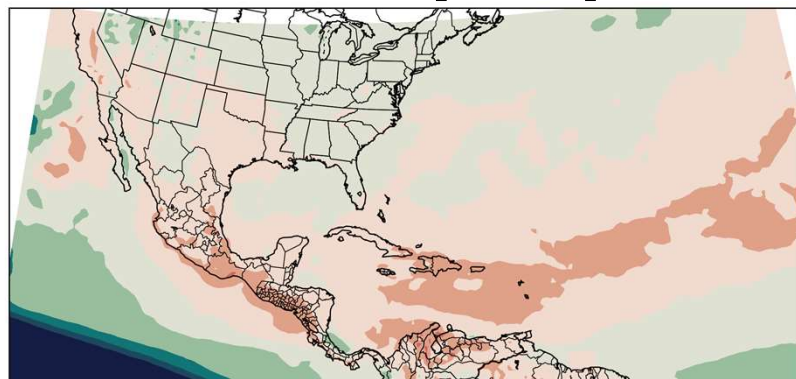
1976-2005



2071-2100



**Mean change from ensemble (%)**  
**Total precipitation**      **TCs precipitation**





- The density of TCs in the future show a change towards a higher concentration towards the North subtropical Atlantic ocean, and a decrease over the Tropical Atlantic. Similarly it is found a higher concentration away from the Mexican coasts and a decrease of TCs concentration close to coastal regions.
- Although the total precipitation shows a decrease all along Mexico, the TCs-associated precipitation shows an increase over Northwest Mexico, especially over the Gulf of California, increasing the contribution of TCs-associated precipitation to total precipitation over that region