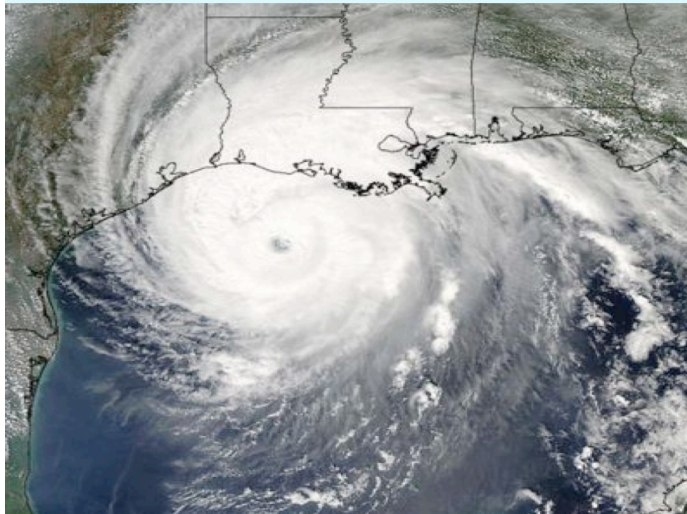




Genesis Potential Index for Tropical Cyclones in the Nested Climate Model (NRCM) Experiments

Cindy Bruyère

Greg Holland, James Done, Asuka Suzuki-Parker

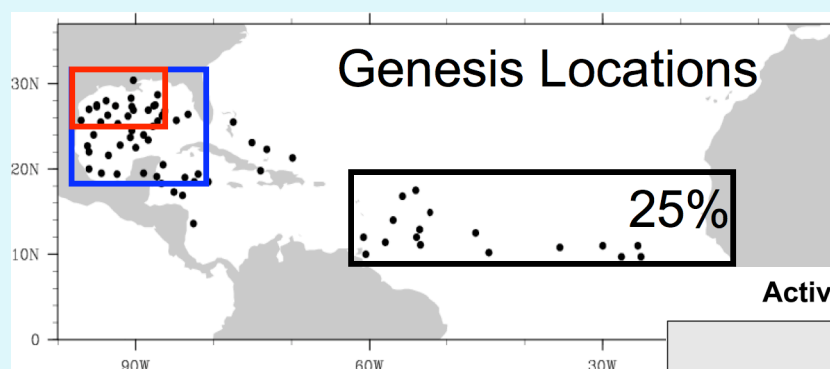
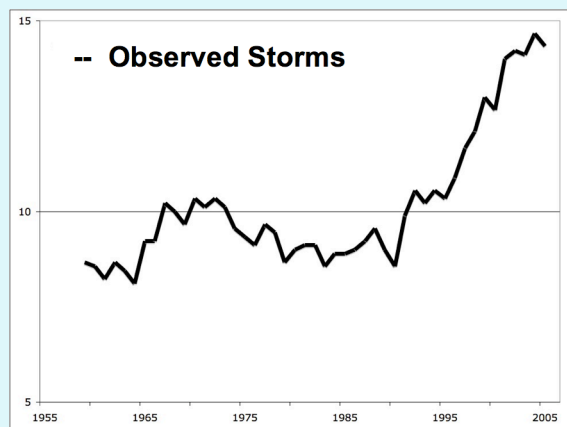


NCAR Earth System Laboratory

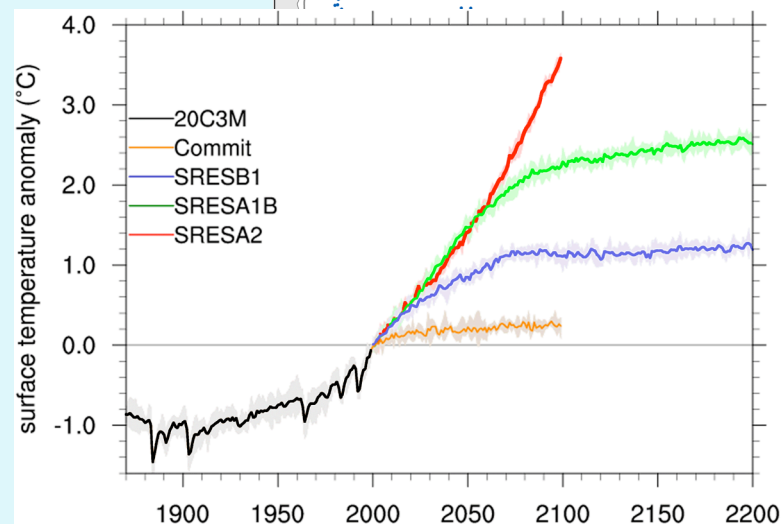
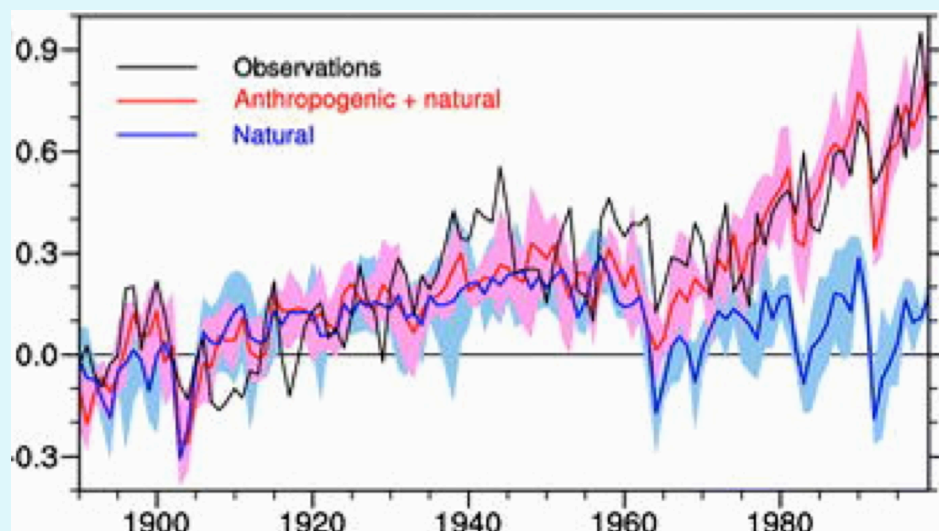
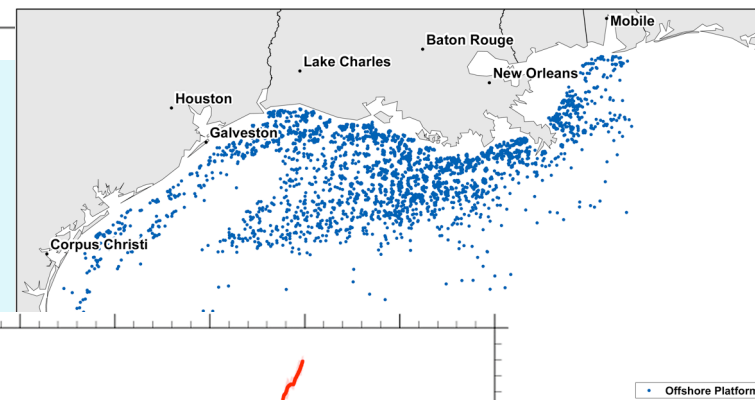
National Center for Atmospheric Research

NCAR is Sponsored by NSF and this work is partially supported by the Willis Research Network and the Research Program to Secure Energy for America

What do we know about North Atlantic Basin Hurricanes?

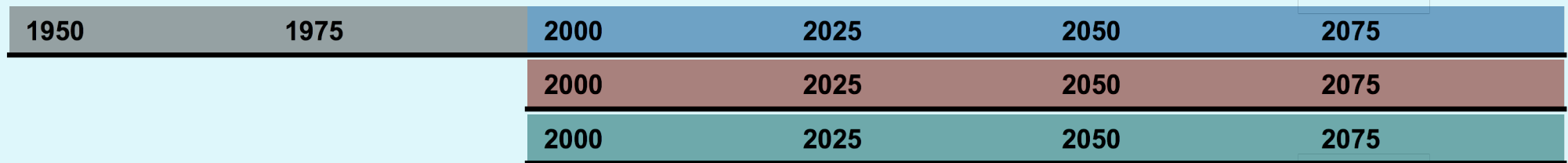


Active Gulf of Mexico Offshore Platforms



Available Data

IPCC-AR4



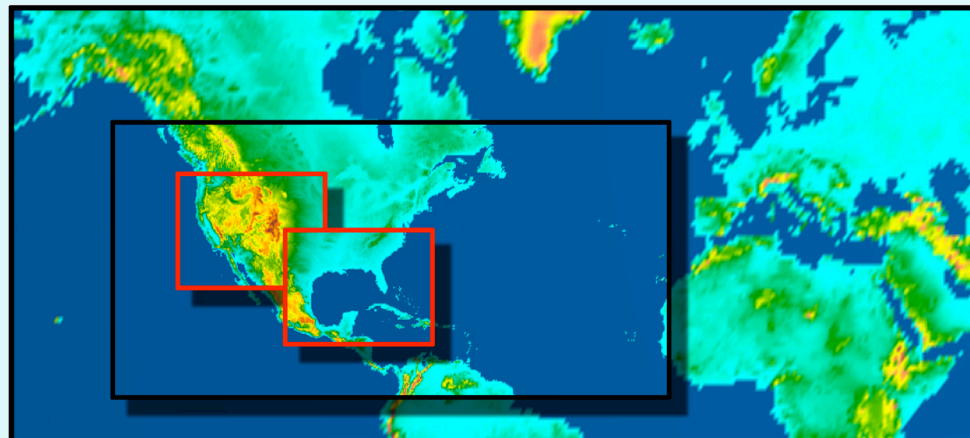
CCSM ~ 150 km

WRF - 36 km

1995-2005

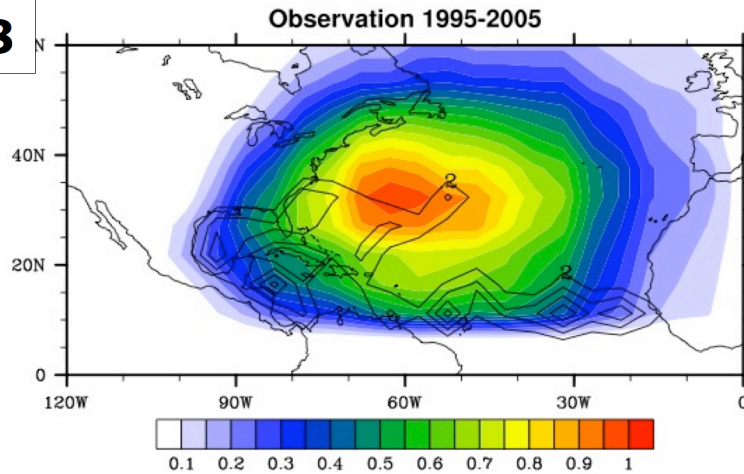
2020-2030

2045-2055

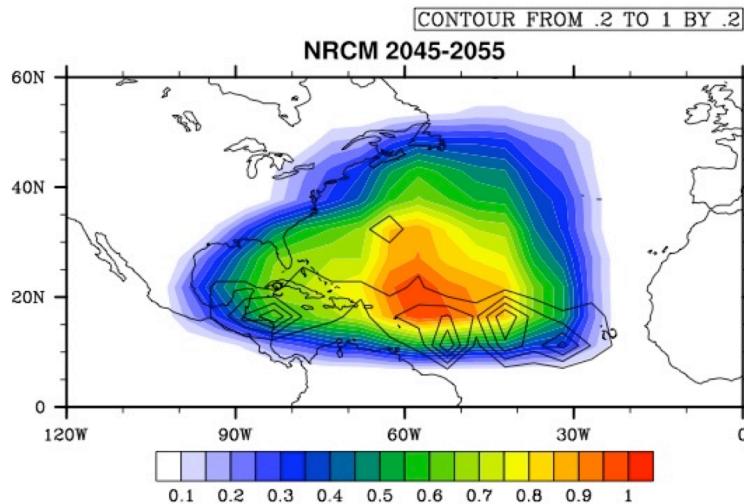
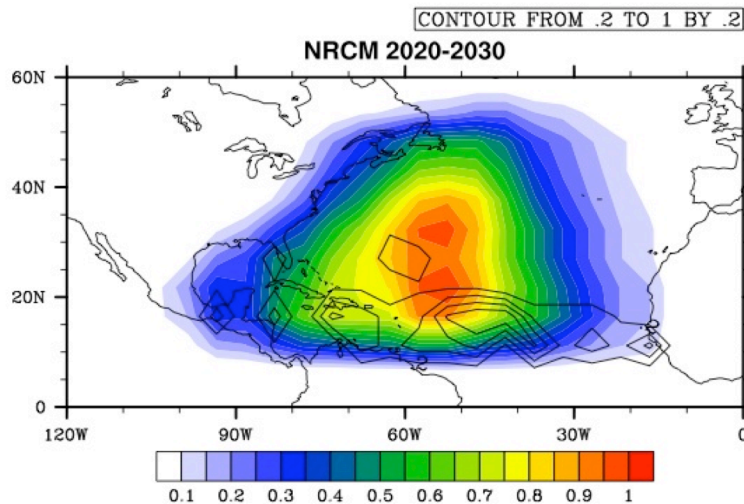
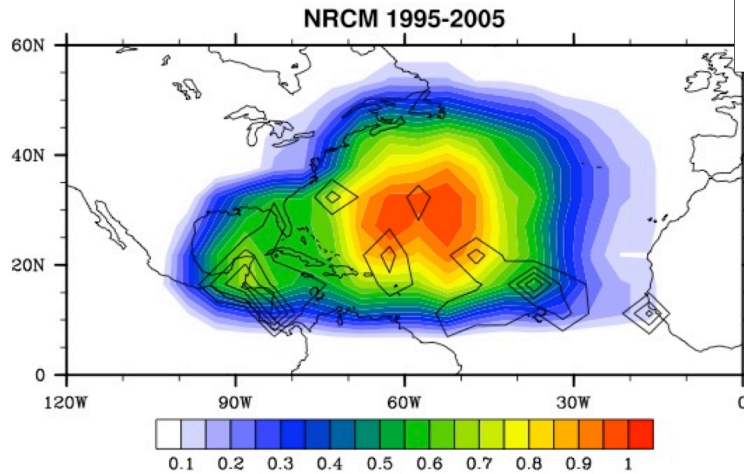


Track Density and Genesis Locations

7.8



7.6



CONTOUR FROM .2 TO 1 BY .2

CONTOUR FROM .2 TO 1 BY .2

Genesis Potential Index

$$GP = |10^5 \eta| \left(\frac{RH_{700}}{30} \right)^3 \left(\frac{V_{pot}}{70} \right)^3 (1 + 0.1 V_{shear})^{-2}$$

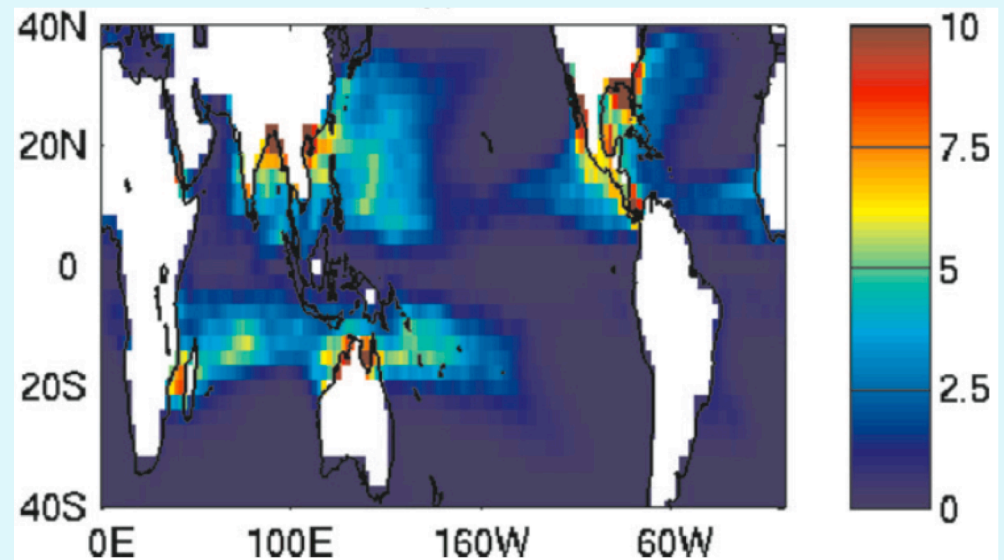
η = absolute vorticity

V_{pot} = potential intensity

V_{shear} = shear between 850hPa and 200hPa

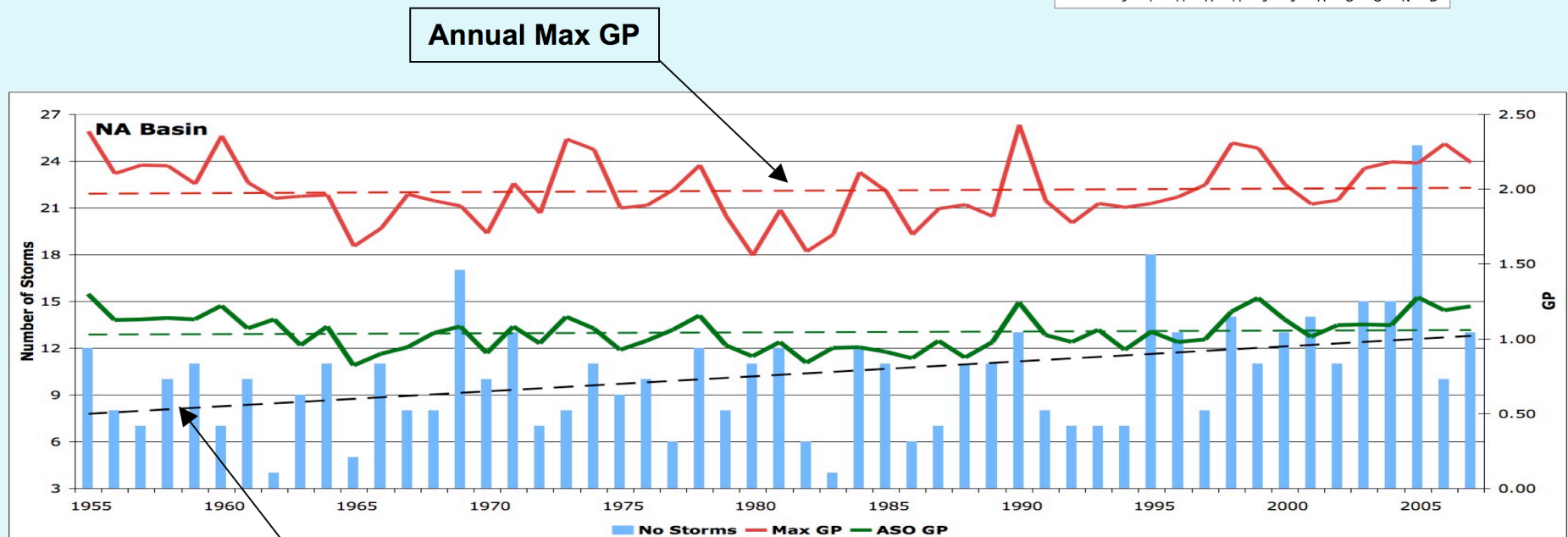
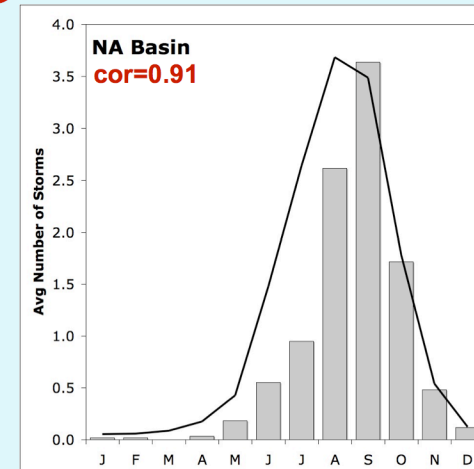
Emanuel and Nolan (2004)

Camargo (2007)



GP from NNRP compared with Observations

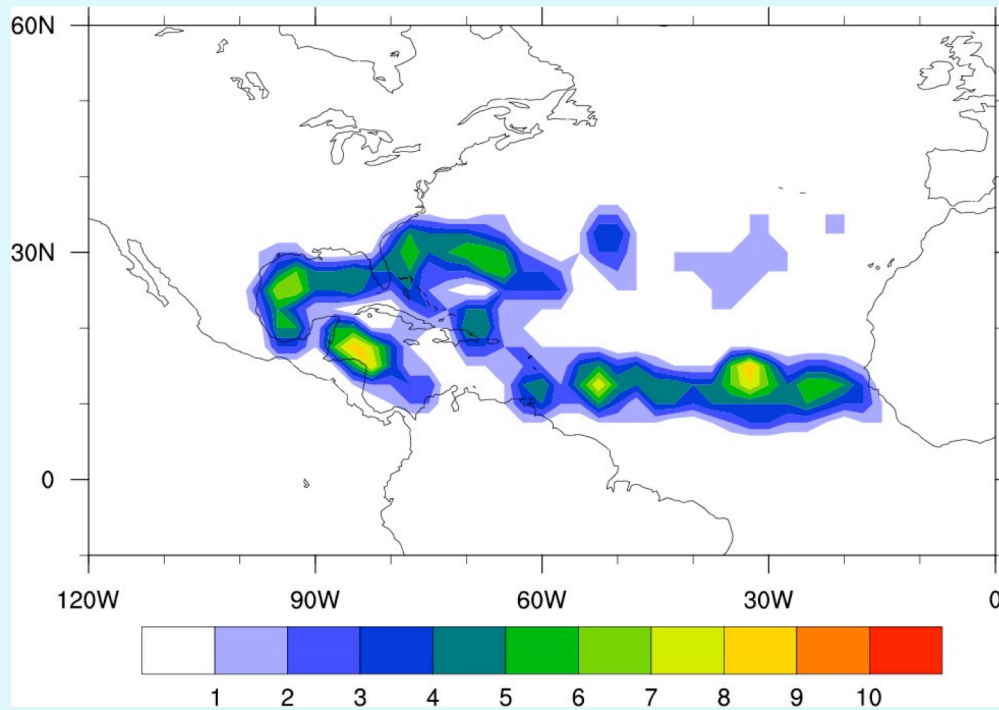
Max GP	0.34
ASO GP	0.40



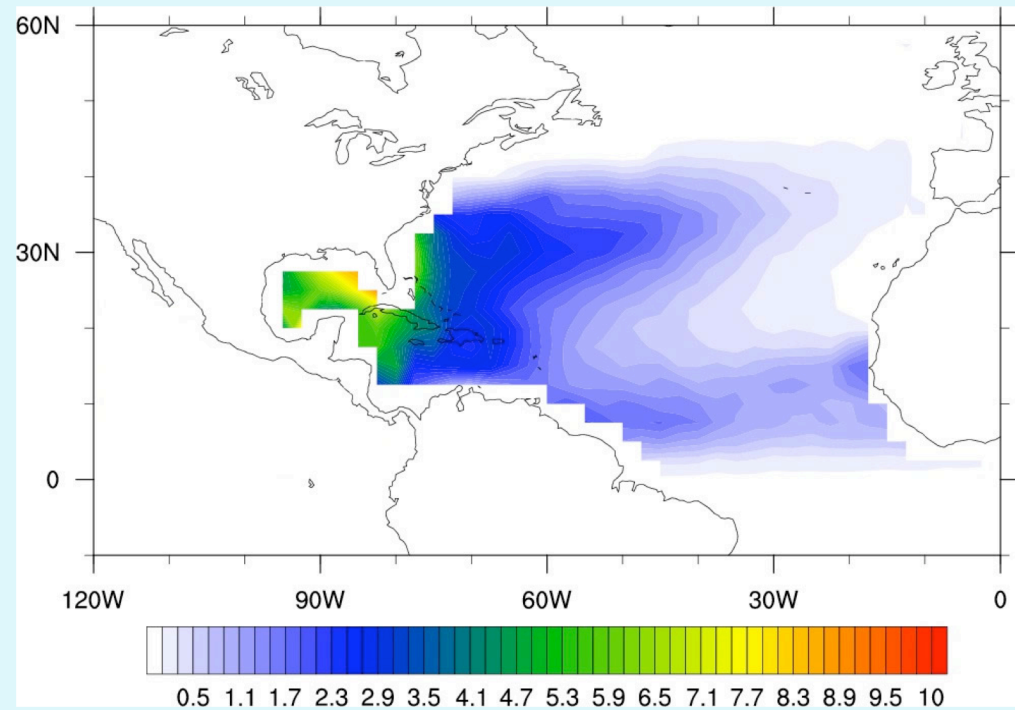
N° Storms

GP from NNRP compared with Observations

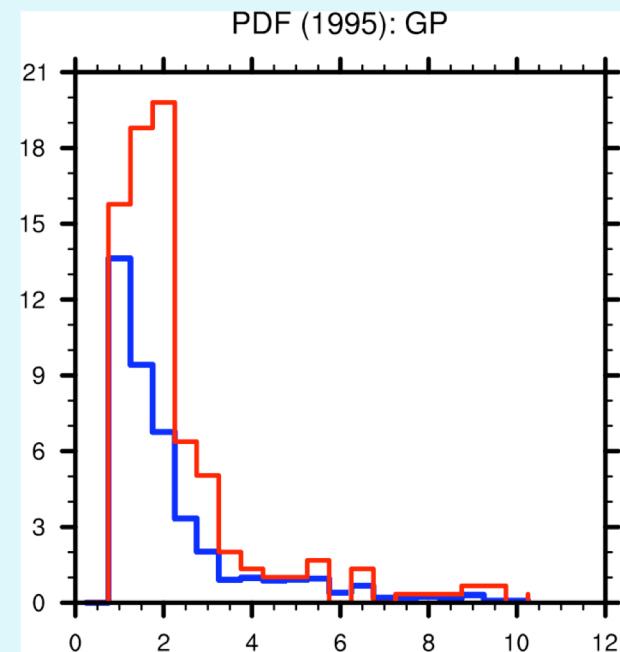
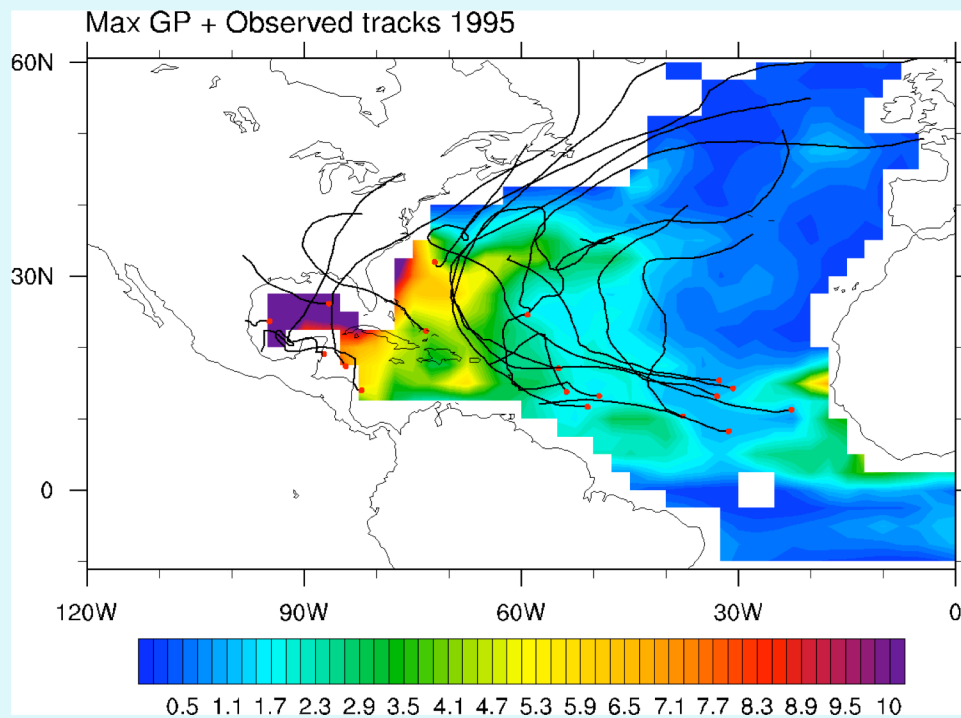
Frequency Distribution of Genesis Location for Observed Storms



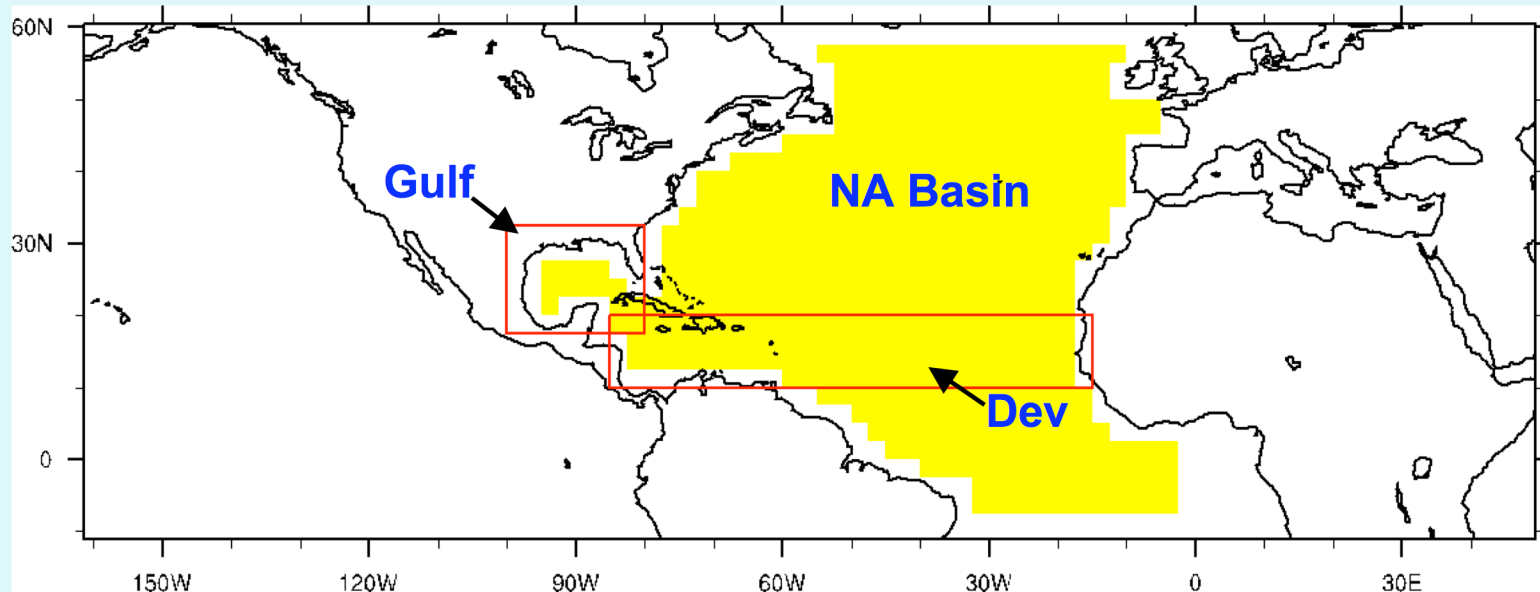
Genesis Potential Index



GP from NNRP compared with Observations

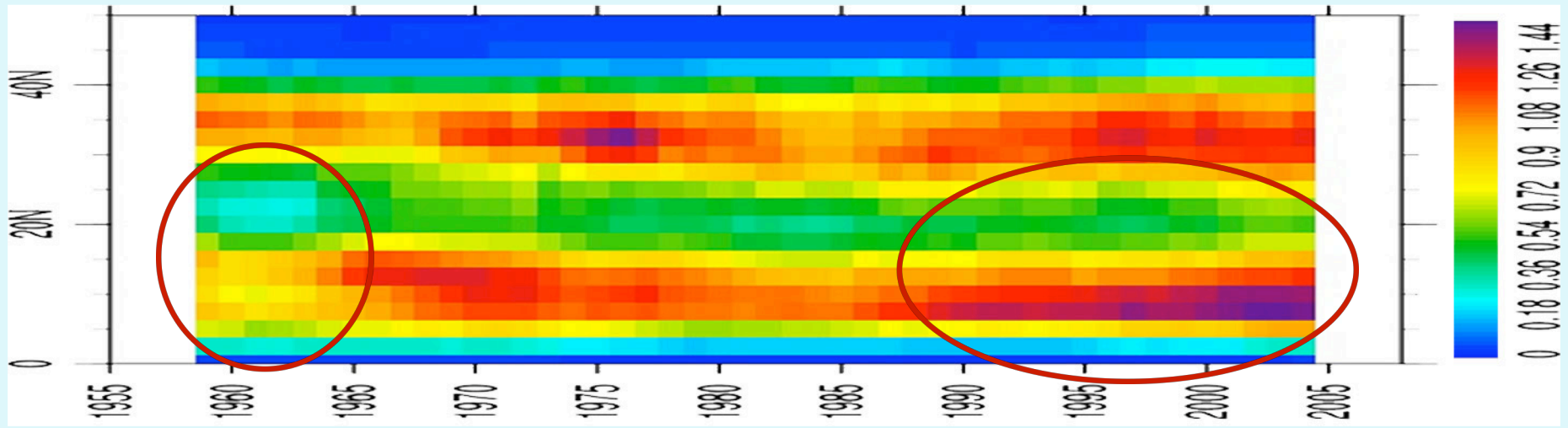


GP - A Different Approach

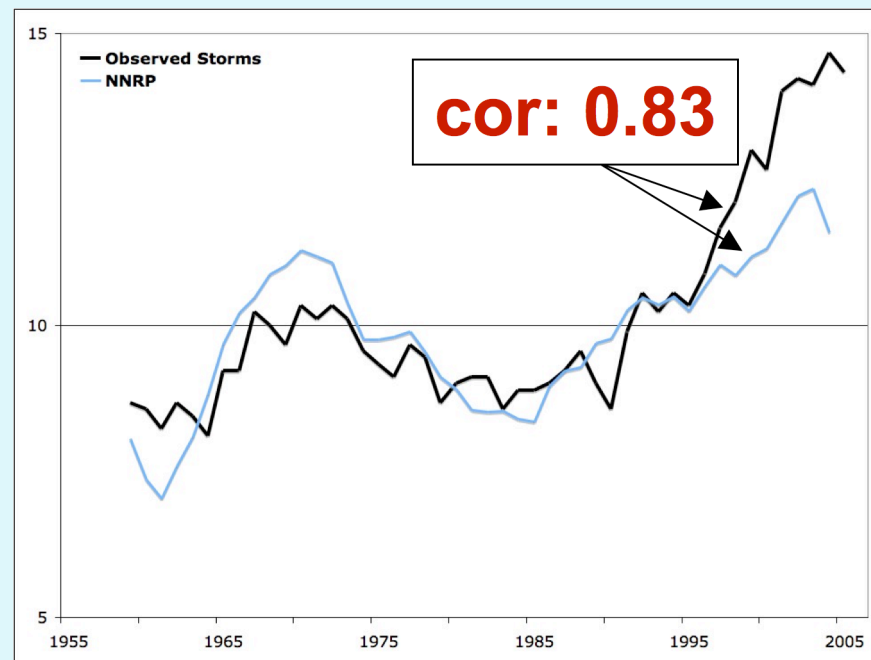
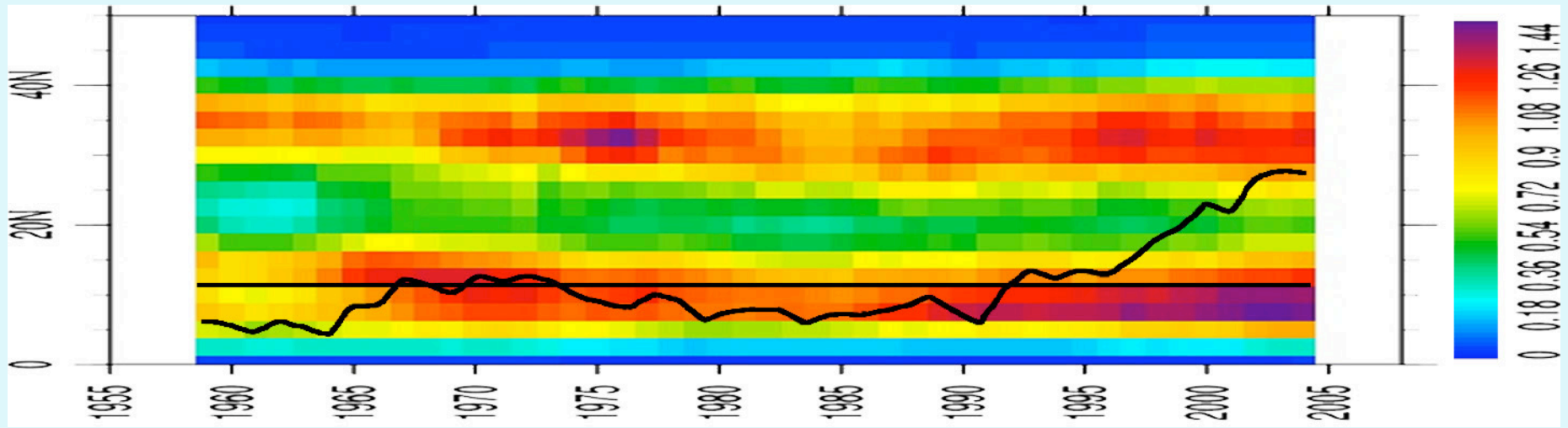


	NA Basin	Gulf	Dev	All Basin Storms _{cor} GP in Dev
Max GP	0.34	0.23	0.60	0.60
ASO GP	0.40	0.35	0.61	0.61

Zonal Average ASO GP

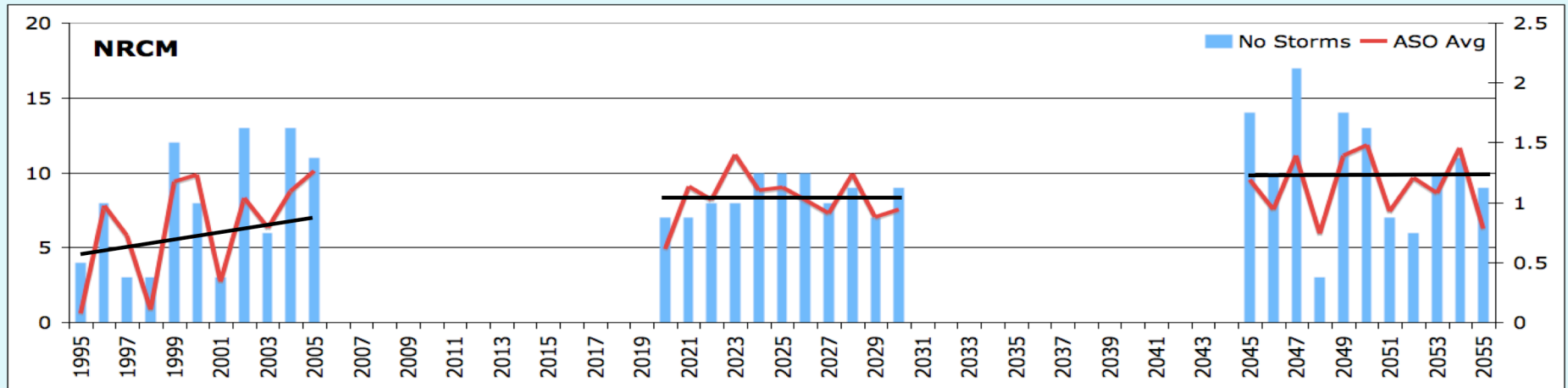
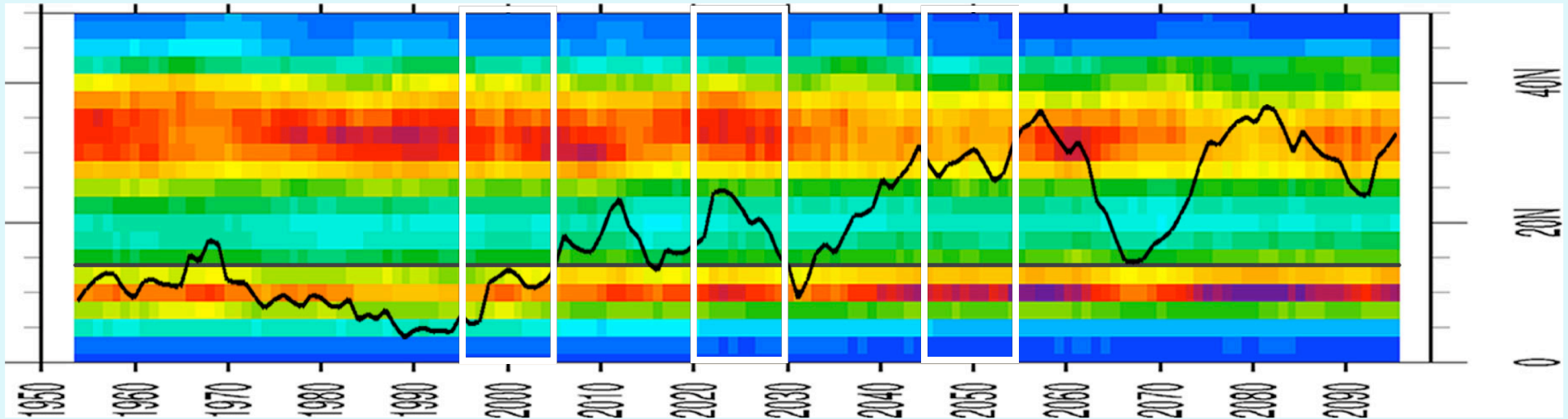


Zonal Average ASO GP



Zonal Average ASO GP

CCSM - A2



Current observation	Model 1995-2005	Model 2020-2030	Model 2045-2055
7.8	7.6	8.5	10.4

Conclusions and Future

- NA basin wide average GP has little value as a genesis predictor
 - GP in the NA basin has a flat trend for both NNPR and CCSM data, while number of observed storms had an upward trend for the last 50 years
- GP in development region is a better measure of storm genesis
- GP in NNRP and CCSM models indicate an increase in GP in the lower latitudes
 - i.e., genesis region seems to be shifting south
- NRCM time-slice experiments compare well with GP predictor.
- More work is needed to develop a better index which can also be used effectively in the Gulf

