



Statewide coupled ocean-atmosphere regional climate model

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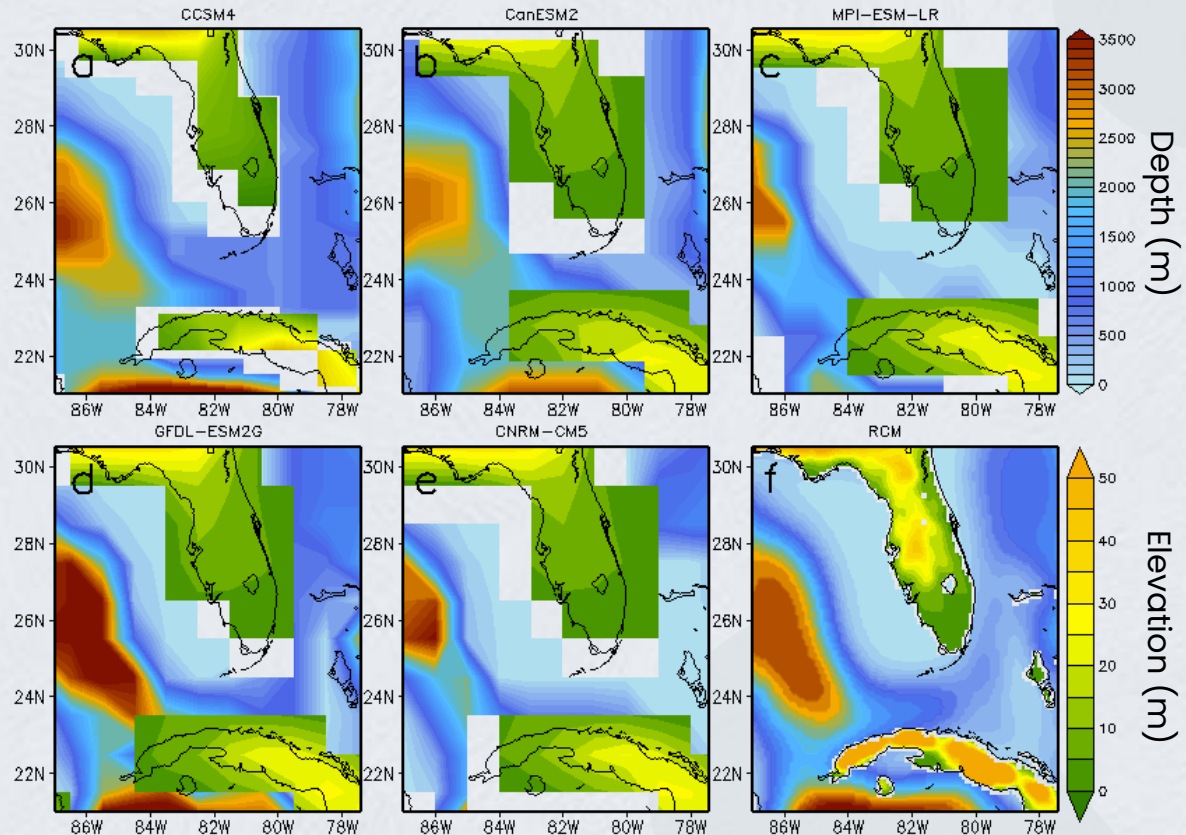
Collaboration



Bottom line up front

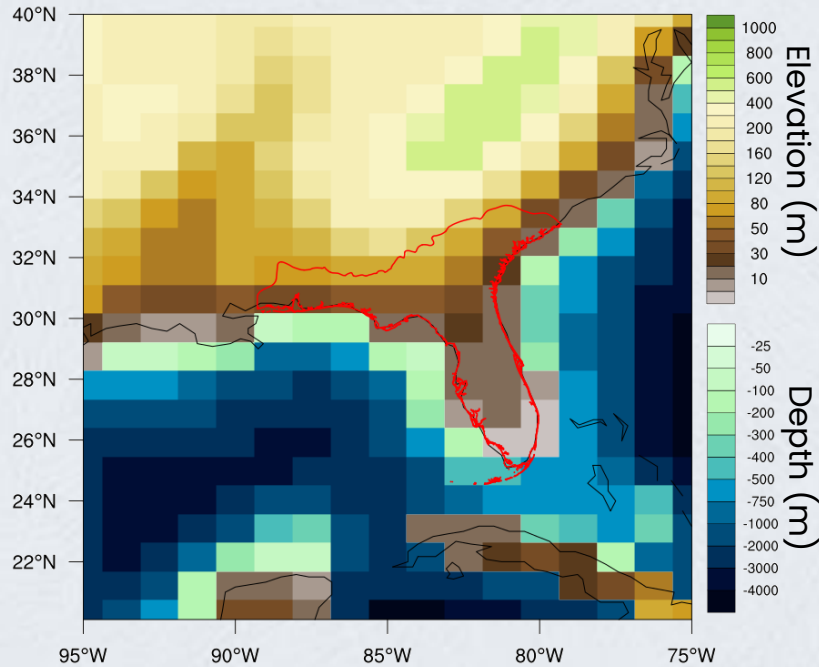
- Rainfall is changing due to global forcing
- Past conditions less predictive of future conditions $\Rightarrow$ use models
- Global models $\nRightarrow$ resolution needed to “capture” changes in rainfall in Florida
- Interim solution = statistical downscaling $\Rightarrow$ change factors for design storms
- Advanced solution = dynamic downscaling via models $\Rightarrow$ change factors (modeling underway with completion expected in 2028)
- Preliminary runs yield some interesting insights

Resolution issue

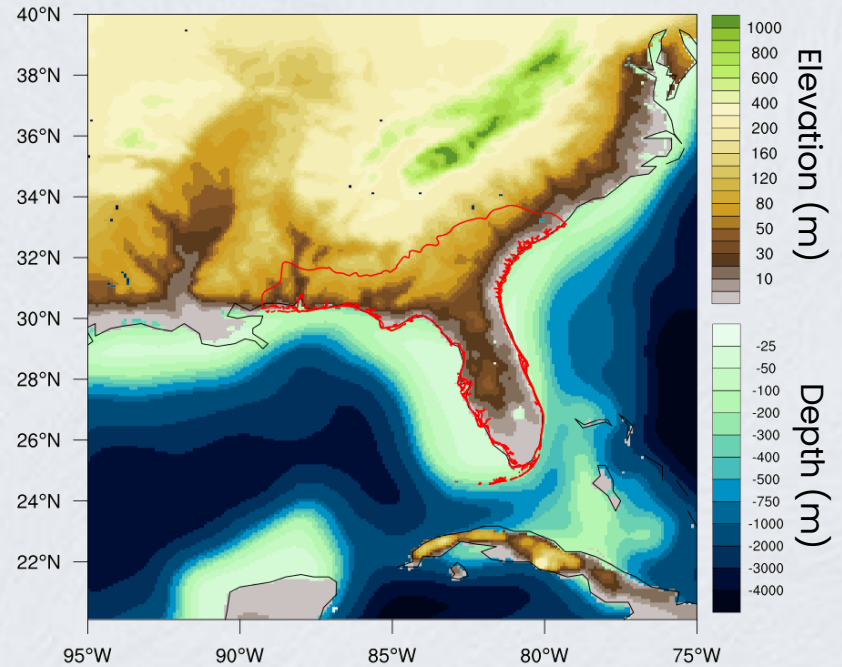


Resolution issue

CESM2 (from CMIP6)



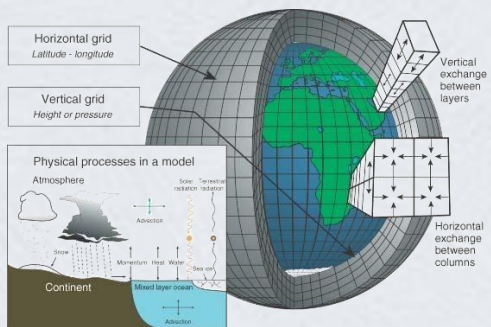
RSM-ROMS (@ 10km)



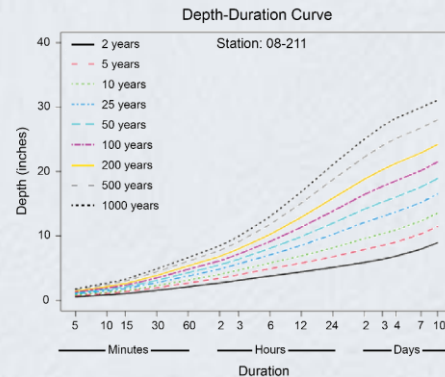
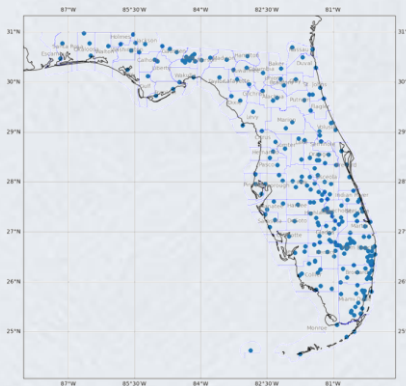
Interim solution: change factors for design storms



Rainfall
Workgroup

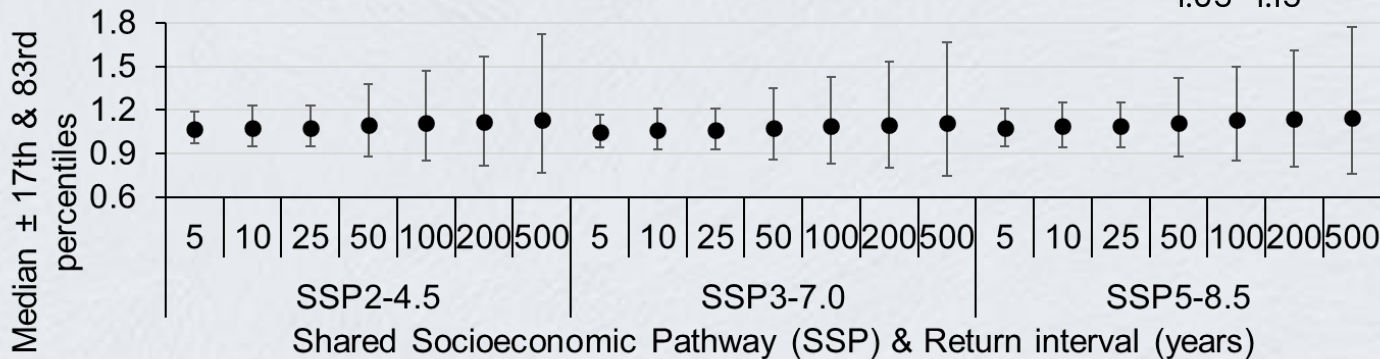


Edwards, P.N. 2011



LOCA2, 7-day duration, 2070

Range of medians
1.05–1.15



Advanced solution: dynamical downscaling via coupled models

Community Earth System Model 2
25 km resolution for atmosphere
10 km resolution for ocean
(PI: Ben Kirtman, UM)



Regional Spectral Model-
Regional Ocean Modeling System
10 km resolution
(PI: Vasu Misra, FSU)



Weather Research & Forecasting Model
4 km resolution
events to 1 km resolution
(PI: John Stamm, USGS)

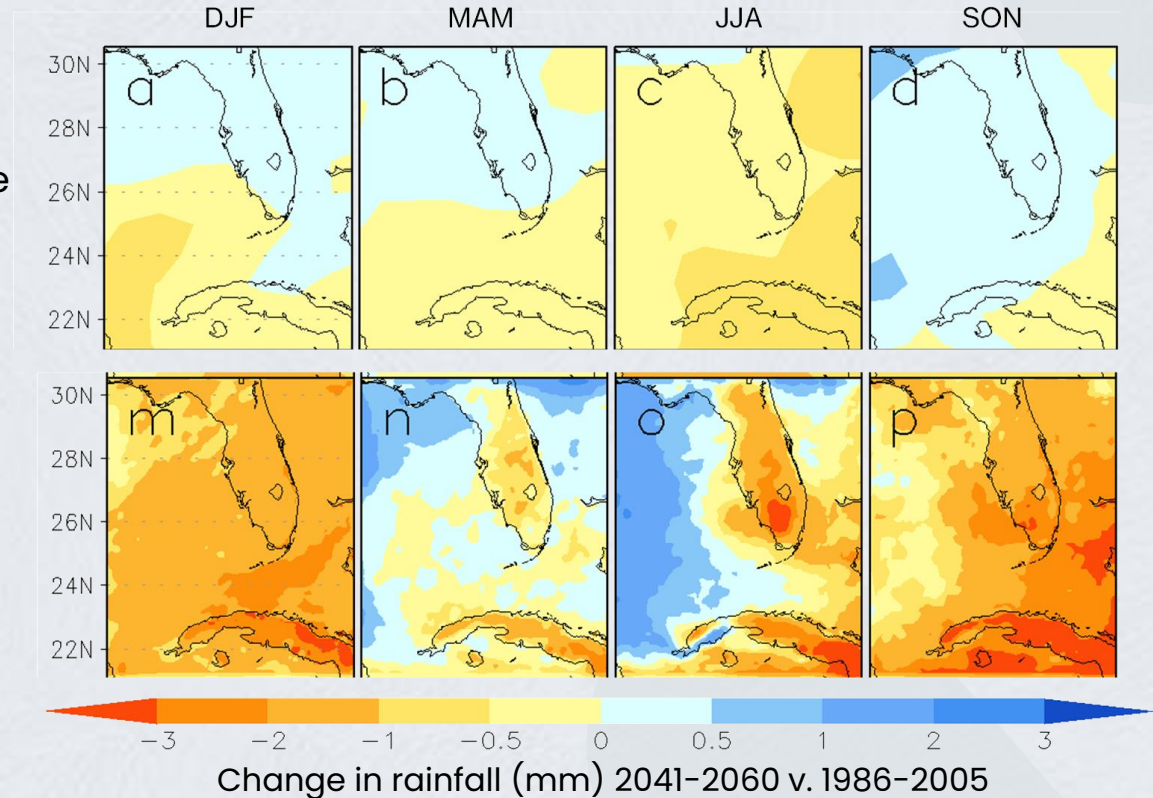
Advanced solution: dynamical downscaling via models

- Reference period = 10 years centered on 2015
- Ensemble 1 = 5×10 -year simulations of reference period
- Ensemble 2 = 5×10 -year simulations of future with 2°C increase in air temperature
- Ensemble 3 = 5×10 -year simulations of future with 3°C increase in air temperature
- Ratios of rainfall in the future to rainfall in the past $\Rightarrow$ change factors

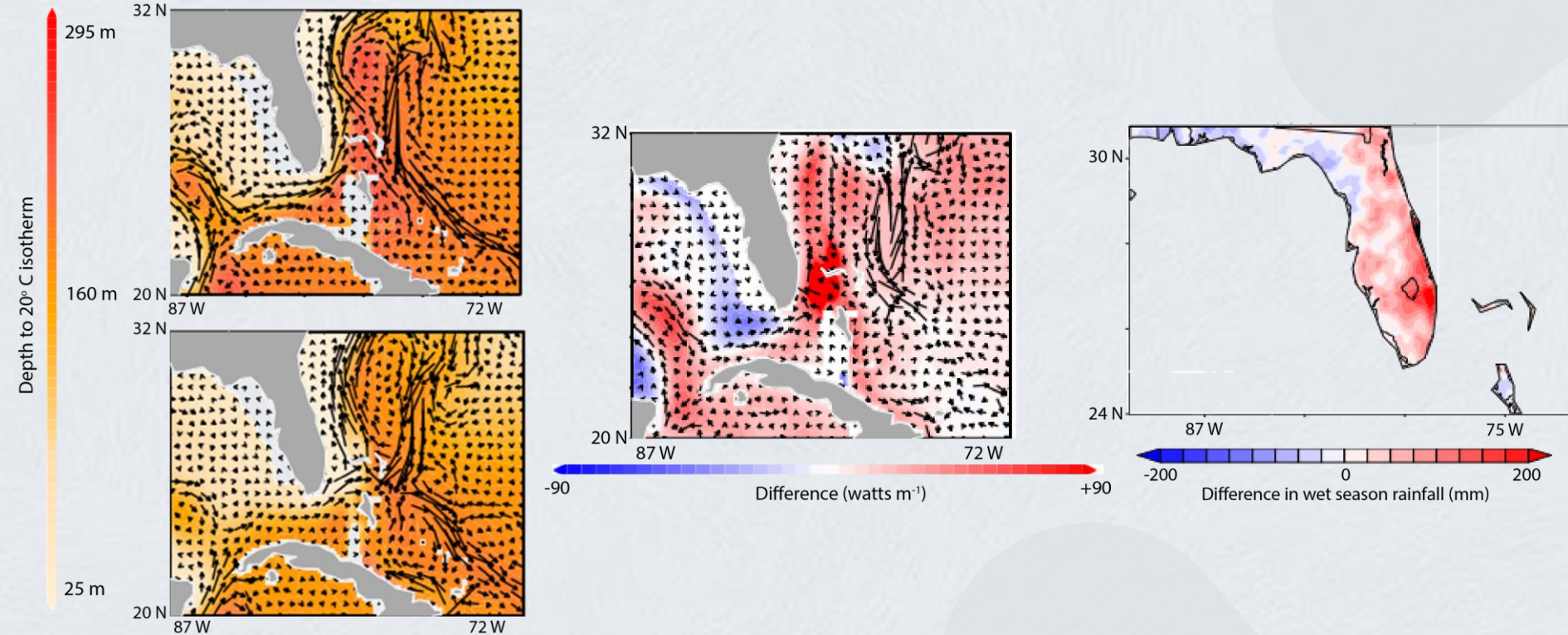
Preliminary runs: global v. regional models

CCSM4:
insignificant to moderate
increase in rainfall

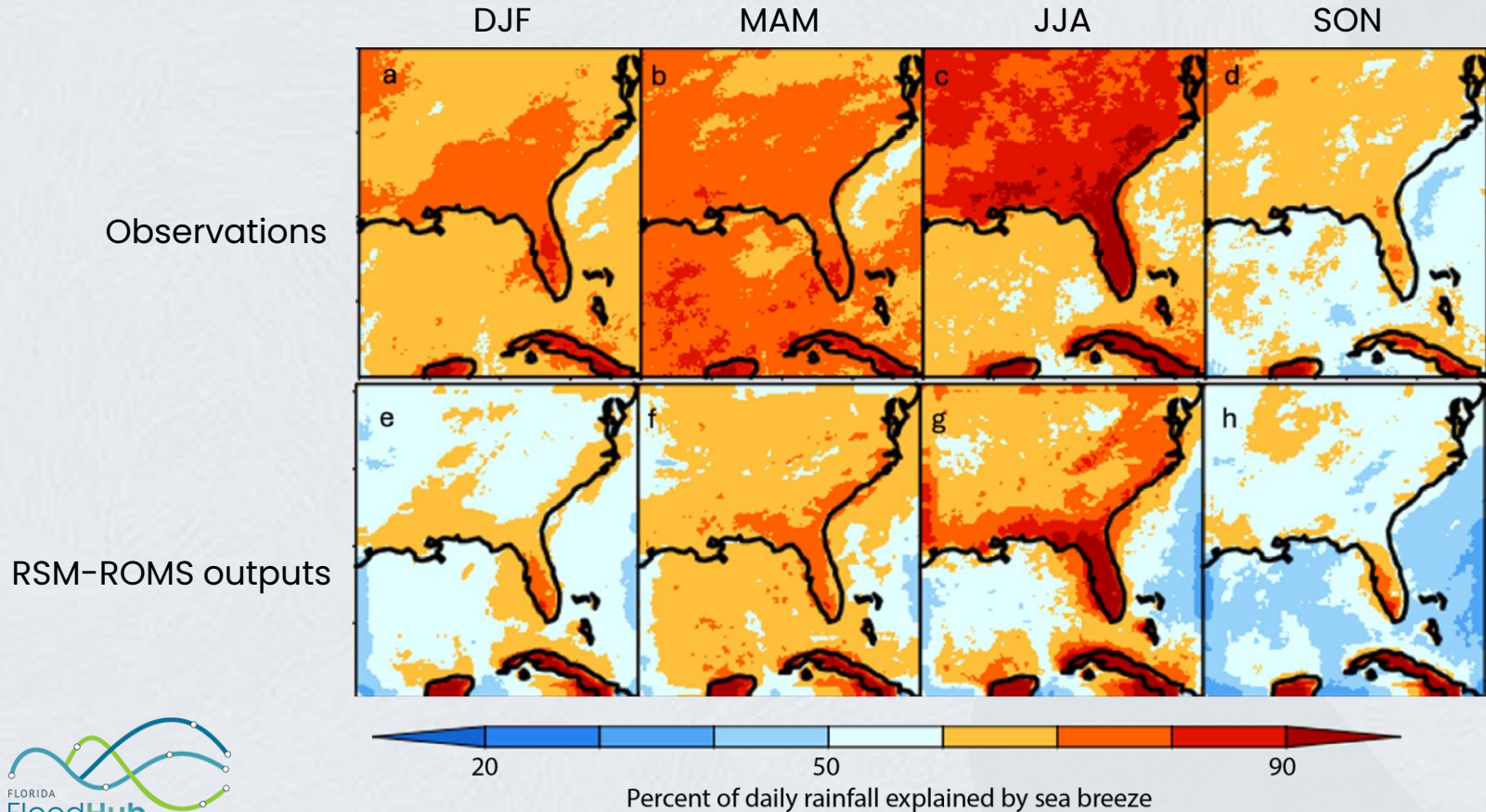
RSM-ROMS:
less rainfall



Preliminary runs: effect of “local” feature = Loop Current

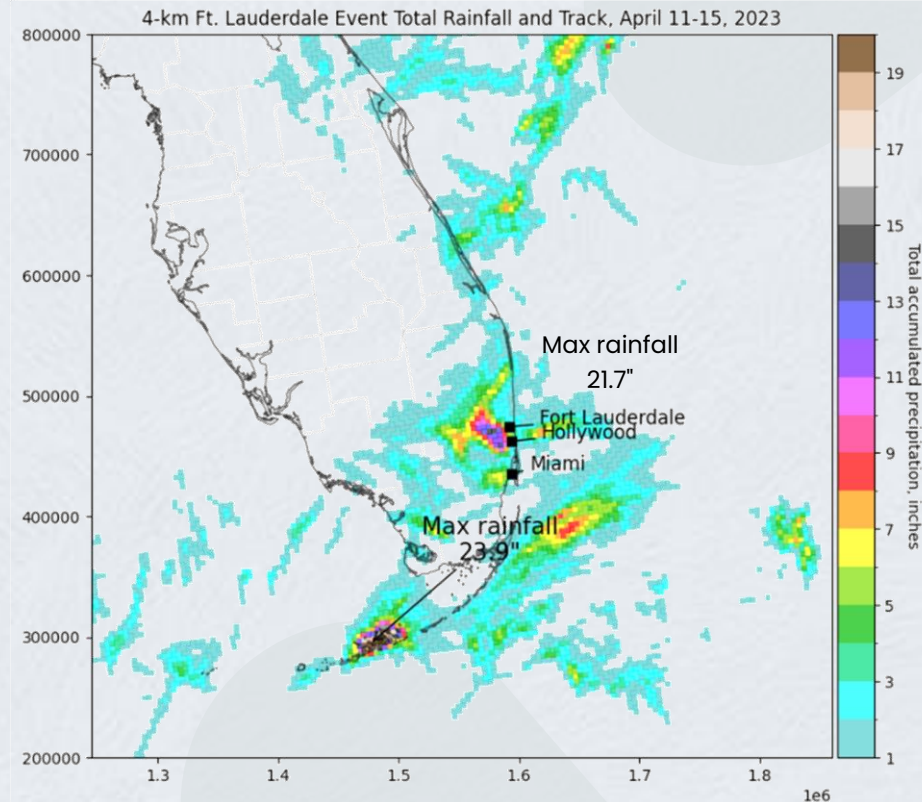


Preliminary runs: effect of “local” feature = sea breeze



Preliminary runs: simulate extreme events

Weather Research and Forecasting model
reproduced the April 2023
extreme event in south Florida
($> 20"$ of rain)



Bottom line

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Thank you!

