

Kathy Pegion (GMU/COLA) The SubX Team









SubX by the numbers



SubX Team

CORE TEAM

Ben Kirtman Kathy Pegion Tim DelSole Michael Tippett Andy Robertson Michael Bell Robert Burgman Jon Gottschalck Dan Collins Emerson LaJoie Hai Lin NCEP-CFSv2 Dan Collins Jon Gottschalck Emerson Lajoie Emily Becker

> NCEP-GEFS Yuejian Zhu Wei Ll

NASA-GEOS5 Deepthi Achuthavarier Randy Koster Len Marshak

> ECCC-GEM Hai Lin Bertrand Denis

Navy-ESM Neil Barton Joe Metzger

NCAR-CCSM4 Ben Kirtman Duguong Min Kathy Pegion Rong Fu

ESRL-FIM Shan Sun Stan Benjamin Ben Green

SubX Protocol

- Prediction System Details up to Provider
- Real-time and Retrospective Systems Identical
- Reforecast Period: 1999-2015
- At Least 3 Ensemble Members
- Minimum Length: 32 Days
- Real-time Forecast Made Available to CPC Through NCO Every Wednesday by 5pm of Every week
- Data on Uniform 1x1 Grid

Priority 1 Variables – Required to support CPC Operations

On 500 and 200 hPa levels

Variable	CF Standard Name	Abbrev	Unit	Frequ	iency			
Geopotential Height	geopotential_height	zg	m	Average of Instantatneous values at 0,6,12,18Z				
On 850 and 200 hPa levels								
Variable	CF Standard Name	Abbrev	Abbrev Unit Frequency					
Zonal Velocity	eastward_wind	ua	ms-1	Average of Instantatneous values at 0,6,12,18Z				
Meridional Velocity	northward_wind	va	ms-1	Average of Instantatneous values at 0,6,12,18Z				
On a single level								
Variable		CF Standard Name			Abbrev	Unit	Frequency	
2m Temperature		air_temperatur	æ		tas	К	Daily Average	
Precipitation		precipitation_f	lux		pr	kgm-2s-1	Accumulated every 24hrs	
Surface Temperature (S	surface_temperature			ts	К	Daily Average		
Outgoing Longwave Ra	toa_outgoing_longwave_flux			rlut	Wm-2	Accumulated every 24hrs		

- 1. How far out did the SubX models pick up on Harvey/Irma and related precipitation?
- 1. Did the SubX models predict large scale environmental factors that would indicate more favorable conditions for development of tropical cyclones?

Hurricane Harvey

August 2017

Monday Tuesday		Wednesday	Thursday	Friday	Saturday	Sunday
	1 EMC-GEFS(21)	2 EMC-GEFS(21) ESRL-FIM(4)	3 ECCC-GEM(21)	4 GMAO-GEOS5(4)	5 NRL-NESM(1)	6 RSMAS-CCSM4(9) NRL-NESM(1)
7 NRL-NESM(1)	8 EMC-GEFS(2) NRL-NESM(1)	9 EMC-GEFS(21) ESRL-FIM(4) GMAO-GEOS5	10 ECCC-GEM(21)	11	12 NRL-NESM(1)	13 RSMAS-CCSM4(9) NRL-NESM(1)
14 NRL-NESM(1) GMAO-GEOS5(4)	15 EMC-GEFS(21) NRL-NESM(1)	16 EMC-GEFS(21) ESRL-FIM(4)	17 ECCC-GEM(21)	18	19 NRL-NESM(1) GMAO-GEOS5(4)	20 RSMAS-CCSM4(9) NRL-NESM(1)
21 NRL-NESM(1)	EMC-GEFS(21) NRL-NESM(1)	EMC-GEFS(21) ESRL-FIM(4)	24 ECCC-GEM(21) GMAO-GEOS5(4)		26 NRL-NESM(1)	27 RSMAS-CCSM4(9) NRL-NESM(1)
28 NRL-NESM(1)	29 EMC-GEFS(2) NRL-NESM(1) GMAO-GEOS5	30 EMC-GEFS(2) ESRL-FIM(4)	31 ECCC-GEM(21)			

MME (34 Ensemble Members)





Valid Aug 26-Sep 8







Init: Aug 12-17 Week 2

































































128

64

32

16

8

4

2

1

0.5

0.25

Д













Init: Jul 30-Aug 3 Week 4

Init: Aug 4-10 Week 3





Weekly total rainfall (mm) for Week of Aug 26- Sep 1

Ensemble Mean





Weekly averaged wind speed (m/s) for Week of Aug 26- Sep 1 Ensemble Mean





Weekly Averaged Zonal Shear for Week of Aug 26- Sep 1 **Ensemble Mean**











Init: Aug 12-17 Week 2

Init Aug 19-24 Week 1























































Init: Sep 2-7 Week 1

Init: Aug 26-30 Week 2

Week 3





















Init: Aug 12-17 Week 4

Weekly total rainfall (mm) for Week of Sep 9-15 **Ensemble Mean**



Summary

- SubX models were able to predict increased precipitation at week 3-4 associated with an "event", but not the details of that event.
- Some SubX models appear to predict tropical cyclone related precipitation at 2 to 3-weeks, but tracks and land fall locations are not well predicted this far out.
- SubX models predicted low shear environment at 3-4 weeks
- Future work will comprehensively evaluate the skill of SubX models in predicting large-scale environmental conditions for tropical cyclone activity.

SubX Forecast and Hindcast data are publicly available





http://cola.gmu.edu/kpegion/subx/