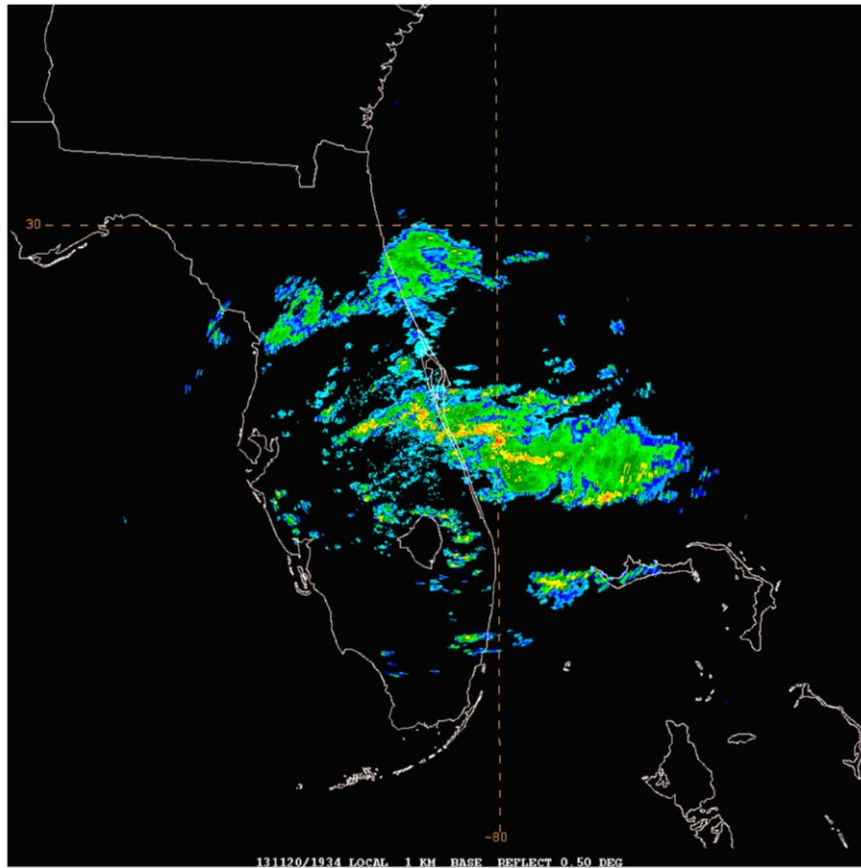


ECHO TRAINING EVENT OVER NORTHERN BAHAMAS

NOVEMBER 19-20, 2013

PETER FEARON
METEOROLOGICAL SERVICE JAMAICA

INSTRUCTORS:
MR. MICHEL DAVISON AND MR. JOSE GALVEZ



MAIN TASKS AT THE TROPICAL DESK

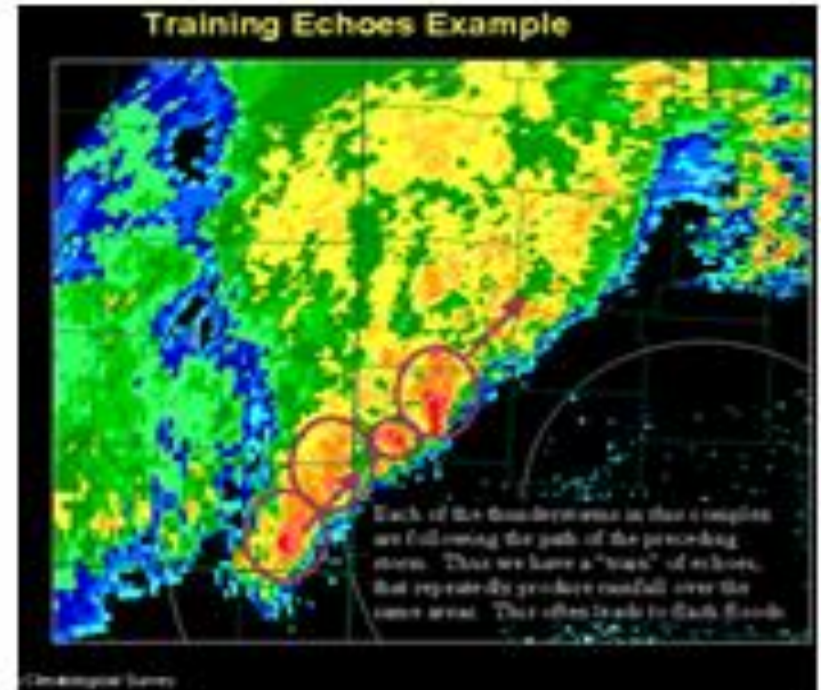
- ◉ Model assessment include : CPC Climate model output (MJO) , Sea-Surface Temperature /Anomalies.
- ◉ At the Tropical Desk models used are the GFS, ECMWF and UKMET.
- ◉ Satellite Imagery Interpretation and Streamline Analysis at 850mb, 500mb and 250mb .
- ◉ Using macros and commands in WINGRIDDS: to assess the vertical structure of atmosphere.
- ◉ Examining the Galvez-Davison (G.D.I) Index output.
- ◉ Chart production with Quantitative Precipitation Forecast for the domain(Mexico, Central America , Caribbean and northern South America) over four days.

WHAT IS ECHO TRAINING?

An area/line of numerous showers and/or thunderstorms moving over the same region during a relatively short period of time.

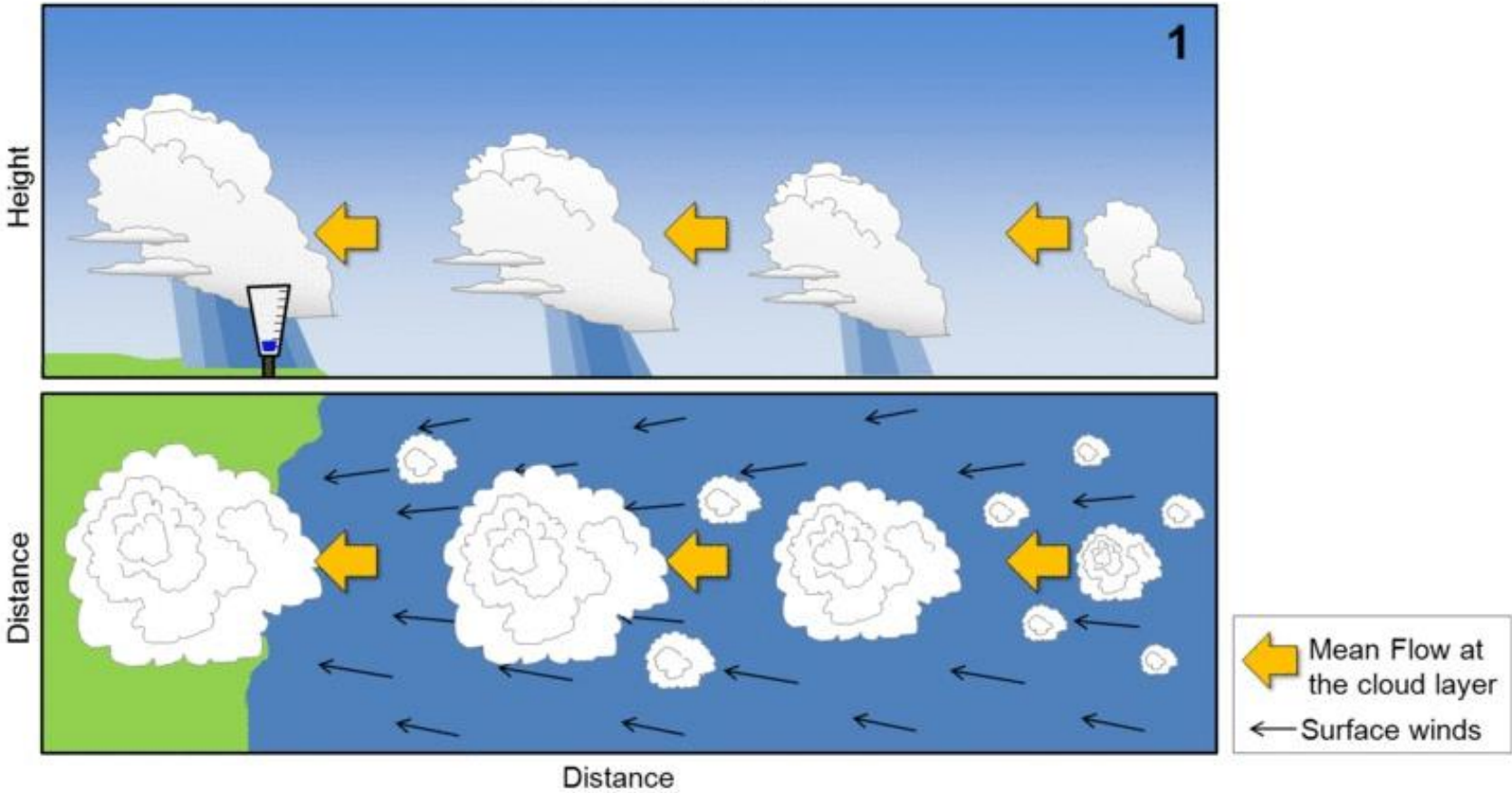
(Glossary of Meteorology.)

- It is a type of Mesoscale Convective system; which are thunderstorm regions that may be round or linear in shape, approximately 100 kilometres or more across in one direction.
- In this case the showers and thunderstorms formed in a line along a Stationary Front (trigger) with deep layer easterly/northeasterly winds(confluence) driving the cells along the boundary.



ANIMATION

Echo Training

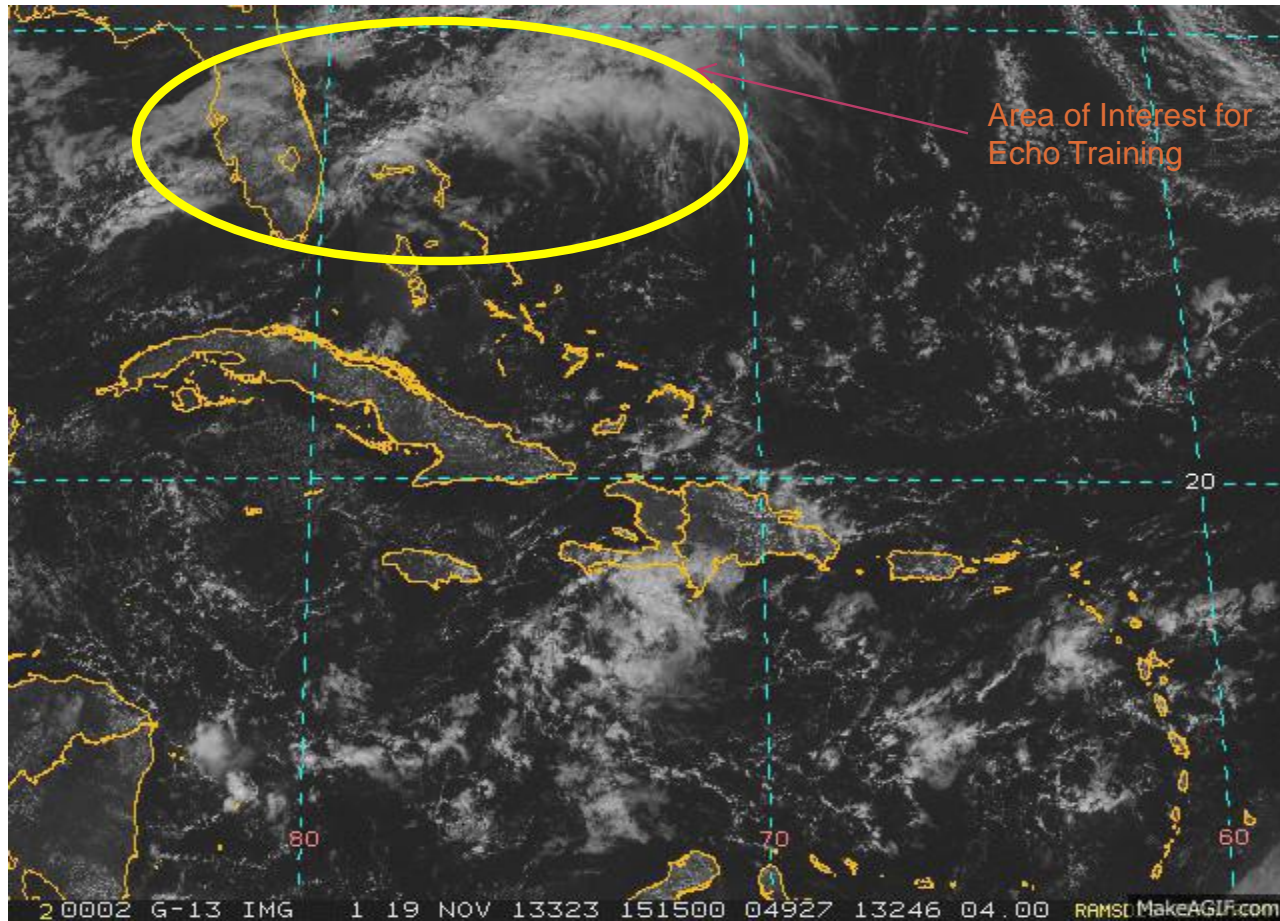


CASE OVERVIEW

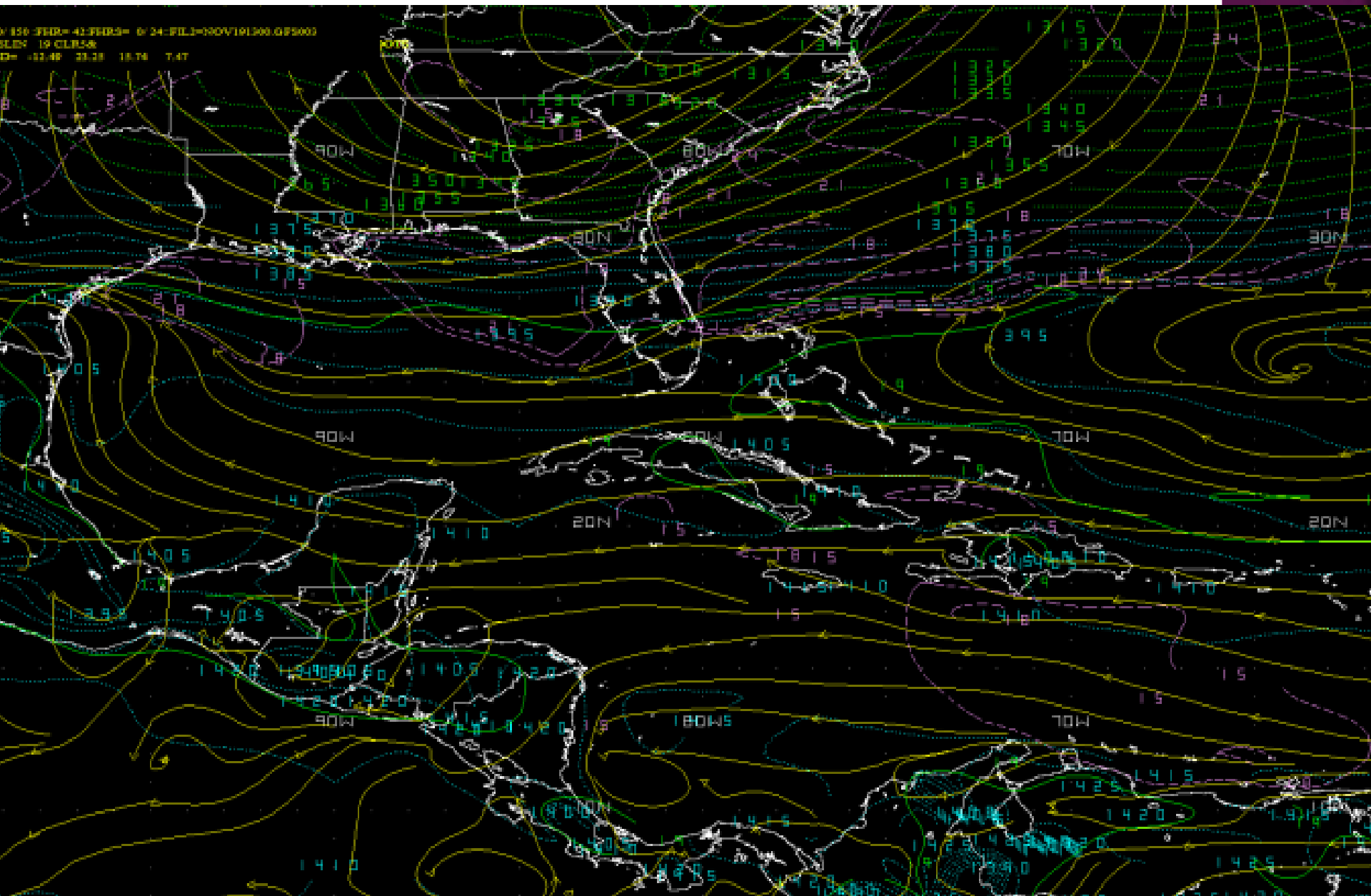
- On the 18th a Cold Front approached the extreme northwestern Bahamas extending into central/southern Florida with enhanced low-level convergence expected. The discussion mentioned the strong potential for scattered showers with the risk of **Echo Training** F24-F54hrs based on model guidance and analysis.
- On the 19th the Front started to stall just near (Grand Bahama) northern Bahamas. Models were consistent with favorable environmental conditions for Echo training development late on the 19th into the 20th.
- On 20th the environmental conditions became the most favorable for Echo training as the Front meandered across extreme northern Bahamas into Florida with largest accumulations through the 21st at 12Z.

VISIBLE SATELLITE IMAGERY

NOVEMBER 19 2013 1515Z-1945Z



FRONT AND SHEAR LINE

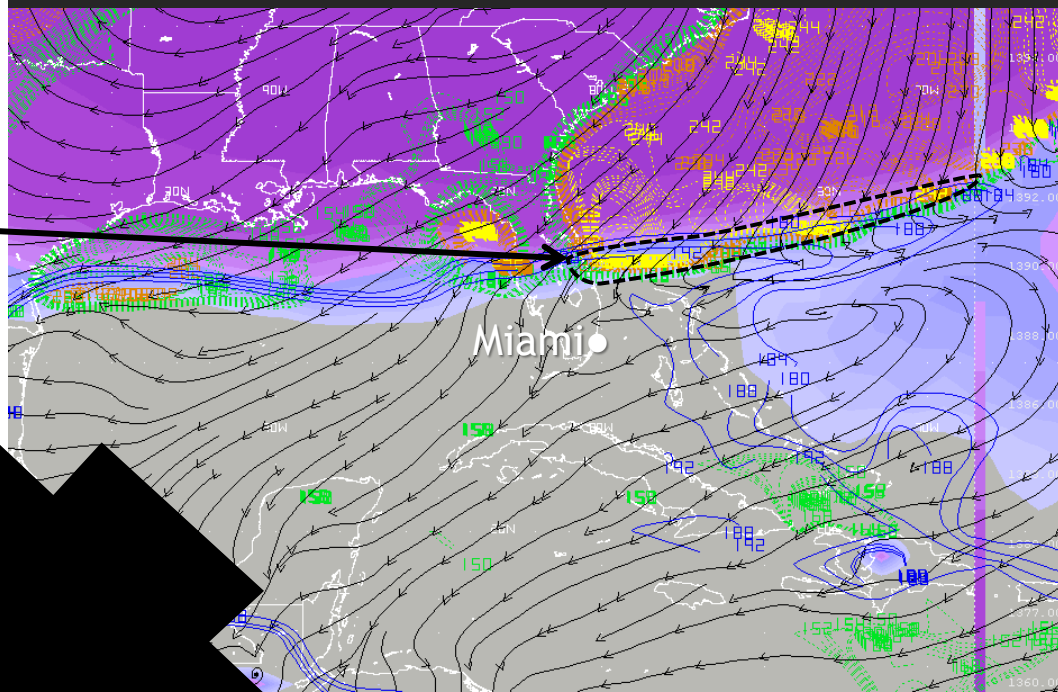


FRONT AND SHEAR LINE

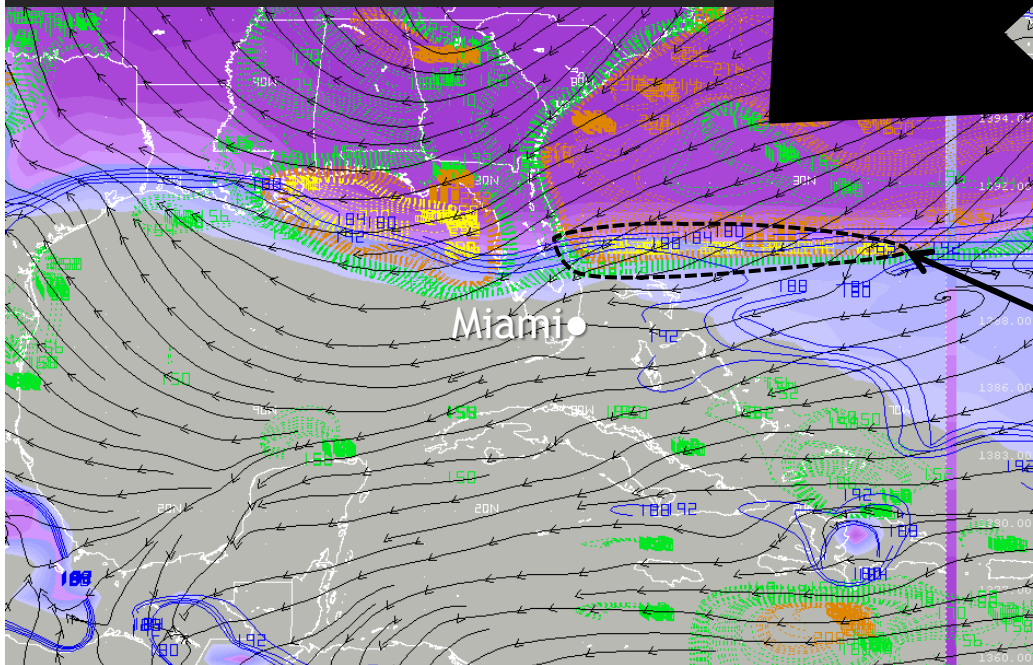
1000-850 THICKNESS (SHADED),
BL DEWPOINT (BLUE),
BL WINDS (STREAMLINES & DASHES)

25-30kt NE Winds increasing,
strongest along the front

Nov 20 00Z (F48): Echo Training Developing



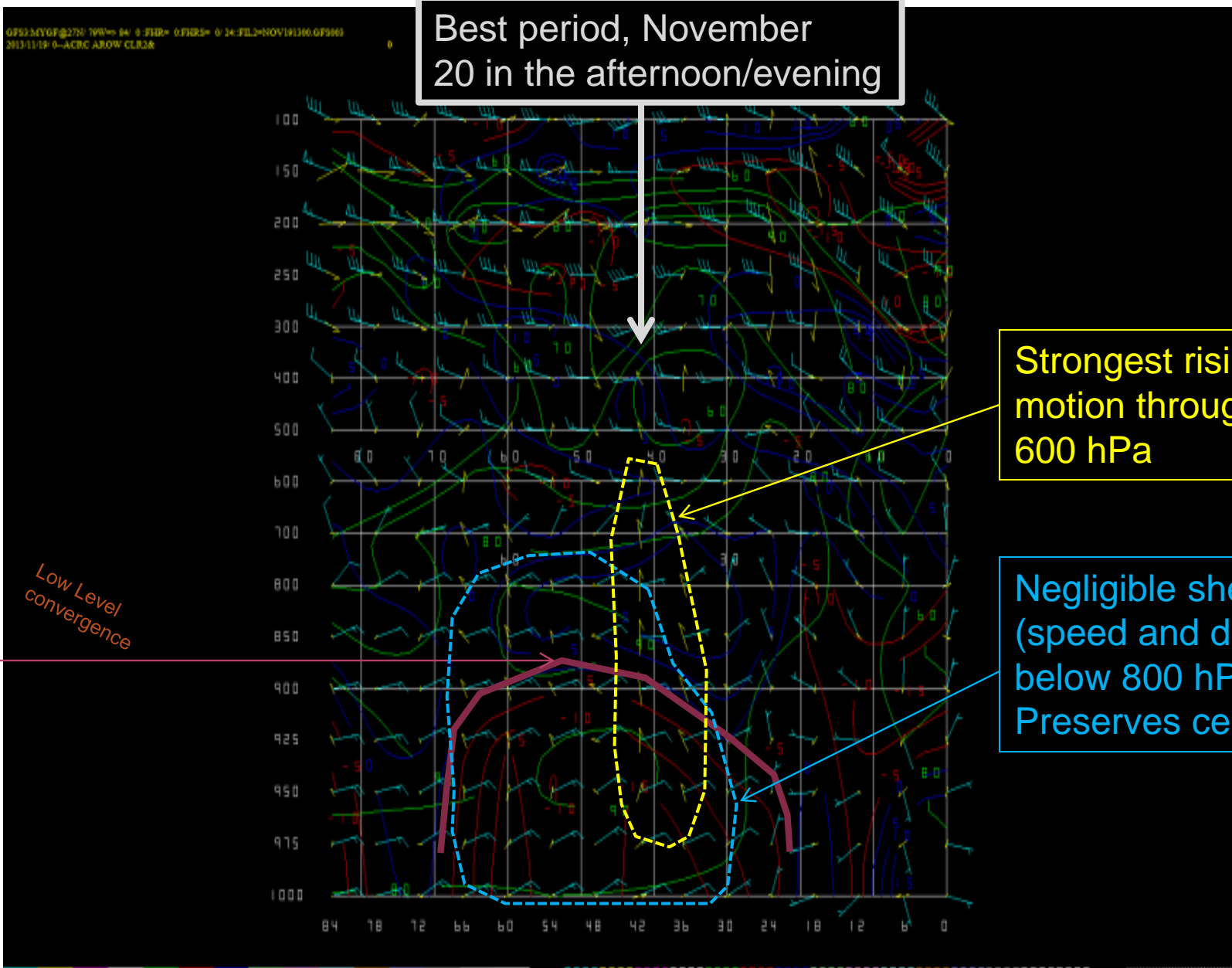
Nov 21 00Z (F72): Decline



25-30kt NE Winds
weakening along the front

TIME-SECTION FREEPORT MYGF (RH, DIV, WIND, FORCING)

Best period, November 20 in the afternoon/evening



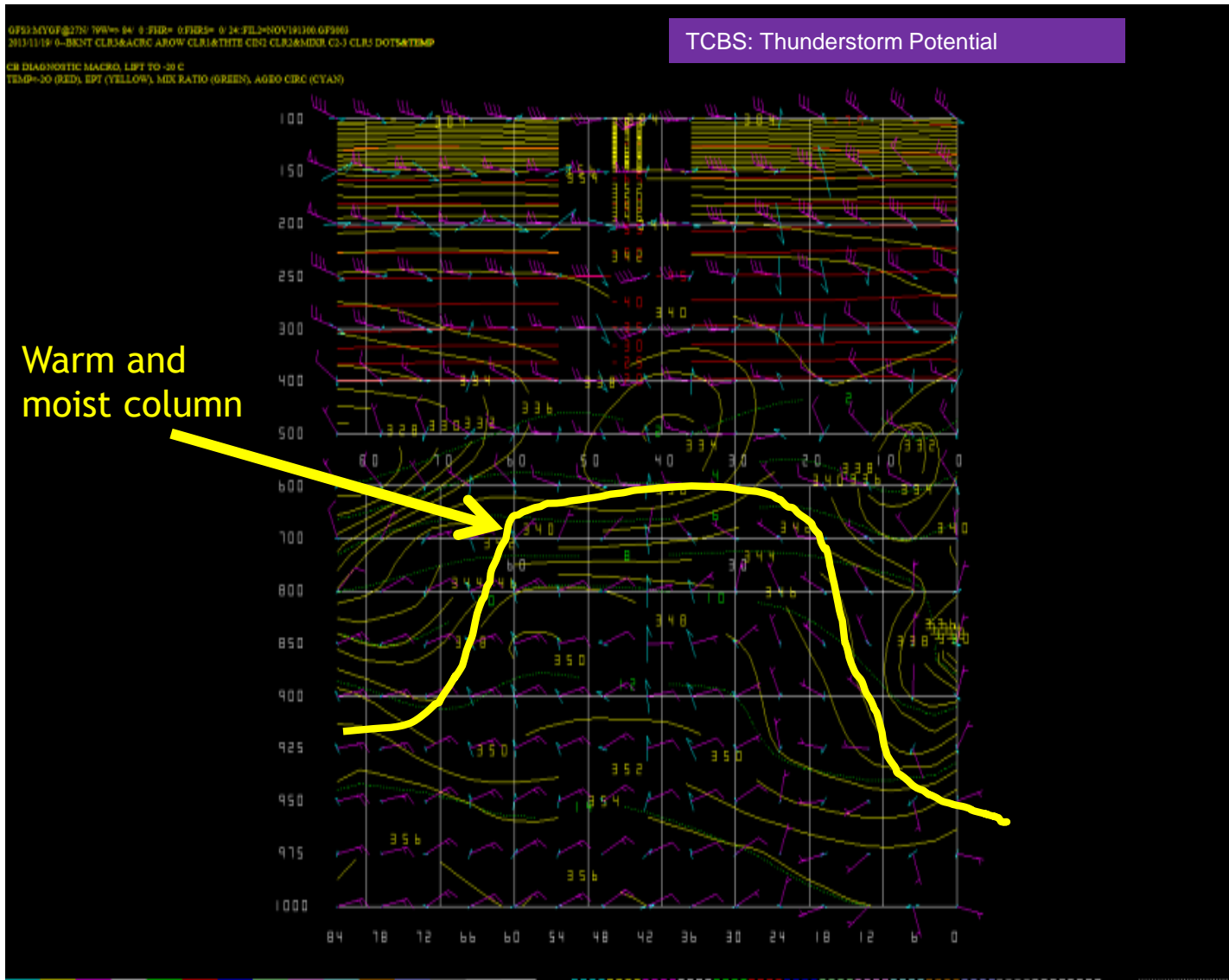
Strongest rising motion through 600 hPa

Negligible shear (speed and direction) below 800 hPa Preserves cell structure

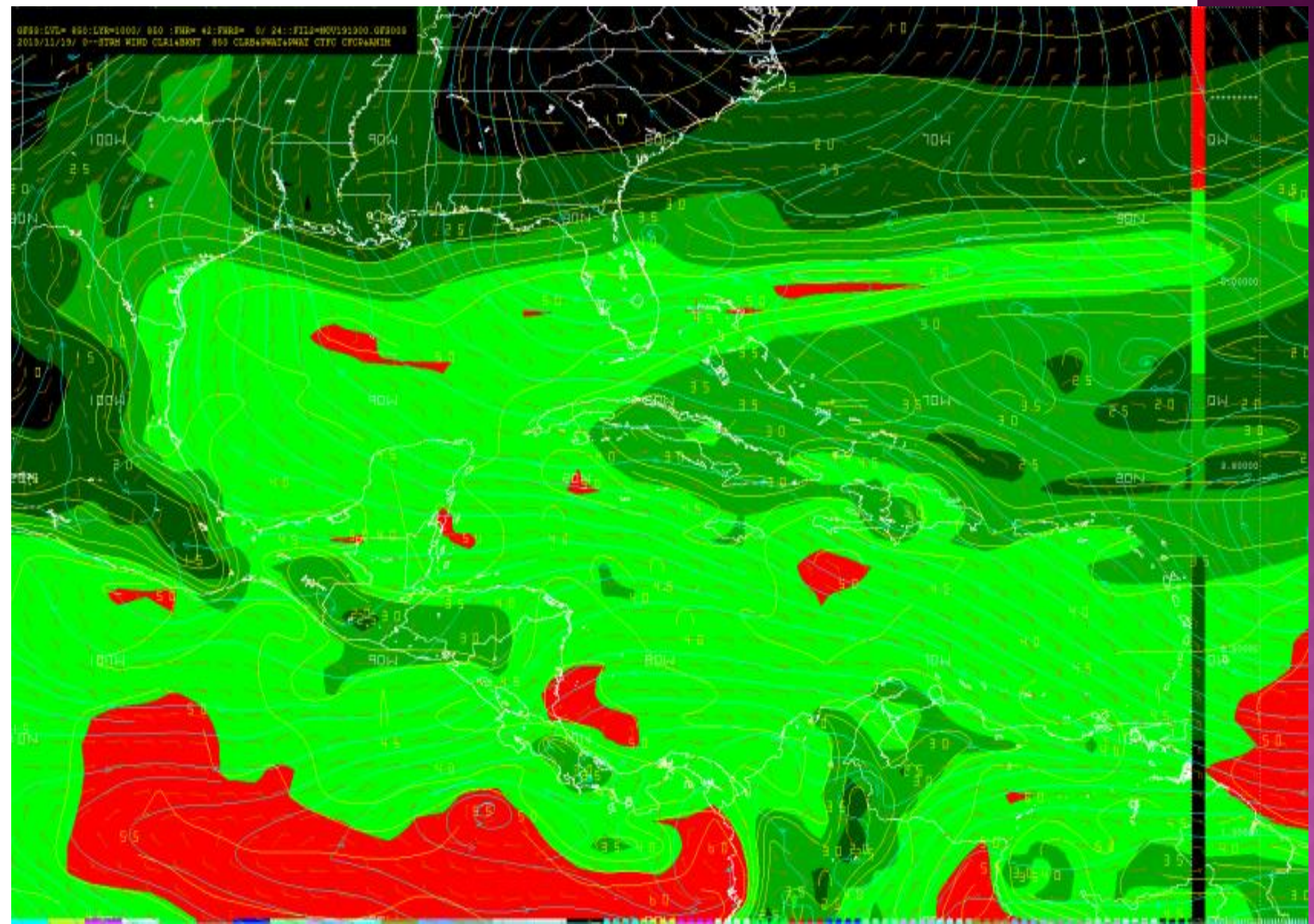
Low Level convergence

THUNDERSTORM POTENTIAL

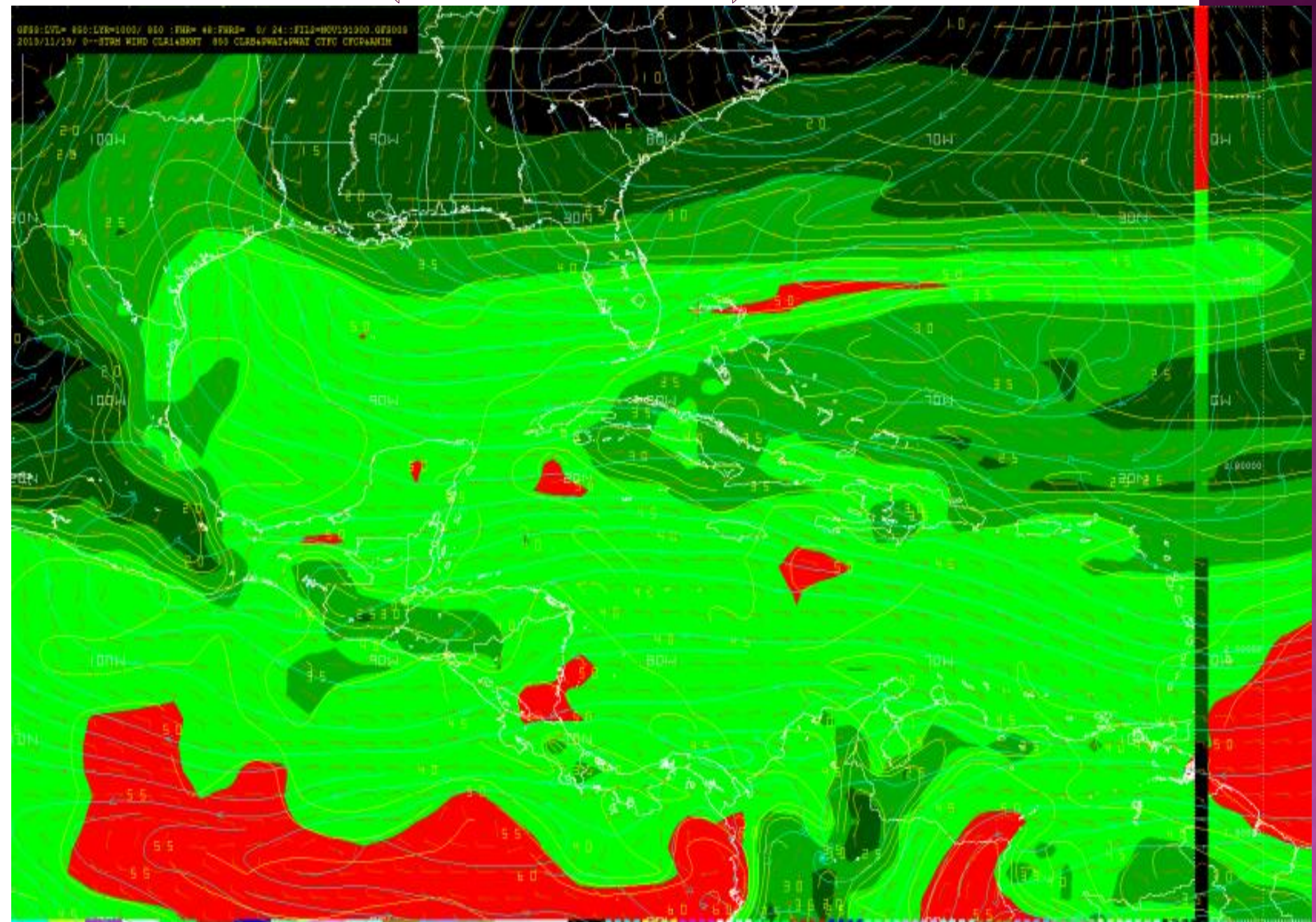
- Vertical distribution of Theta-e
- Rising motion reaching the -20C isotherm, where ice formation is highly likely



GFS 850MB WINDS AND PRECIPITABLE WATER

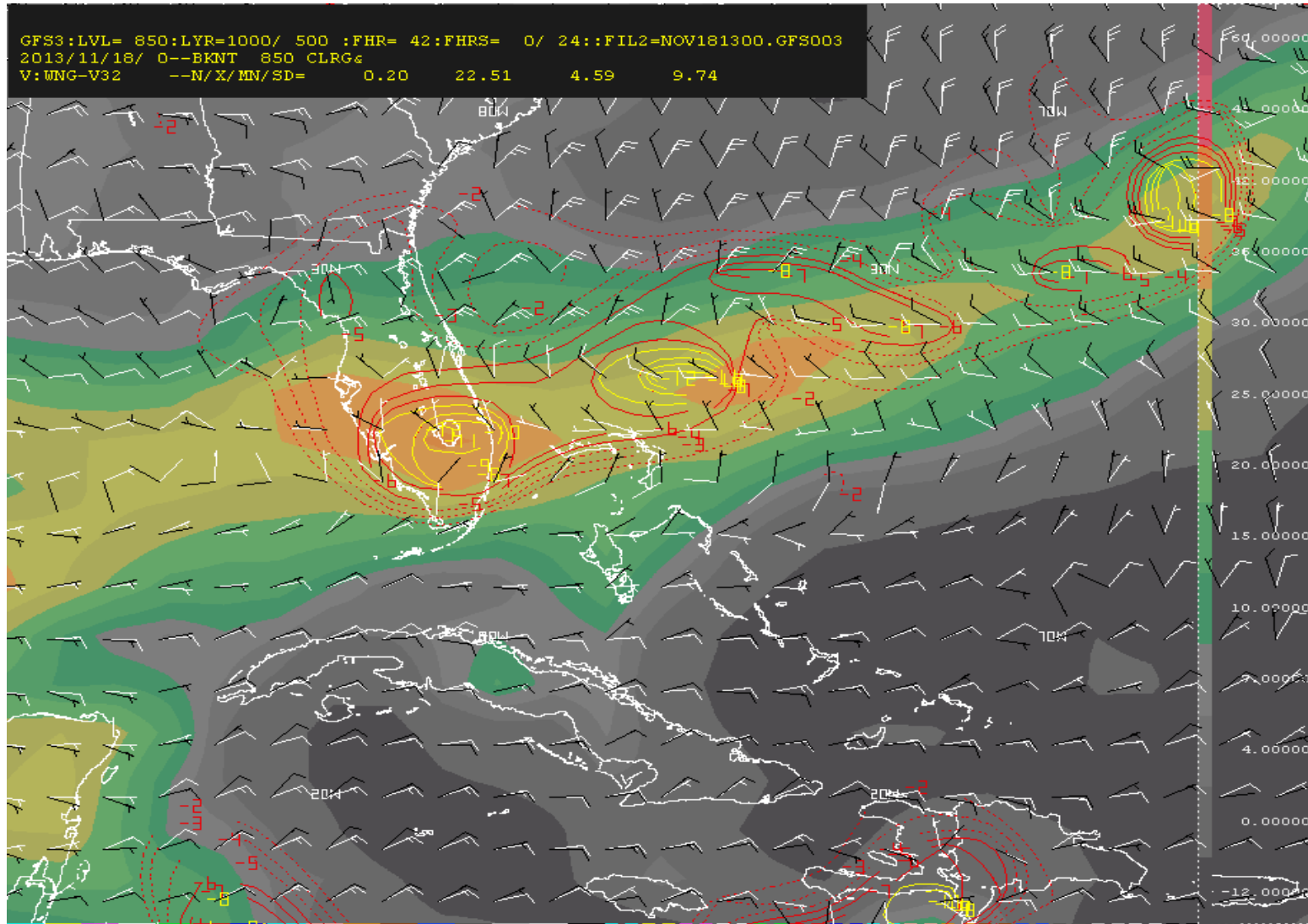


MOISTURE PLUME (PWAT INCREASE)



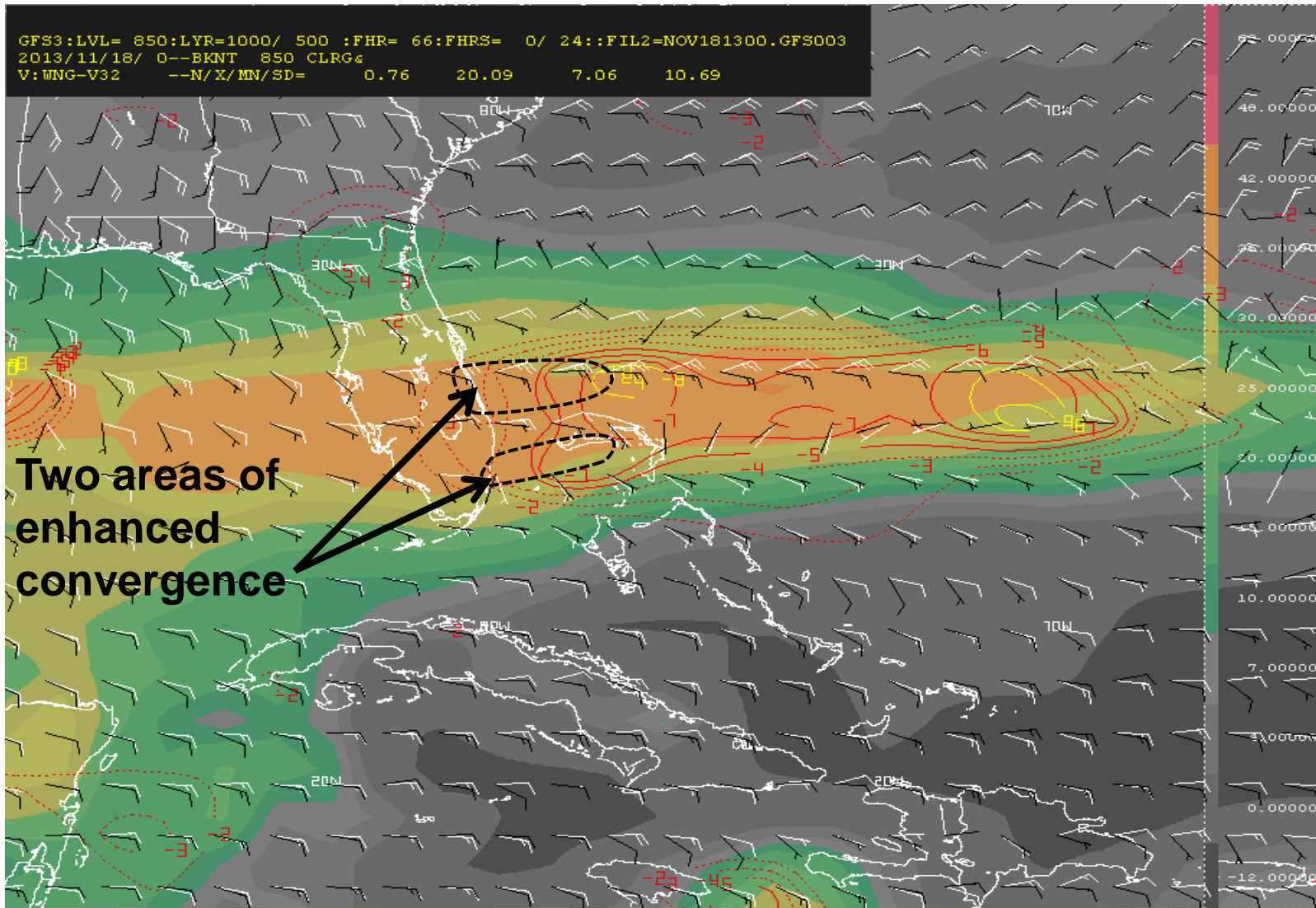
GDI (GALVEZ-DAVISON INDEX FOR CONVECTIVE INSTABILITY), 850 AND 925 WINDS, LOW-LEVEL CONVERGENCE

November 19TH 2013 , 1pm



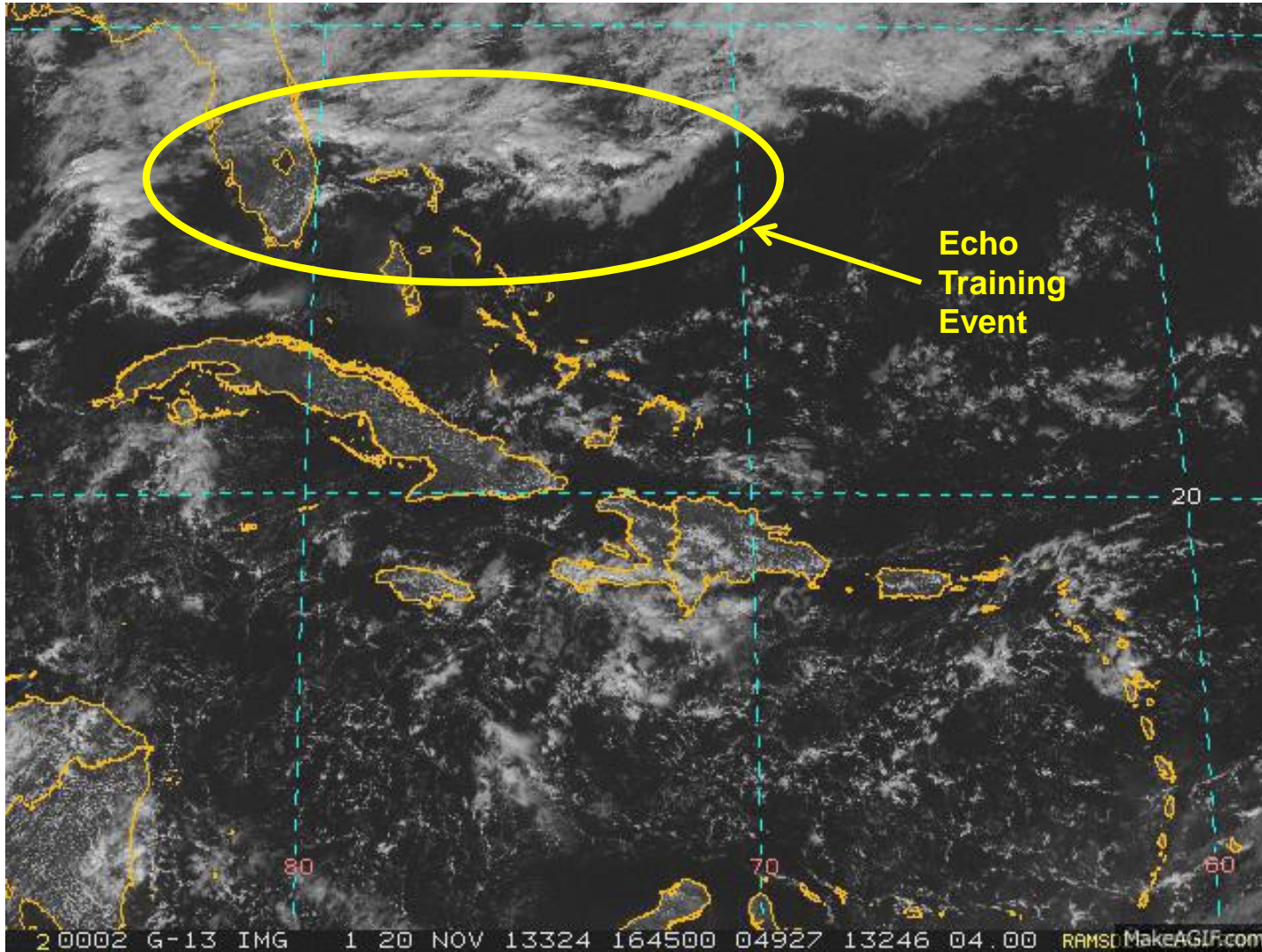
SAME BUT DURING ECHO TRAINING PEAK

November 20TH 2013 , 1pm



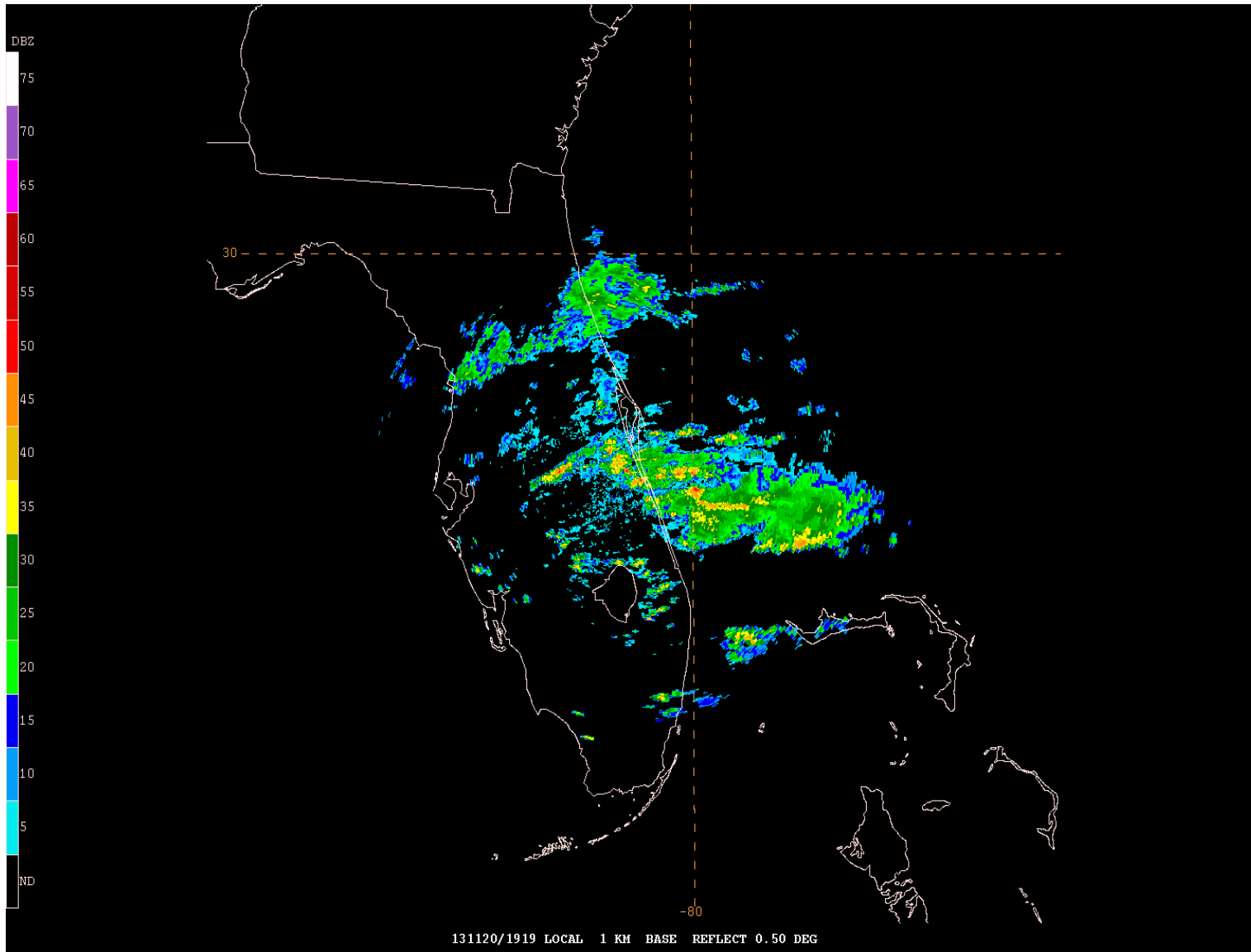
VISIBLE SATELLITE IMAGERY

NOVEMBER 20 2013 1515Z-1945Z



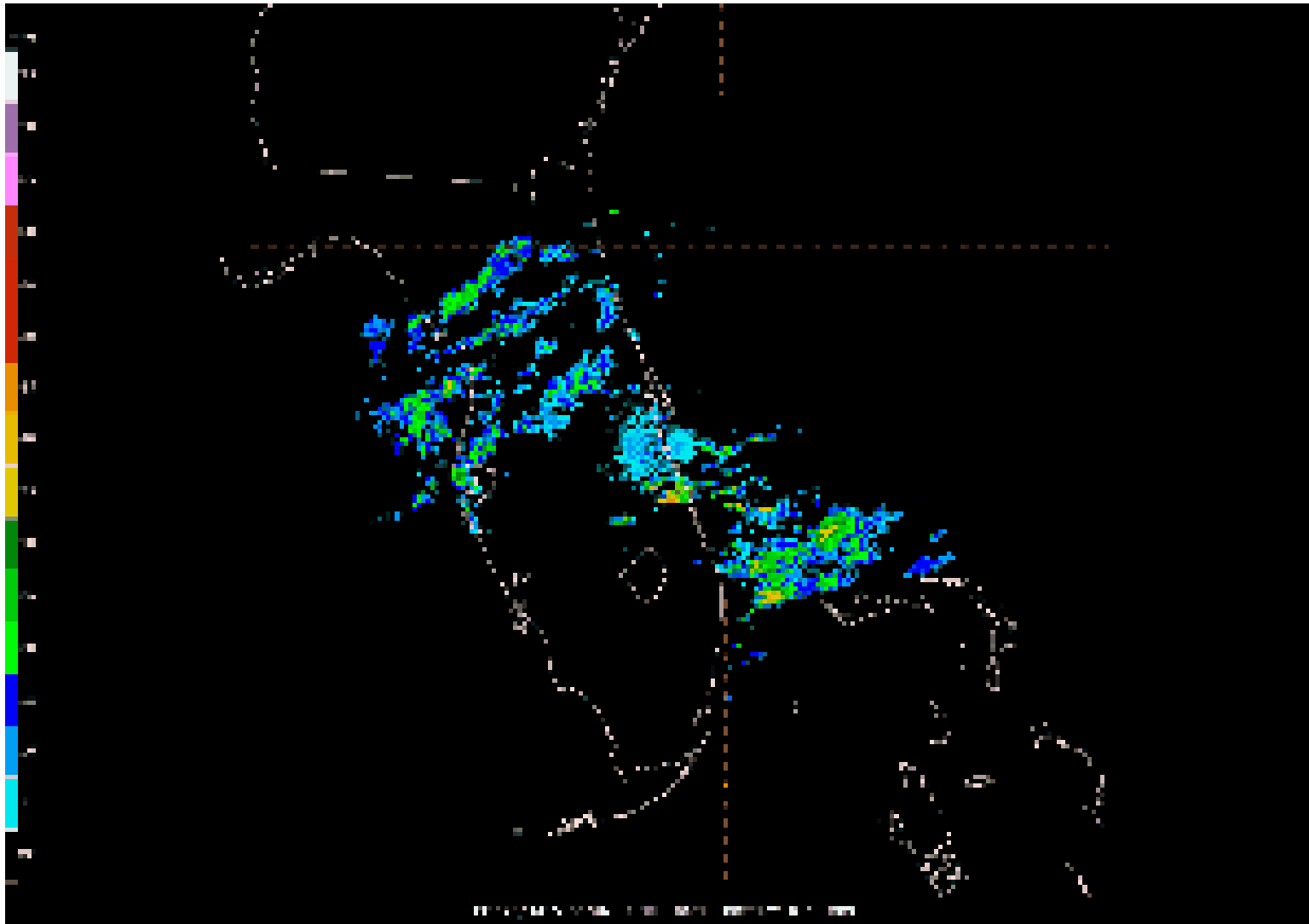
DOPPLER RADAR / MELBOURNE, FLORIDA

Base Reflectivity Images @ 0.5 degrees.

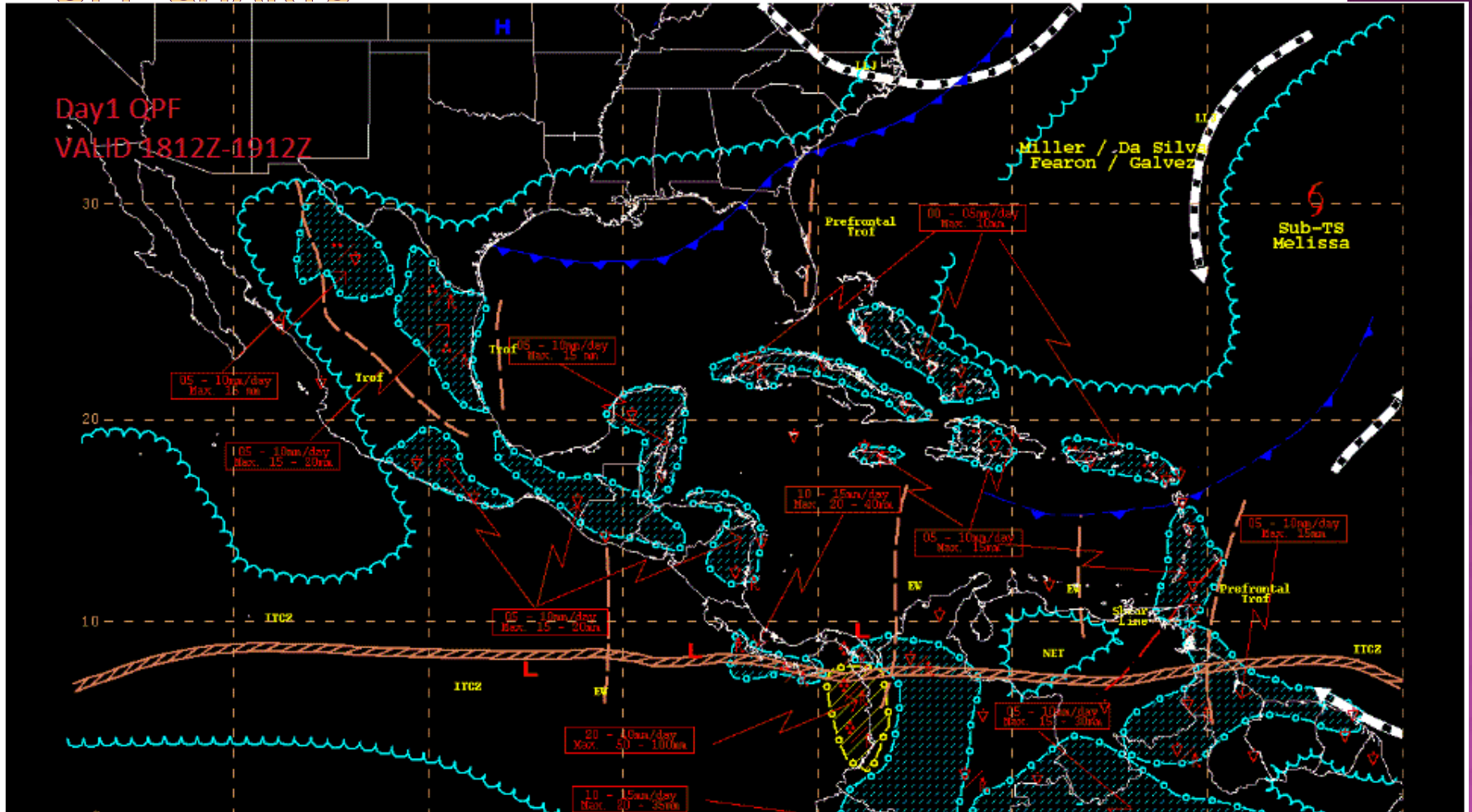


DOPPLER RADAR LOOP/ MELBOURNE, FLORIDA

Base Reflectivity Images @ 0.5 degrees.

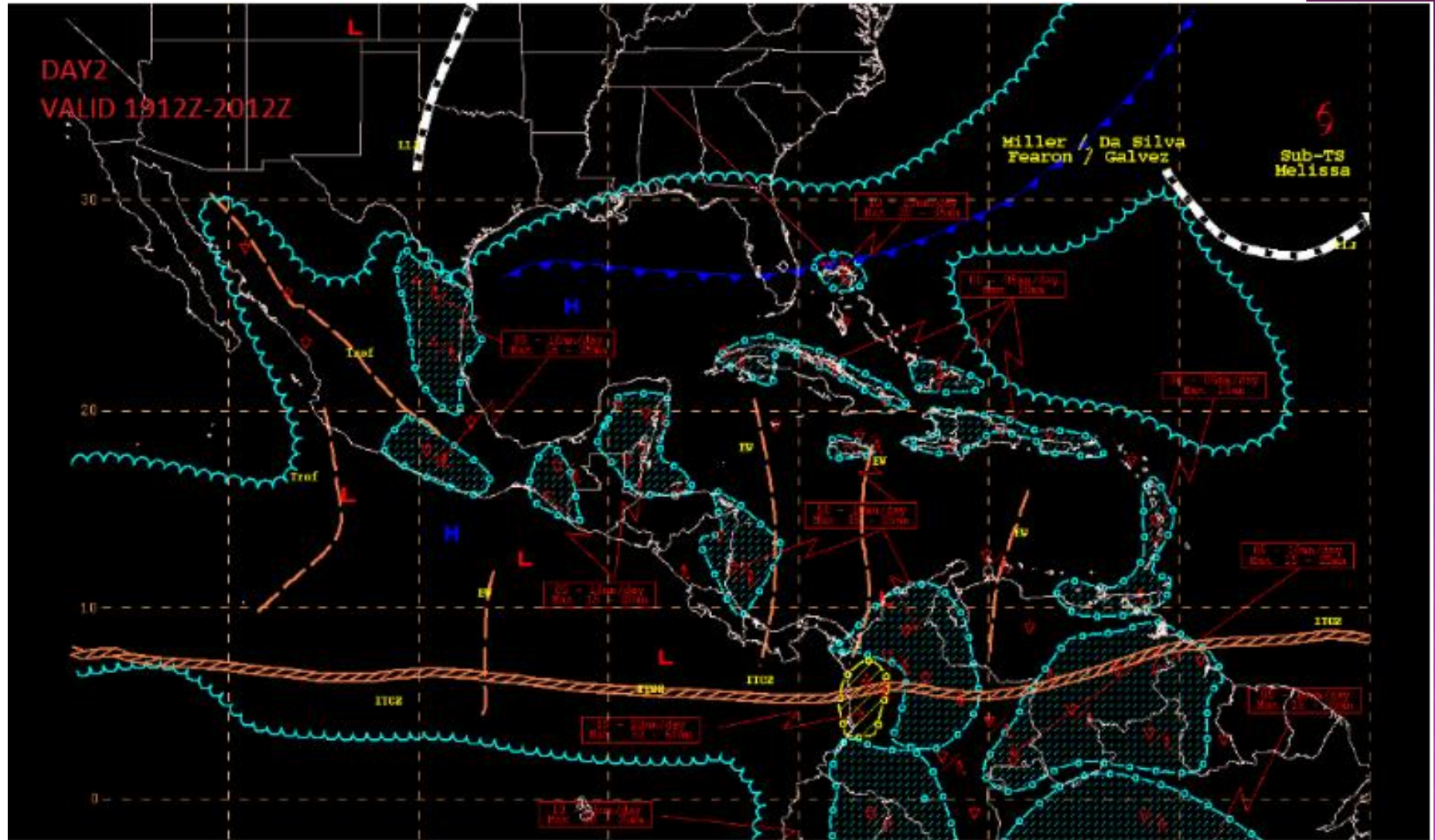


OPF CHARTS



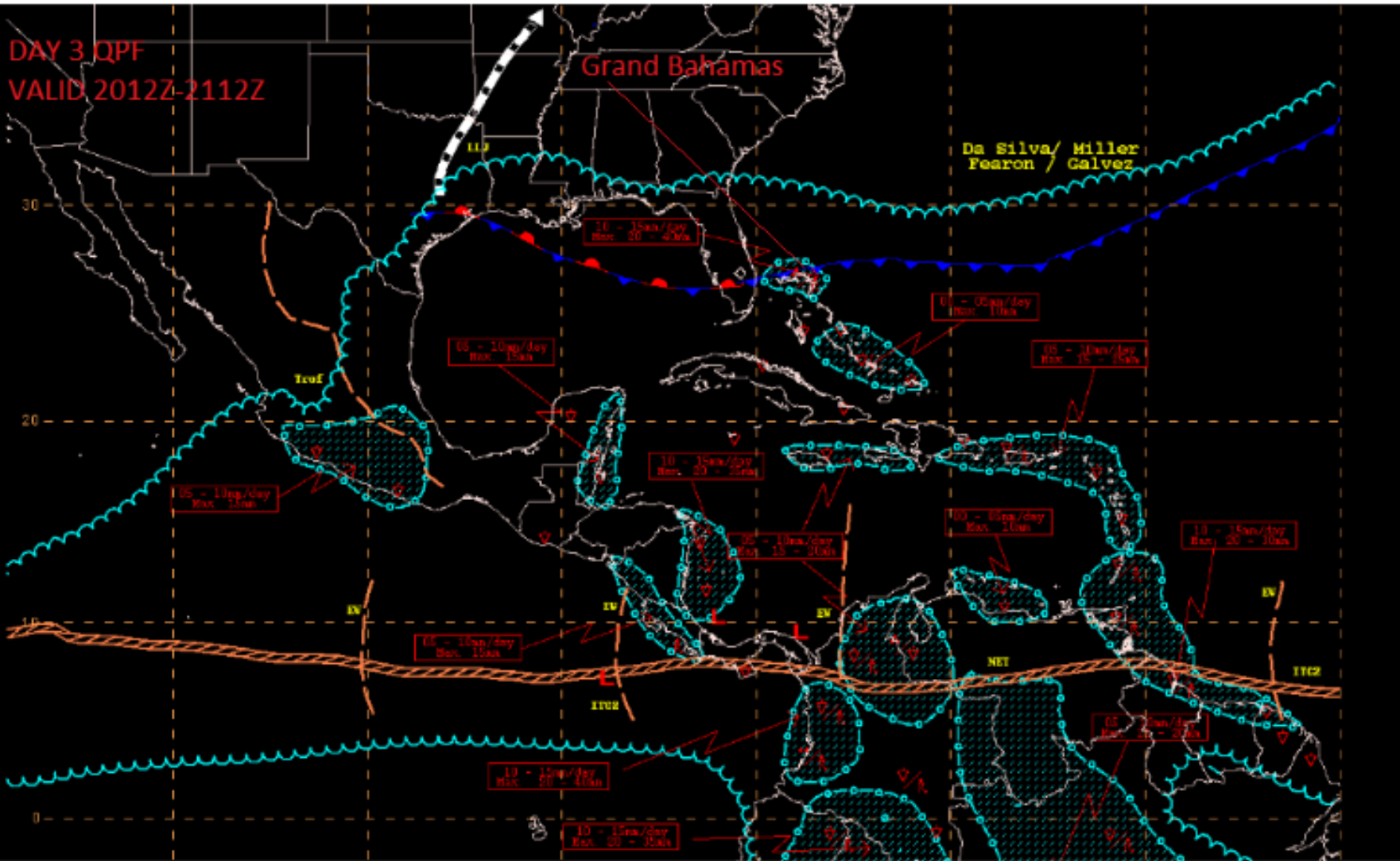
DESK FORECASTS FOR DAY 2 (FRONT DAY)

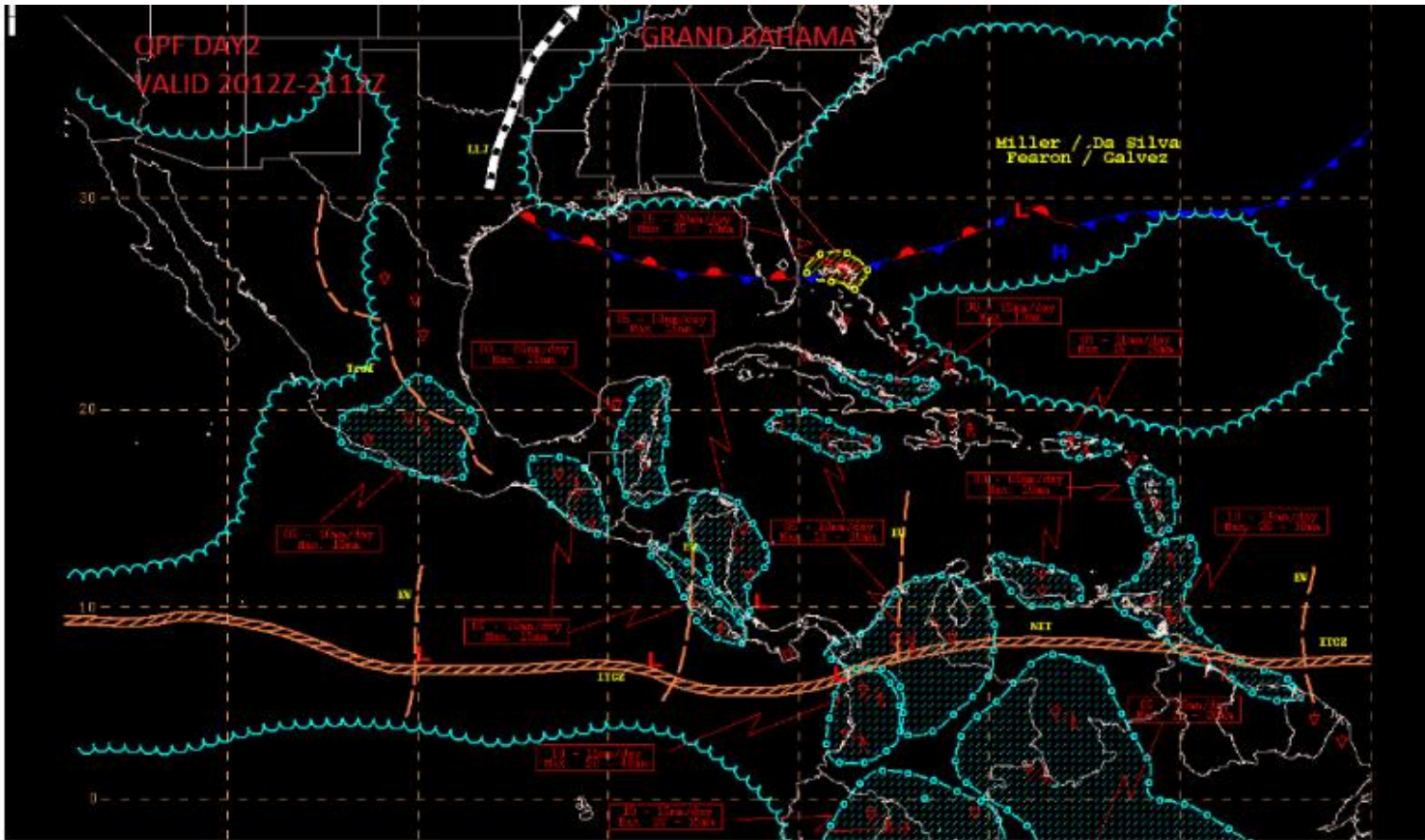
MAX .8 - 1.4 INCHES



DESK FORECASTS FOR DAY 3 (ECHO TR.) MAX .8 - 1.6 INCHES

DAY 3 QPF
VALID 2012Z-2112Z





RAINFALL RECORD

STATION: FREEPORT, BAHAMAS NUMBER: 78062 YEAR: 2013

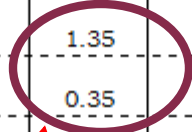
ISLAND: GRAND BAHAMA Latitude: 26° 33' N Longitude: 78° 42' W Altitude: 7FT.

Totals of rainfall for 24 hours commencing at 7:00 AM on the date shown, in inches, tenths and hundredths.

Date	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			TRACE		0.44		1.68	0.06			0.03	
2					2.77		0.65	0.45	0.48			0.81
3	TRACE				0.23	1.50	0.01		0.11			
4			0.01	1.53		TRACE	0.03		0.07		0.01	
5			0.00	0.24	4.30				TRACE		0.06	0.02
6			TRACE					2.43	0.19		TRACE	0.01
7								0.01		1.78		
8				0.41		6.11	1.74	0.03		1.14		
9	TRACE			0.01			0.47	0.14	1.48	0.31		0.01
10	TRACE			0.04		0.04	0.88		0.87			TRACE
11						1.13	0.06		0.38		0.31	
12			0.01			0.07	0.01	0.84	0.03			0.17
13									0.02		TRACE	
14		0.64				TRACE		0.02				
15		0.06		0.98			3.46	TRACE				
16				1.58			1.25		0.22			0.84
17	0.02					0.20	0.02		1.19			
18		0.86	0.07				0.40		TRACE		0.01	

Northern Bahamas → ~1.4 inches of rain on both days.
Largest in Florida.

Cold Front Day

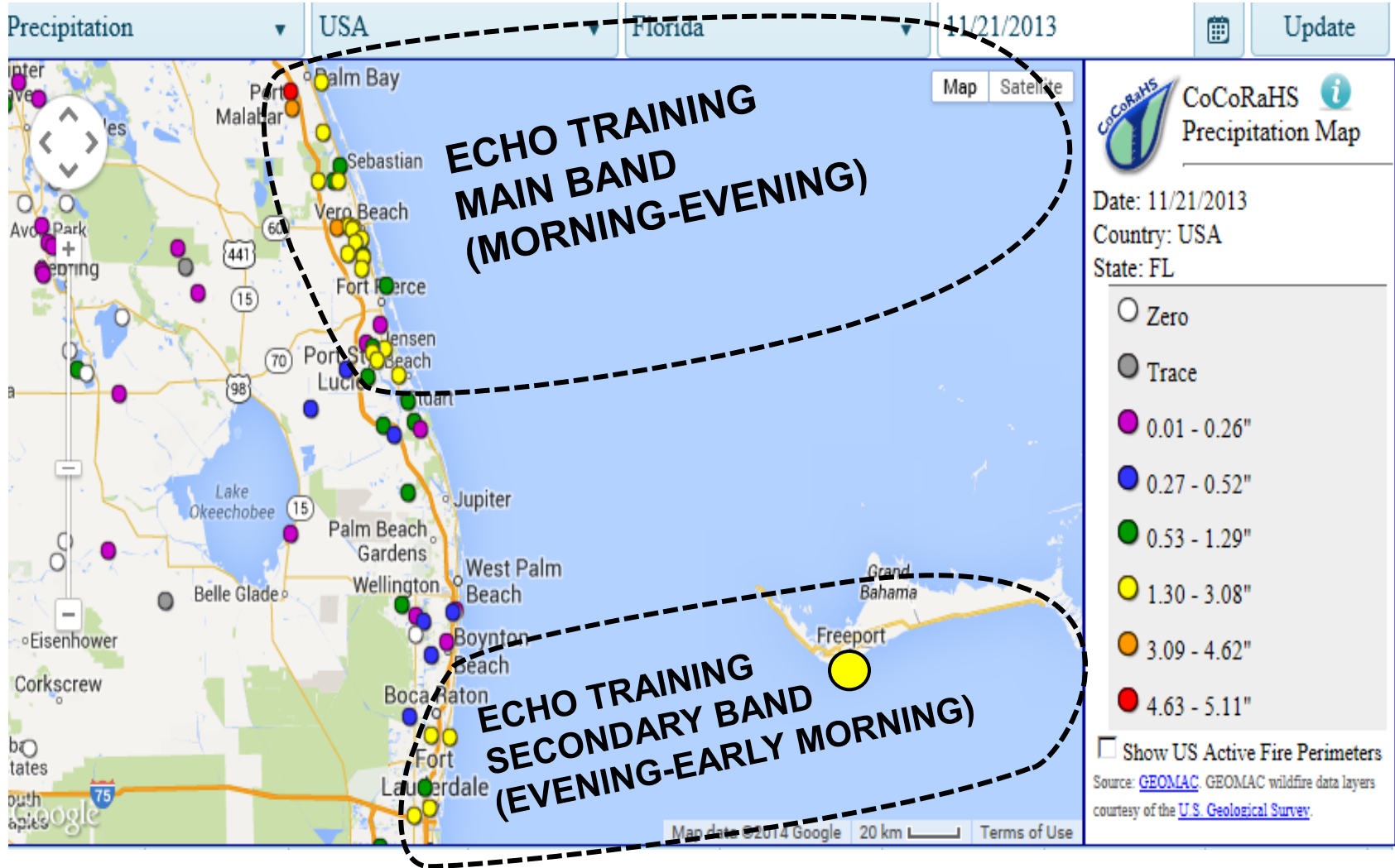


Echo Training

19		0.16	0.09					0.03	0.03		1.55	
20		0.02	0.02					0.42			1.35	
21	0.03				0.27	0.06		0.05			0.35	
22	0.02			0.70	0.87		0.20			0.04		
23					0.19		TRACE		0.40	0.03		TRACE
24					TRACE	0.09	0.42		0.11			TRACE
25			1.00			0.01			0.50		0.05	
26								1.27	0.23		0.52	
27		0.16			TRACE	0.11		0.08			0.26	TRACE
28	TRACE	TRACE			0.32	0.00						
29				0.03	0.10		0.53	0.59				
30				0.10	0.19				0.04			0.14
31	0.11											0.01
Total	0.18	1.90	1.20	5.62	9.68	9.32	11.81	6.42	6.35	3.30	4.50	2.01
Cumulative	0.18	2.08	3.28	8.90	18.58	27.90	39.71	46.13	52.48	55.78	60.28	62.29
Days	4	6	7	10	10	11	16	14	17	5	11	8
Long Term (1980-2009)												
Total	3.02	2.76	4.34	2.60	3.82	6.97	6.69	7.92	8.96	5.04	3.28	2.61
Cumulative	3.02	5.78	10.12	12.72	16.54	23.51	30.20	38.12	47.08	52.12	55.40	58.01
Days	11	11	12	10	13	18	20	21	22	16	12	11

COCORAHS 24-HR RAINFALL DATA

NOV. 21, 12Z



BENEFITS OF THE TROPICAL DESK

- ◉ Following the Forecast funnel : Forecast accuracy is best accomplished with good understanding of the thermodynamic and dynamic principles at each step in the decision making process.()
- ◉ Understanding that Models are forecast aids. Forecast confidence increases with accurate analysis and model consensus.
- ◉ System identification and monitoring; influences of topography and air mass characteristics on weather. Especially during transition (for models) period at the end of Atlantic Hurricane season; when Tropical waves are less and Frontal systems weaker.
- ◉ Utilizing a new tool : Galvez-Davison (G.D.I) Index.
- ◉ Differentiate between a Shear/ Squall line and Echo Training.
- ◉ Archiving and researching unusual weather phenomena.

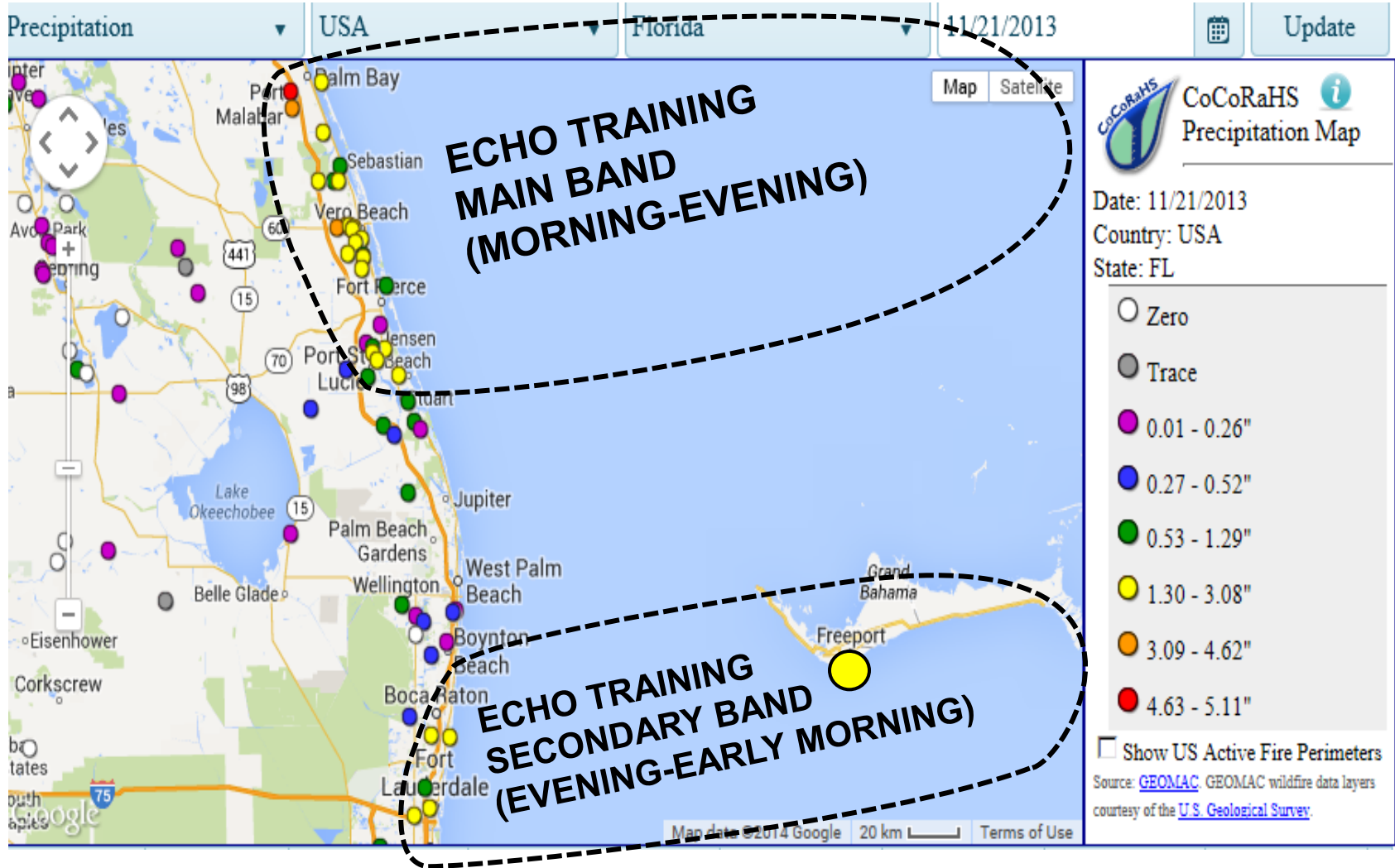
THANK YOU.

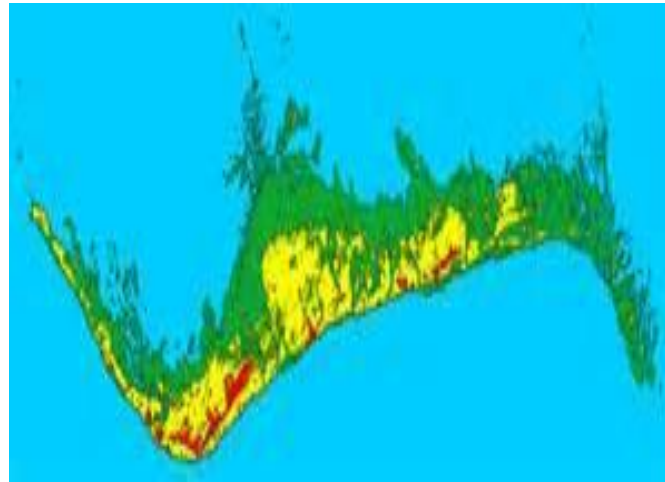
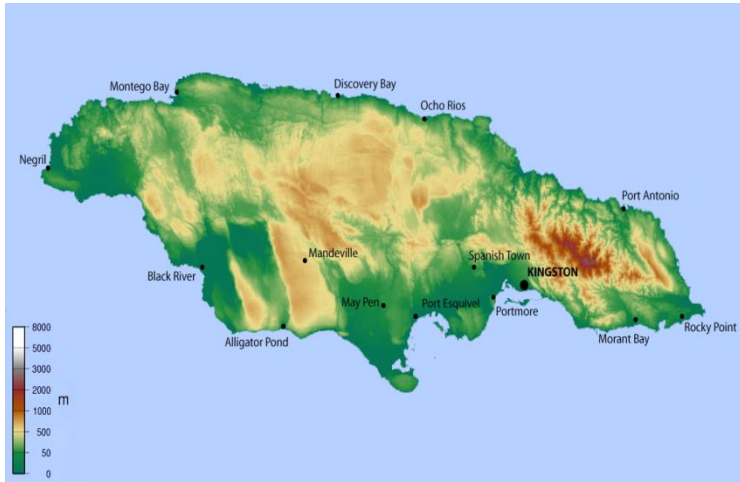
Any Question or comments?

ADDITIONAL SLIDES

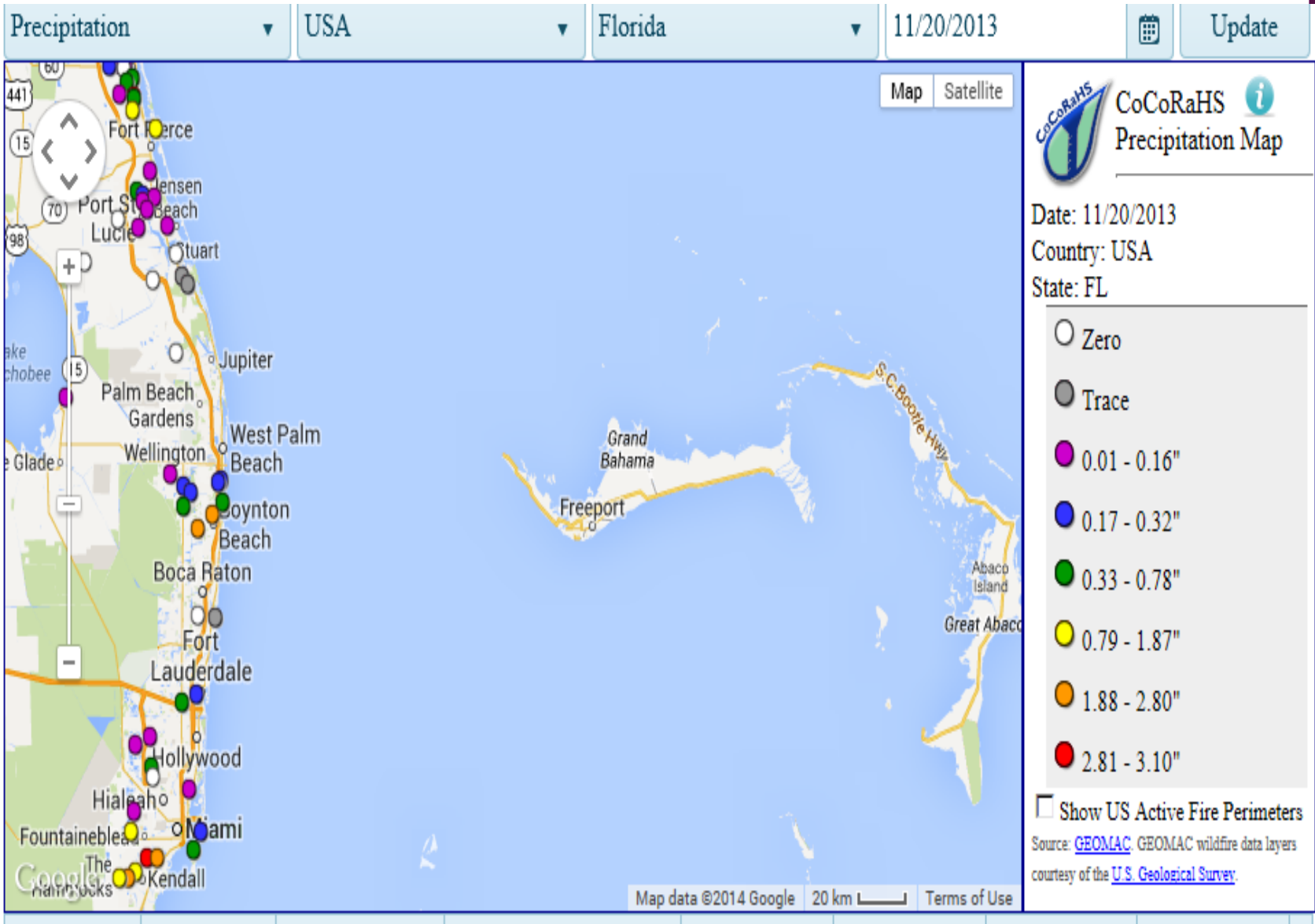
COCORAHS 24-HR RAINFALL DATA

NOV. 21, 12Z



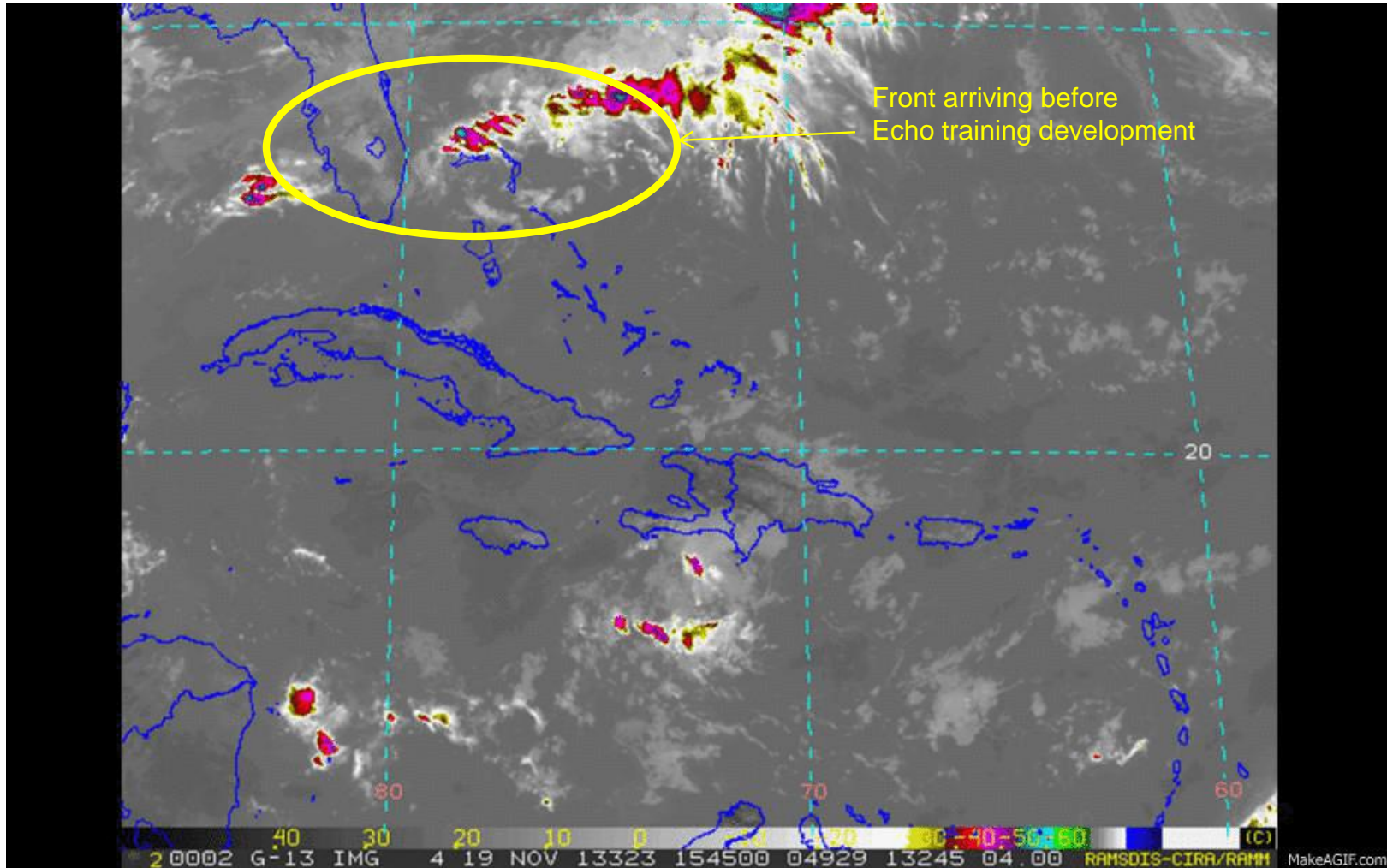


COCORAHS RAINFALL DATA



INFRA-RED SATELLITE IMAGERY

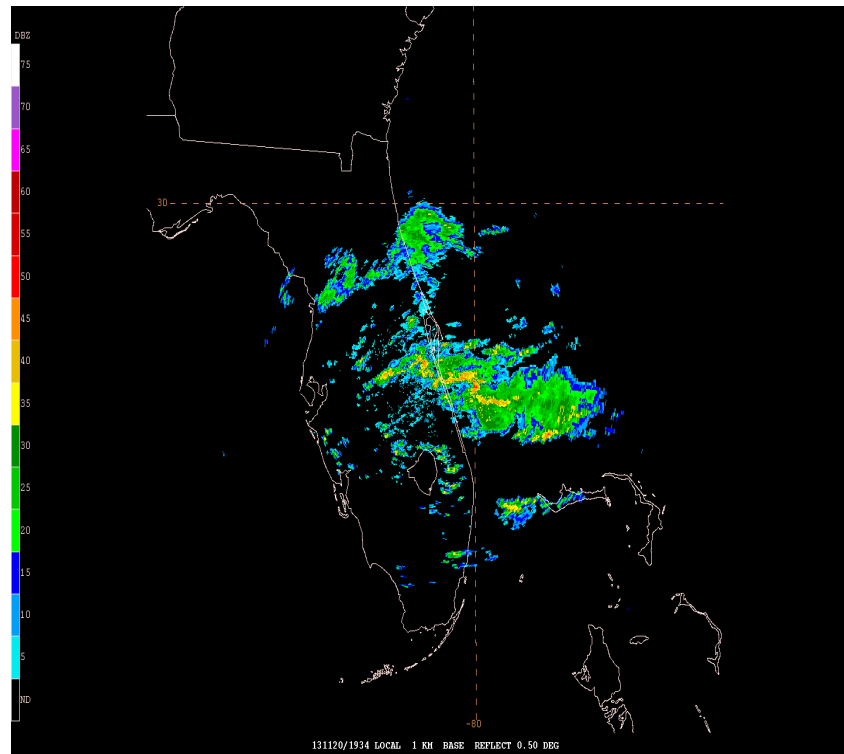
NOVEMBER 19 2013 1545Z-1945

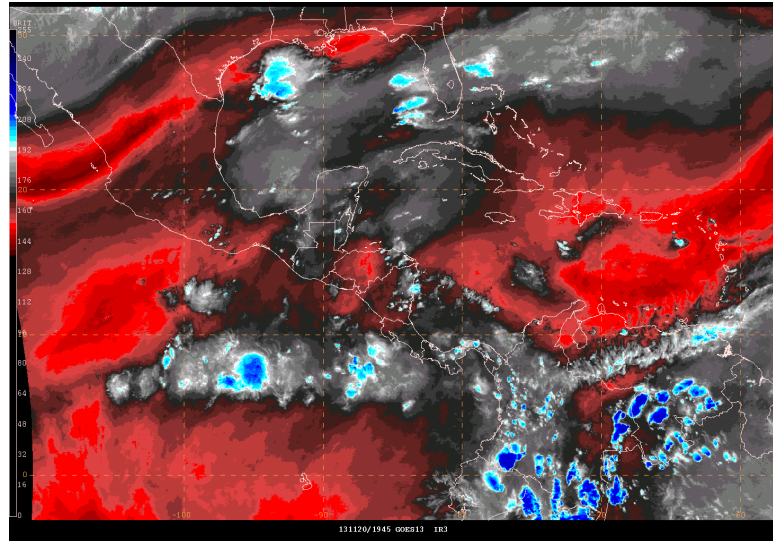
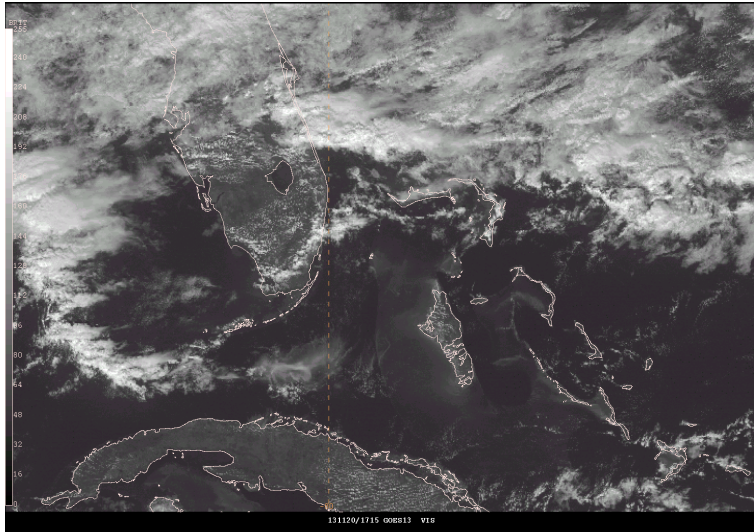


METARS AND SPECIS

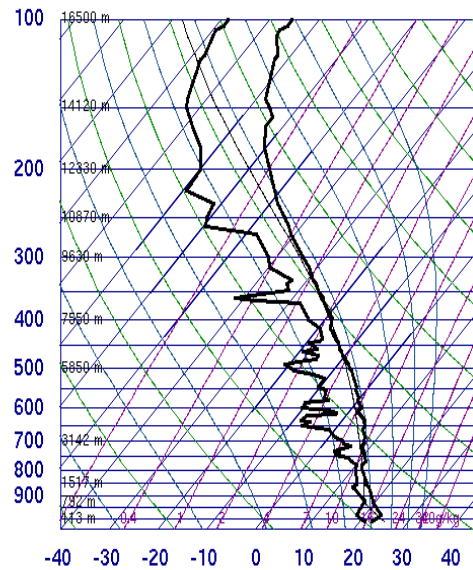
- SA 19/11/2013 15:00-> METAR MYGF 191500Z 22004KT 9999 BKN020 BKN070 26/24 A2992=
- SA 19/11/2013 16:00-> METAR MYGF 191600Z 29004KT 9999 VCSH FEW018TCU BKN020 27/24 A2991 RMK SHRA/TCU E/NW=
- SA 19/11/2013 17:00-> METAR MYGF 191700Z 23005KT 9999 VCSH FEW018TCU BKN020 27/25 A2989 RMK SHRA/TCU NE/NW=
- SA 19/11/2013 18:00-> METAR MYGF 191800Z 32013KT 9999 SHRA BKN012TCU BKN040 25/24 A2987 RMK RAB48 TCU OHD=
- SP 19/11/2013 18:21-> SPECI MYGF 191821Z 36010KT 1600 +TSRA BKN012CB OVC120 23/22 A2988 RMK TSB21 TS/CB OHD MOV SE=
- SA 19/11/2013 18:21-> METAR MYGF 191821Z 36010KT 1600 +TSRA BKN012CB OVC120 23/22 A2988 RMK TSB21 TS/CB OHD MOV SE=
- SP 19/11/2013 18:36-> SPECI MYGF 191836Z 08010KT 9000 TSRA SCT012CB BKN015 OVC120 22/22 A2987 RMK TS/CB NE MOV SE=
- SA 19/11/2013 18:36-> METAR MYGF 191836Z 08010KT 9000 TSRA SCT012CB BKN015 OVC120 22/22 A2987 RMK TS/CB NE MOV SE=
- SA 19/11/2013 19:00-> METAR MYGF 191900Z 10004KT 350V110 2400 +TSRA BKN012CB OVC120 22/22 A2998 RMK TS/CB OHD MOV SE=
- SP 19/11/2013 19:11-> SPECI MYGF 191911Z 31003KT 4800 TSRA BKN012CB OVC120 22/22 A2988 RMK

- SA20/11/2013 17:00->METAR MYGF 201700Z
0000KT 9999 BKN020 28/24 A2999=
- 20/11/2013 18:00->METAR MYGF 201800Z
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27/25 A2997 RMK SHRA NE/NW TCU SCT
ALQDS=
- SA 20/11/2013 19:00->METAR MYGF 201900Z
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25/24 A2995 RMK RAB43 TCU
OHD/ALQDS=
- SP20/11/2013 19:38->MYGF 201938Z
08004KT 4800 +SHRA BKN018TCU OVC120
23/23 A2997 RMK TCU OHD/ALQDS=
- SA20/11/2013 19:38->METAR MYGF 201938Z
08004KT 4800 +SHRA BKN018TCU OVC120
23/23 A2997 RMK TCU OHD/ALQDS=
- SA20/11/2013 20:00->METAR MYGF 202000Z
09003KT 4800 +RA BR SCT018TCU SCT020
OVC120 22/22 A2997 RMK TCU W=
- SA20/11/2013 21:00->METAR MYGF 202100Z
0000KT 8000 -RA FEW018CB SCT025
BKN100 23/22 A2998 RMK CB SCT ALQDS=
- SA20/11/2013 22:00->METAR MYGF 202200Z
0000KT 8000 -RA FEW018CB BKN100 23/22
A3000 RMK CB SW THRU W=
- SA20/11/2013 23:00->METAR MYGF 202300Z
0000Z 9999 FEW018 SCT100 23/22 A3002=





72202 MFL Miami

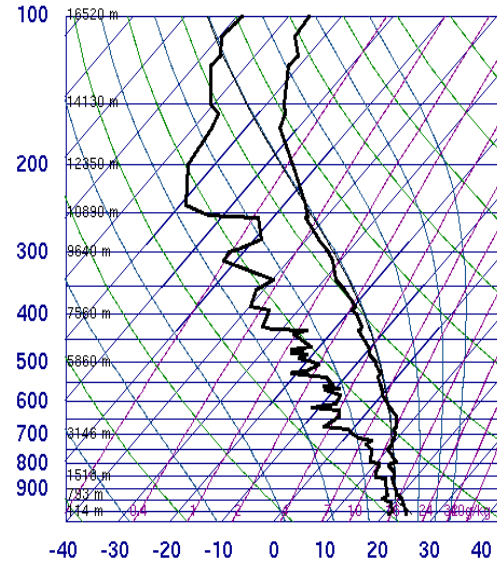


12Z 19 Nov 2013

University of Wyoming

SLAT 25.75
 SLON -80.38
 SELV 5.00
 SHOW 1.68
 LIFT 0.73
 LFTV 0.32
 SWET 205.6
 KINX 31.00
 CTOT 20.20
 VTOT 22.10
 TOTL 42.30
 CAPE 11.24
 CAPV 19.07
 CINS -51.9
 CINV -45.4
 EQLV 405.1
 EQTV 403.6
 LFCT 808.8
 LFCV 819.9
 BRCH 1.31
 BRCV 2.22
 LCLT 291.1
 LCLP 930.4
 MLTH 297.1
 MLMR 14.15
 THCK 5737.
 PWAT 47.06

72201 KEY Key West



12Z 19 Nov 2013

University of Wyoming

SLAT 24.55
 SLON -81.75
 SELV 6.00
 SHOW 2.80
 LIFT -0.64
 LFTV -1.16
 SWET 177.3
 KINX 26.50
 CTOT 18.70
 VTOT 22.30
 TOTL 41.00
 CAPE 360.1
 CAPV 471.4
 CINS -12.8
 CINV -8.29
 EQLV 241.7
 EQTV 241.4
 LFCT 893.4
 LFCV 908.1
 BRCH 106.5
 BRCV 139.4
 LCLT 292.9
 LCLP 948.2
 MLTH 297.4
 MLMR 15.55
 THCK 5746.
 PWAT 44.82