

Overview

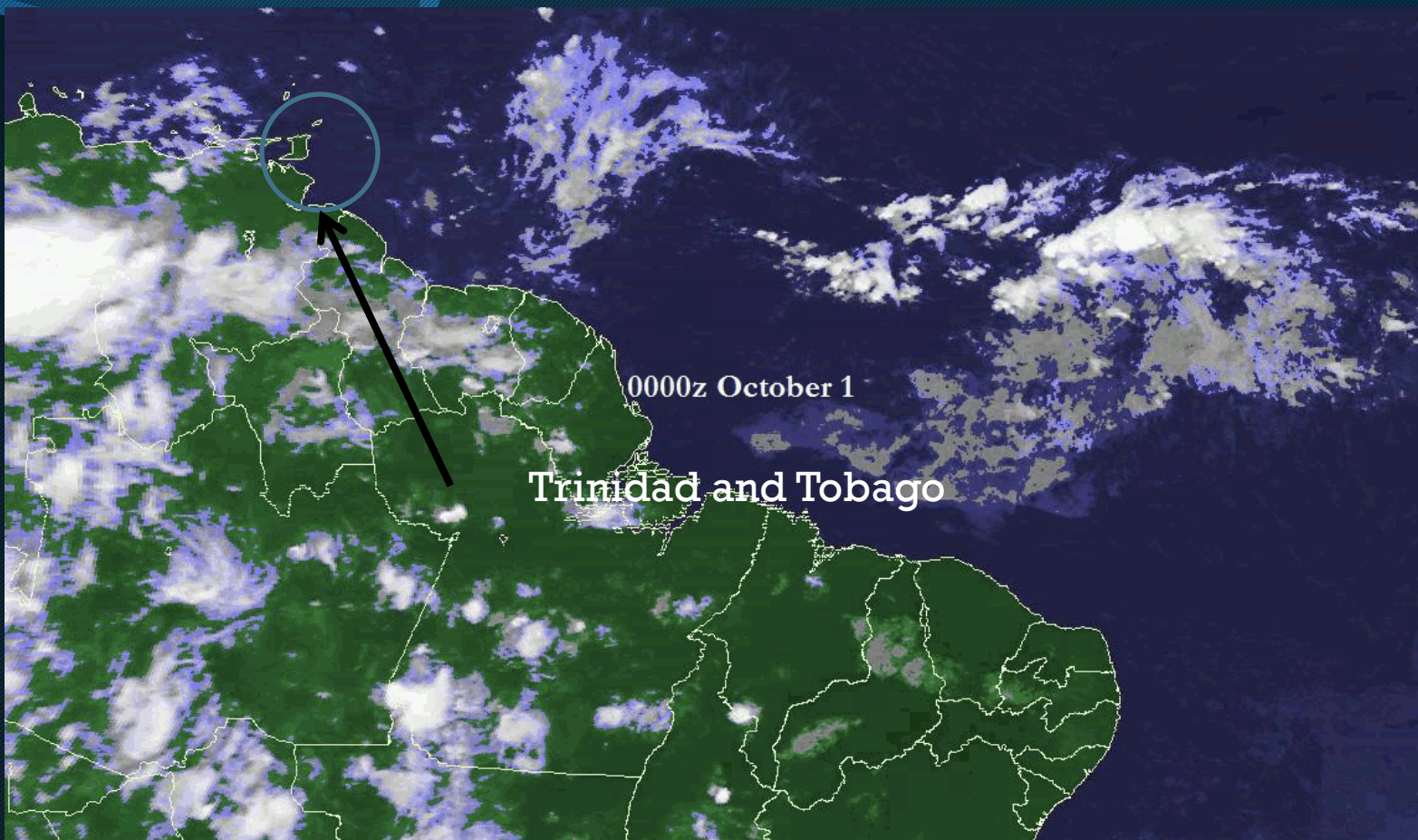
“ During the period October 1- 4, 2014, Trinidad and Tobago was affected by:

- periods of sustained gale force winds (≥ 27 kts) and;
- extended periods of rain, showers and thunderstorms.

Overview

“ Though showery conditions were not uncommon for the time of year, it resulted in the **second highest daily** rainfall accumulation on record for the month of October at ANR International Airport, Crown Point Tobago.

October 1-4, 2014



Oct 1
00z

Oct 2
00z

07-08z TW
07z 040°/03kts
08z 110°/30G46kts
100°/16G29kts;
RR: 27.8mm

Oct 3
00z

01 - 07z
070°/16G39kts
(period avg)
RR: 15.2mm

19z

Rainfall event
Trop passage
RR: 80.5mm

Oct 4
00z

**Case Study:
Extreme Rainfall
Event – Trinidad
and Tobago
October 1- 4,
2014**

Fellow: Simon Craig

Instructors: Michel Davison & Jose Galvez

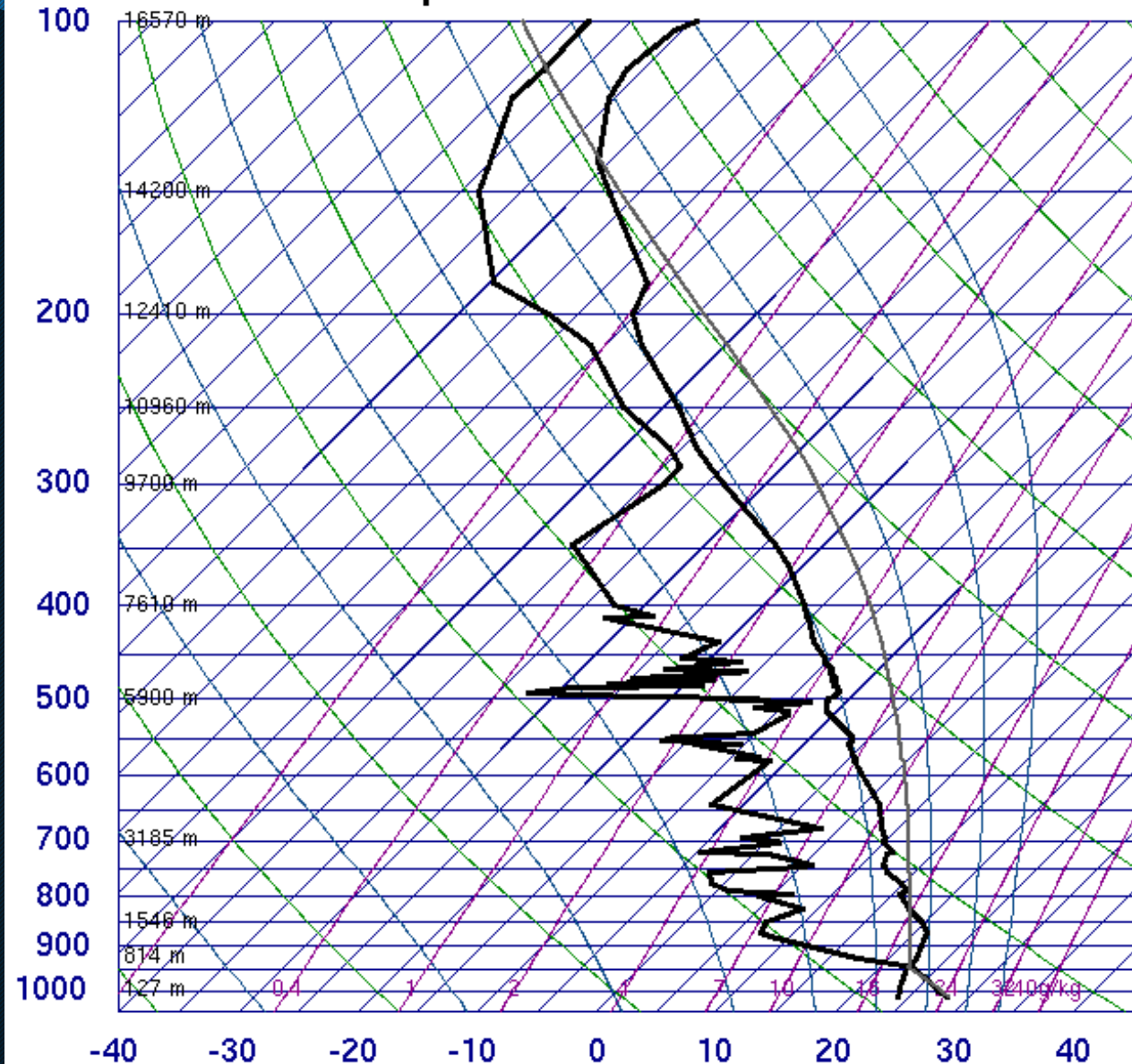
Presentation of Data

- “ 1. Soundings
- “ 2. Analysed Charts
(T.T.M.S.) and forecasts
(Tropical Desk)
- “ 3. Model Runs

Soundings

“TTPP – 0000z October 1
to
0000z October 4

78970 TTPP Piarco Int. Airport



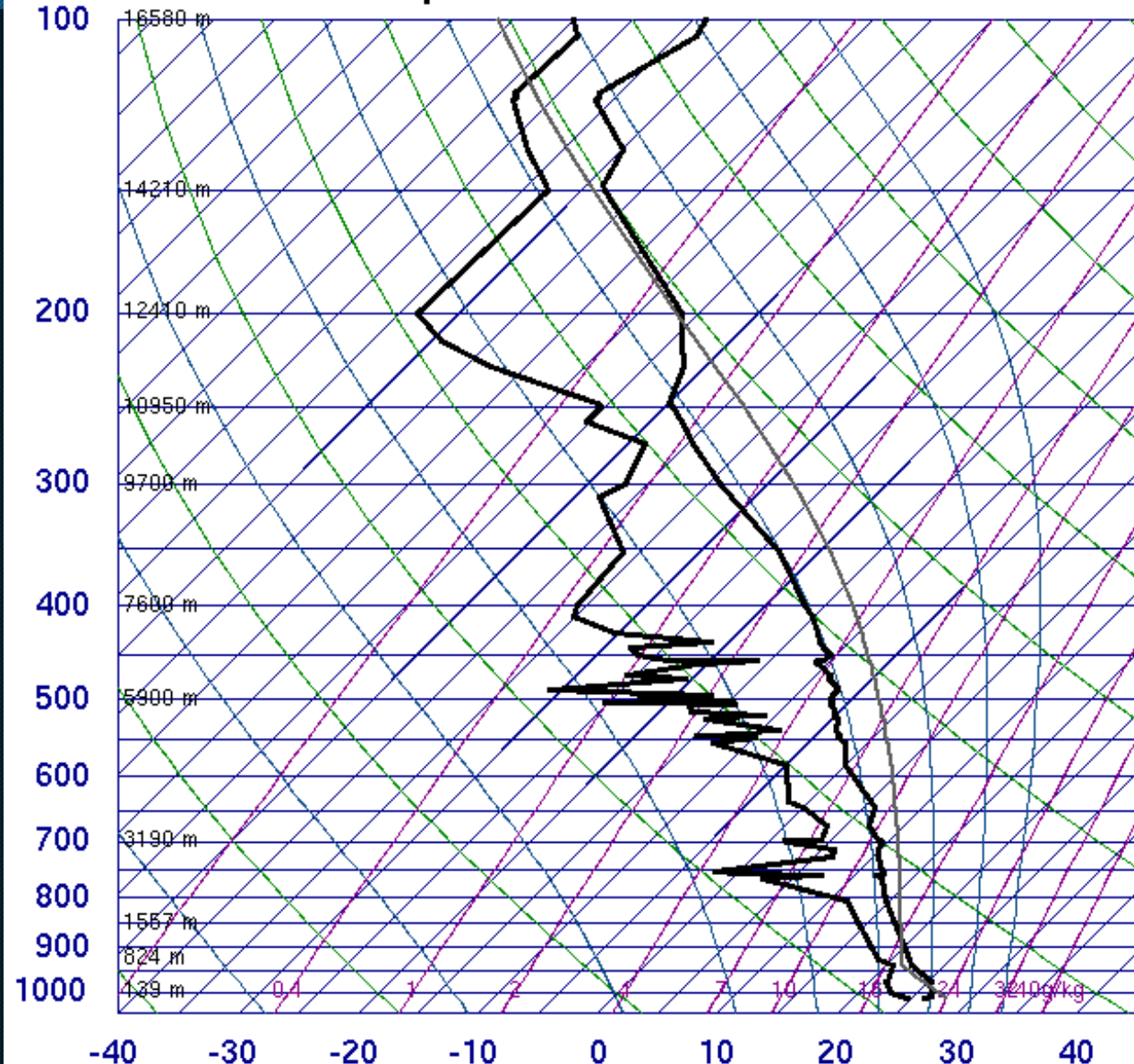
SLAT	10.58
SLON	-61.35
SELV	12.00
SHOW	4.88
LIFT	-5.48
LFTV	-6.17
SWET	131.5
KINX	24.30
CTOT	13.50
VTOT	26.50
TOTL	40.00
CAPE	2375.
CAPV	2636.
CINS	-32.1
CINV	-1.27
EQLV	138.4
EQTV	138.3
LFCT	824.2
LFCV	937.7
BRCH	248.0
BRCV	275.3
LCLT	295.7
LCLP	947.4
MLTH	300.4
MLMR	18.67
THCK	5773.
PWAT	43.34

Relatively weak low to mid lvl wind speed; Isothermal layer 950mb – 860mb

00Z 01 Oct 2014

University of Wyoming

78970 TTPP Piarco Int. Airport



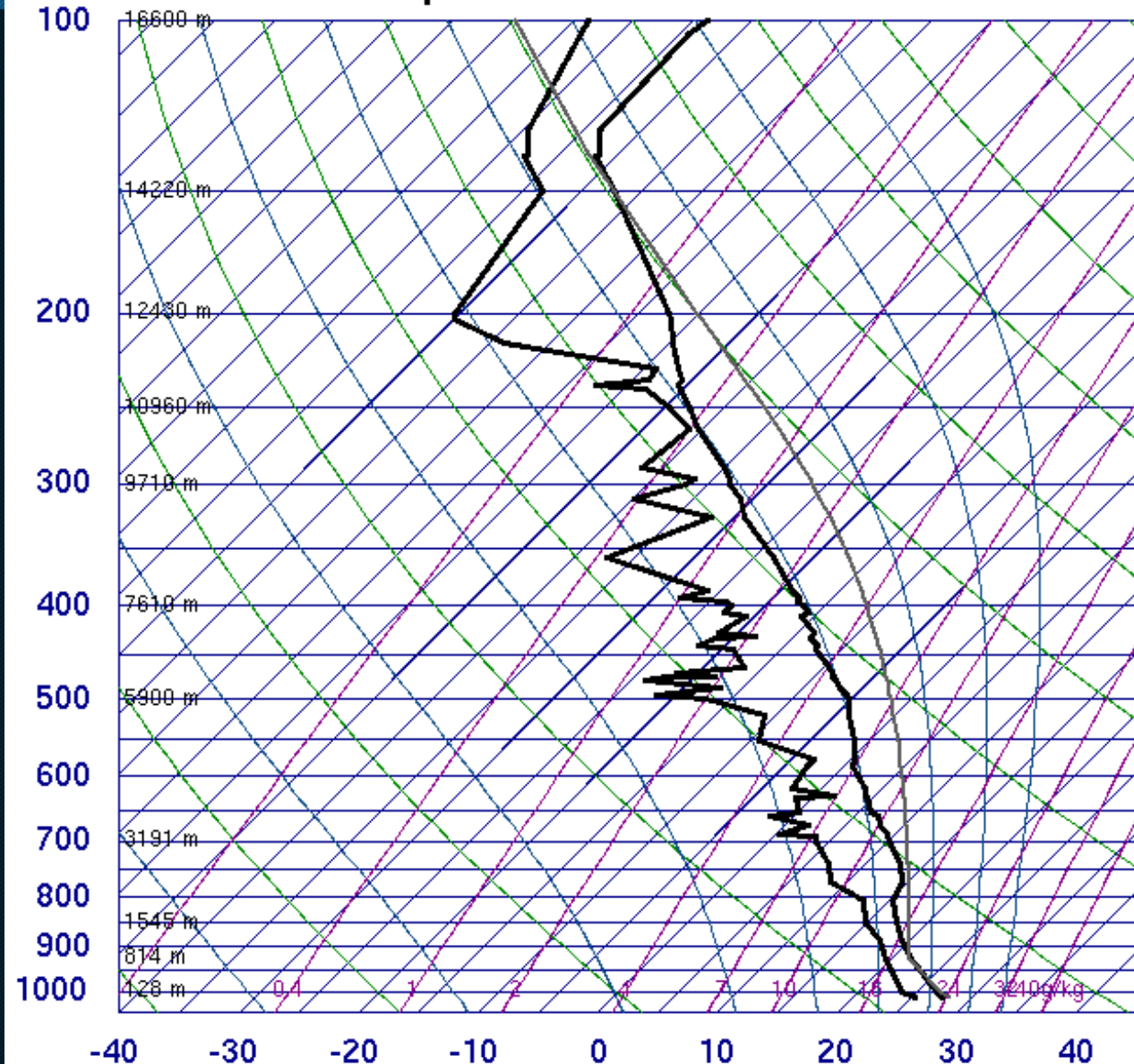
SLAT	10.58
SLON	-61.35
SELV	12.00
SHOW	-0.20
LIFT	-4.06
LFTV	-4.83
SWET	237.5
KINX	30.40
CTOT	21.00
VTOT	24.10
TOTL	45.10
CAPE	1498.
CAPV	1695.
CINS	-13.7
CINV	-8.15
EQLV	203.0
EQTV	202.8
LFCT	880.7
LFCV	906.0
BRCH	816.9
BRCV	924.5
LCLT	294.6
LCLP	939.8
MLTH	299.8
MLMR	17.49
THCK	5761.
FWAT	50.45

Incr. low to mid lvl wind speed; Moist and unstable

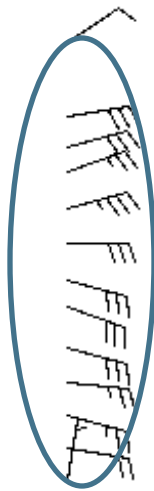
12Z 01 Oct 2014

University of Wyoming

78970 TTPP Piarco Int. Airport



SLAT	10.58
SLON	-61.35
SELV	12.00
SHOW	0.72
LIFT	-3.45
LFTV	-4.24
SWET	259.7
KINX	31.60
CTOT	20.00
VTOT	22.70
TOTL	42.70
CAPE	1949.
CAPV	2147.
CINS	-6.87
CINV	-3.41
EQLV	150.4
EQTV	150.4
LFCT	912.6
LFCV	928.3
BRCH	63.87
BRCV	70.37
LCLT	295.5
LCLP	947.2
MLTH	300.1
MLMR	18.37
THCK	5772.
PWAT	54.89

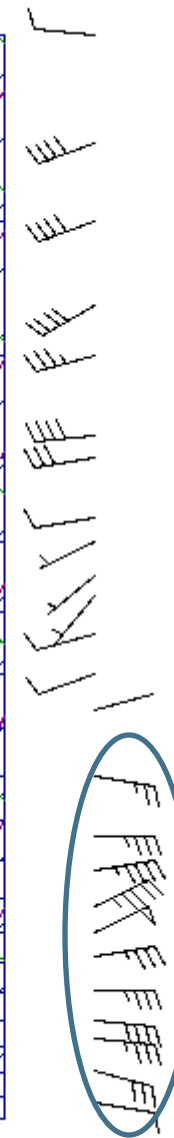
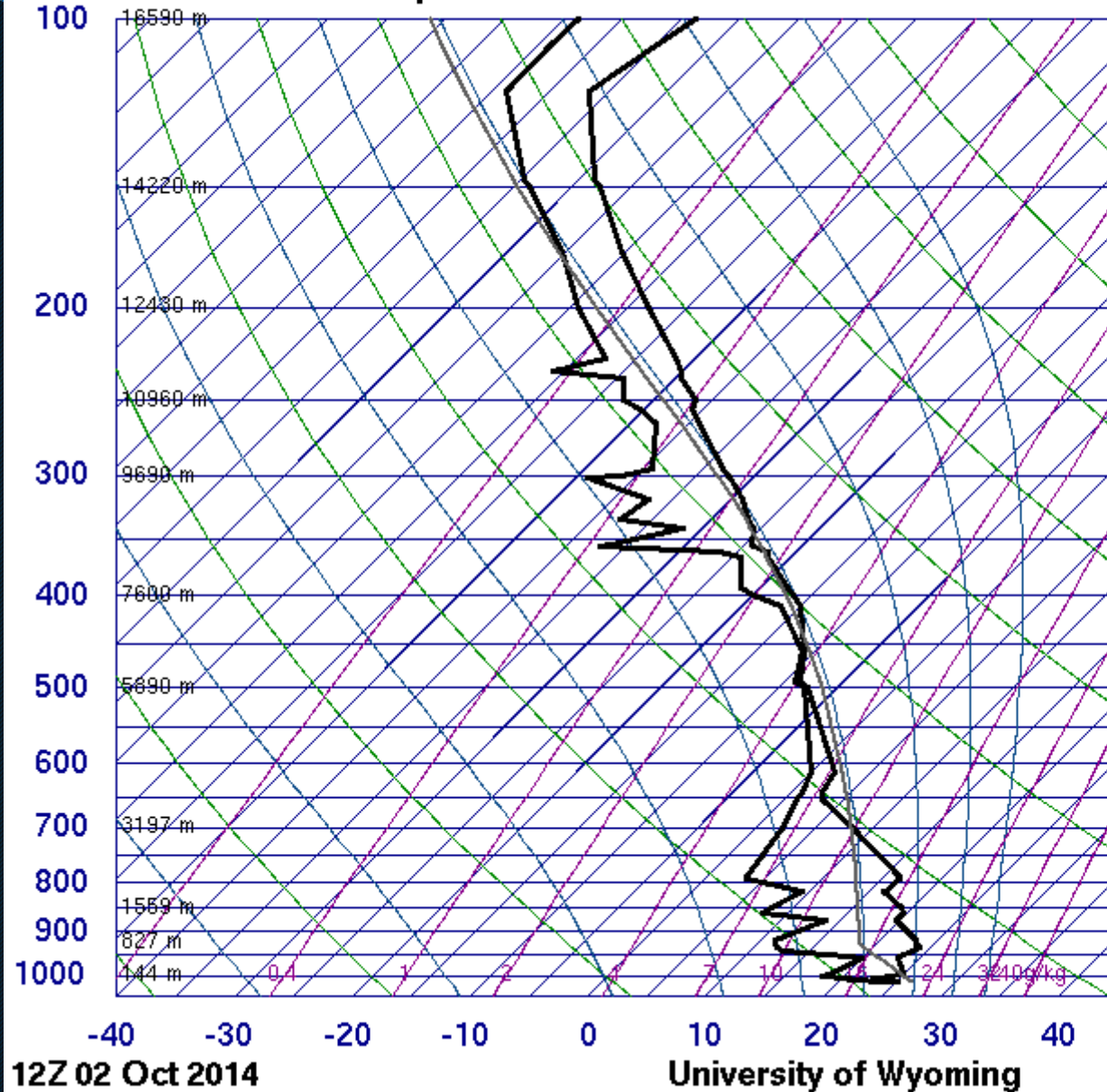


Incr. low to mid lvl wind speed;
Trof passed;
Moist and unstable

00Z 02 Oct 2014

University of Wyoming

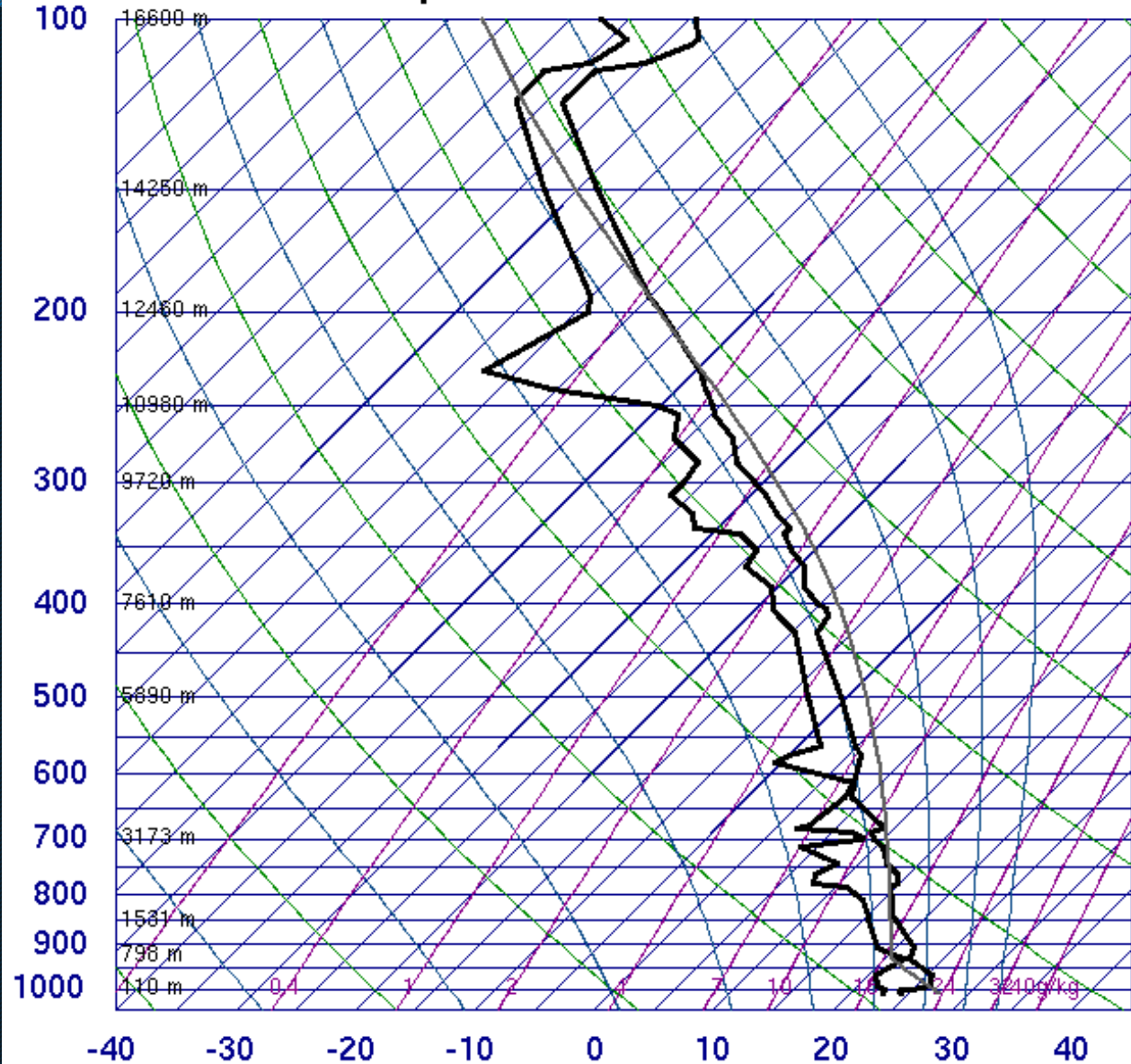
78970 TTPP Piarco Int. Airport



SLAT	10.58
SLON	-61.35
SELV	12.00
SHOW	3.36
LIFT	-1.25
LFTV	-1.34
SWET	202.4
KINX	28.90
CTOT	15.70
VTOT	26.70
TOTL	42.40
CAPE	147.0
CAPV	175.6
CINS	-264.
CINV	-198.
EQLV	343.7
EQTV	342.2
LFCT	696.7
LFCV	710.8
BRCH	3.10
BRCV	3.71
LCLT	291.8
LCLP	927.0
MLTH	298.2
MLMR	14.91
THCK	5746.
PWAT	46.98

Incr. low to mid lvl wind speed; TW passed; Moist and increased stability in low levels

78970 TTPP Piarco Int. Airport



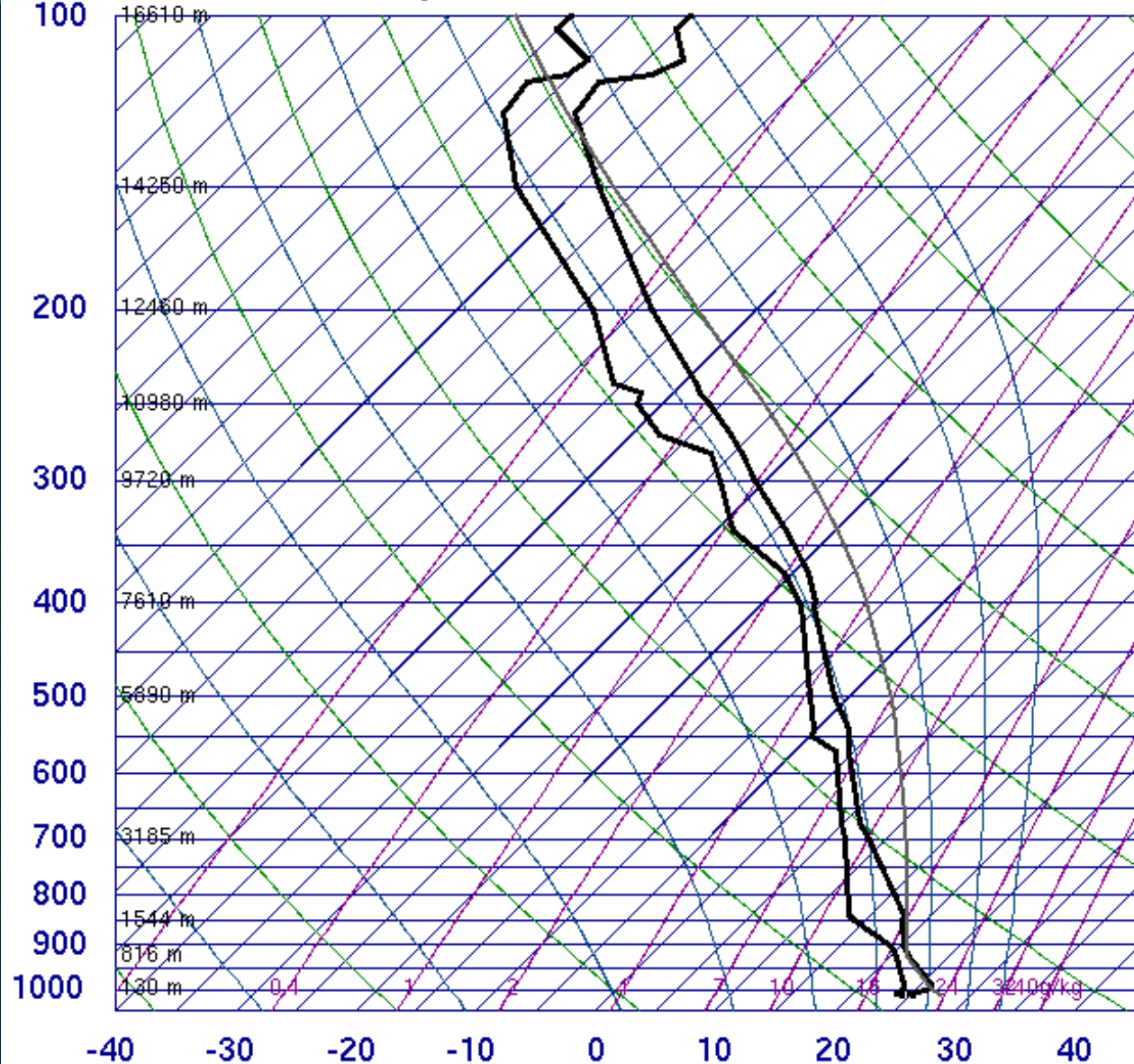
SLAT	10.58
SLON	-61.35
SELV	12.00
SHOW	-0.46
LIFT	-2.18
LFTV	-2.49
SWET	288.2
KINX	37.80
CTOT	21.10
VTOT	23.30
TOTL	44.40
CAPE	577.3
CAPV	668.4
CINS	-54.7
CINV	-41.2
EQLV	213.3
EQTV	211.0
LFCT	745.5
LFCV	848.0
BRCH	50.02
BRCV	57.92
LCLT	293.8
LCLP	931.4
MLTH	299.8
MLMR	16.83
THCK	5780.
PWAT	59.19

**Stronger winds
confined to low
lvls;
Moist and
unstable**

00Z 03 Oct 2014

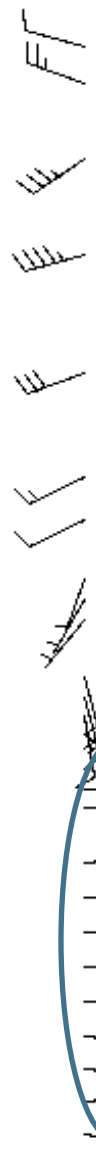
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78970 TTPP Piarco Int. Airport



12Z 03 Oct 2014

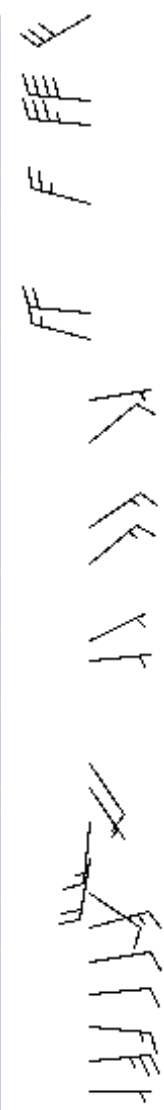
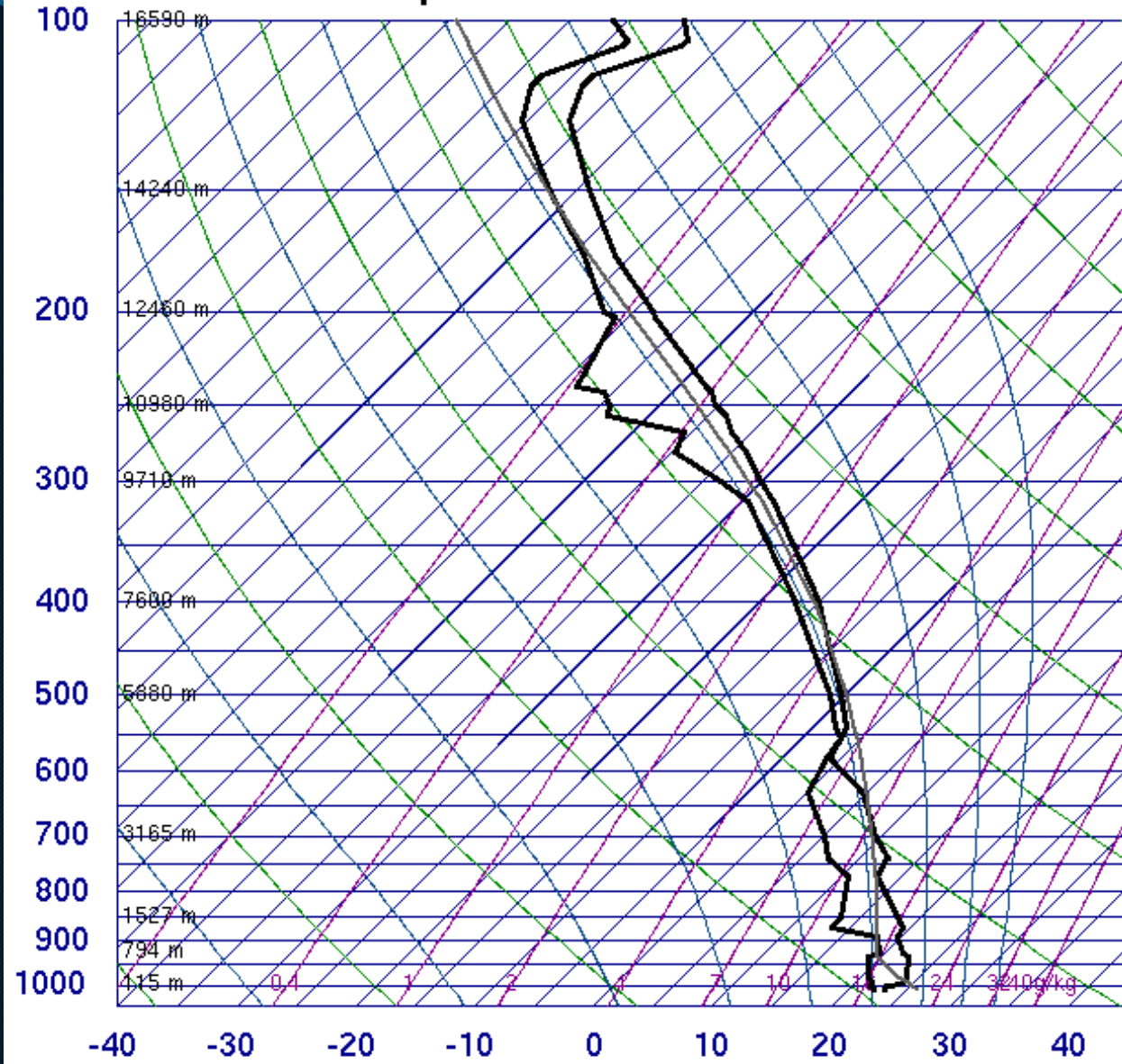
University of Wyoming



SLAT	10.58
SLON	-61.35
SELV	12.00
SHOW	-0.01
LIFT	-4.77
LFTV	-5.24
SWET	268.2
KINX	36.60
CTOT	20.40
VTOT	24.50
TOTL	44.90
CAPE	1893.
CAPV	2039.
CINS	-6.73
CINV	-5.02
EQLV	133.8
EQTV	133.2
LFCT	917.9
LFCV	925.1
BRCH	88.66
BRCV	95.47
LCLT	295.9
LCLP	957.8
MLTH	299.6
MLMR	18.68
THCK	5760.
PWAT	61.76

Sustained low to mid lvl winds 25-35kts; Trof passed; Extremely Moist and unstable

78970 TTPP Piarco Int. Airport



SLAT	10.58
SLOE	-61.35
SELE	12.00
SHOW	1.65
LIFT	-0.46
LFTV	-0.56
SWET	190.7
KINX	32.70
CTOT	18.70
VTOT	23.50
TOTL	42.20
CAPE	97.66
CAPV	125.6
CINS	-118.
CINV	-79.6
EQLV	423.6
EQTV	426.4
LFCT	666.7
LFCV	776.3
BRCH	4.41
BRCV	5.67
LCLT	293.4
LCLP	945.6
MLTH	298.1
MLMR	16.14
THCK	5765.
PWAT	58.11

Strong low to mid lvl wind field bkn dwn; Trof passed; Extremely Moist and less unstable

00Z 04 Oct 2014

University of Wyoming

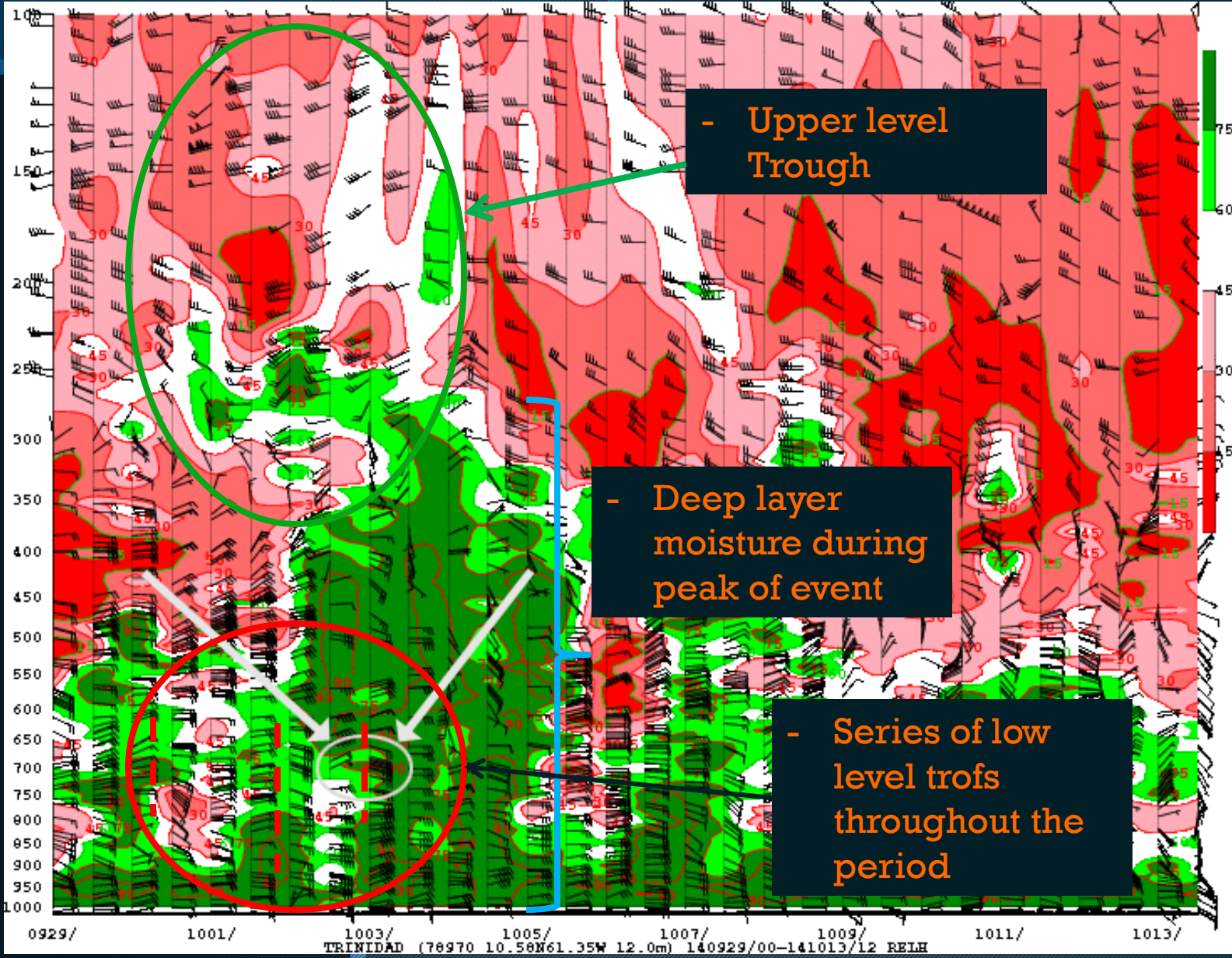
Charts

“ Winds and Relative Humidity;

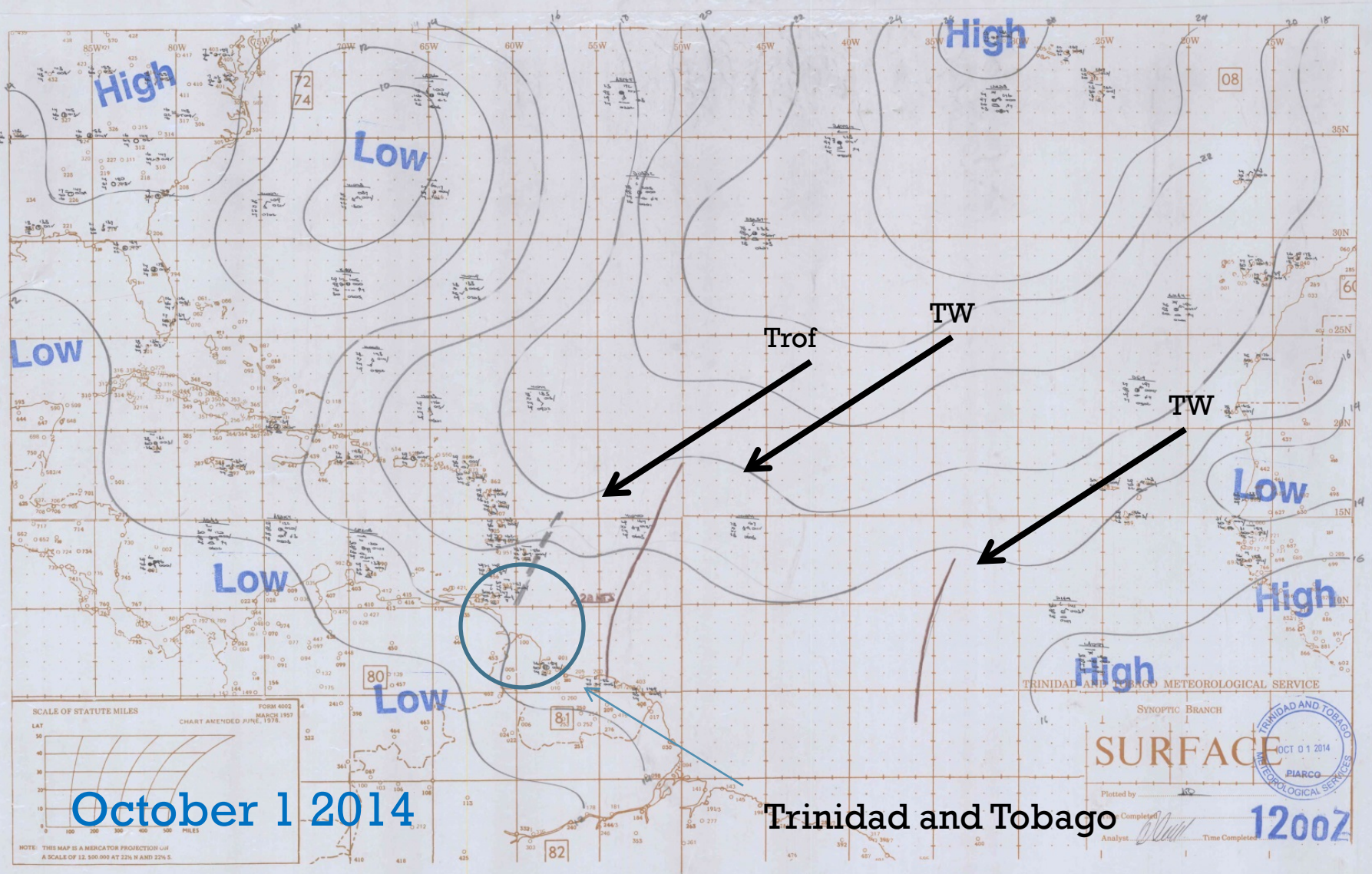
“ - Analysed Surface;

“ - Analysed mid – upper Levels (850mb, 700mb, 500mb, 300mb) and;

“ Analysed 200mb



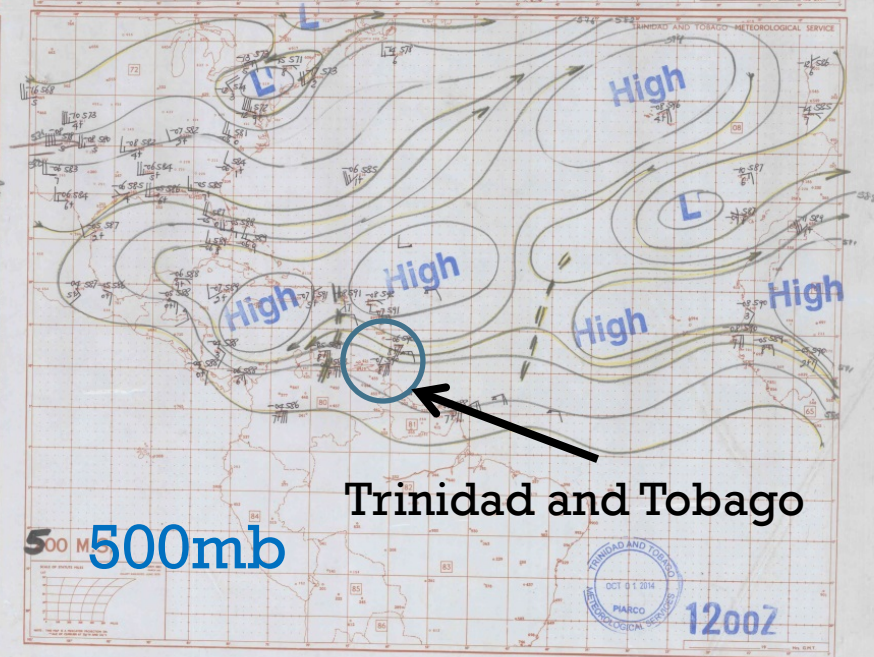
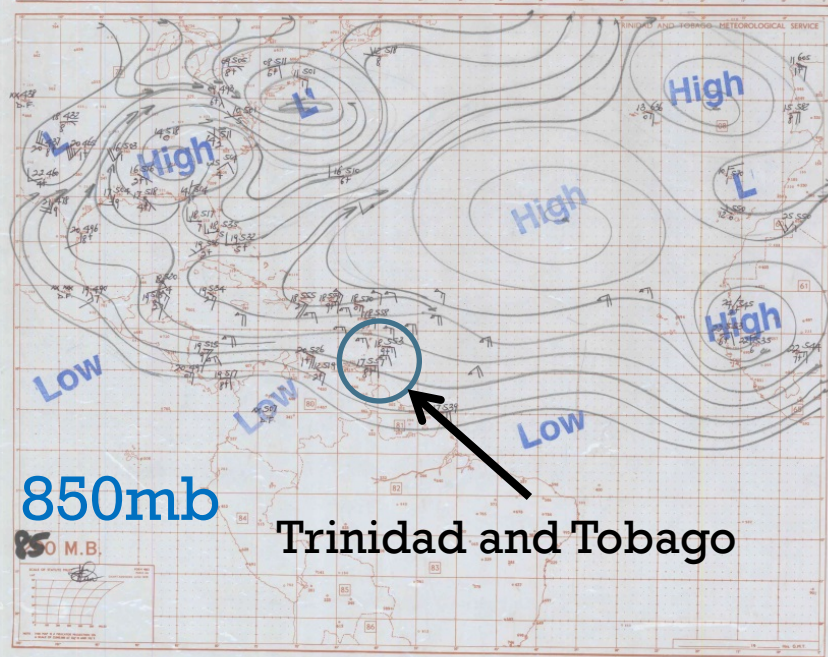
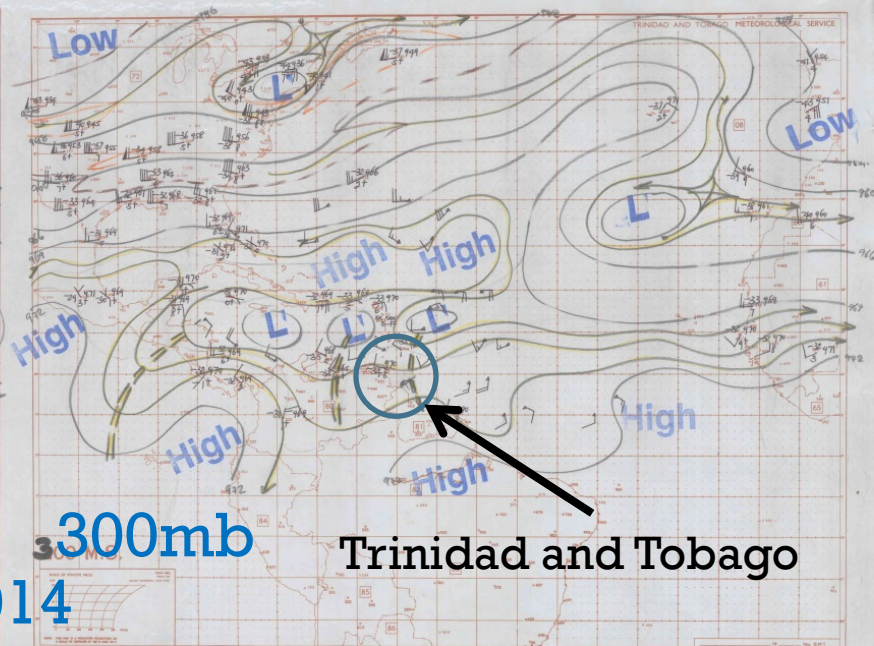
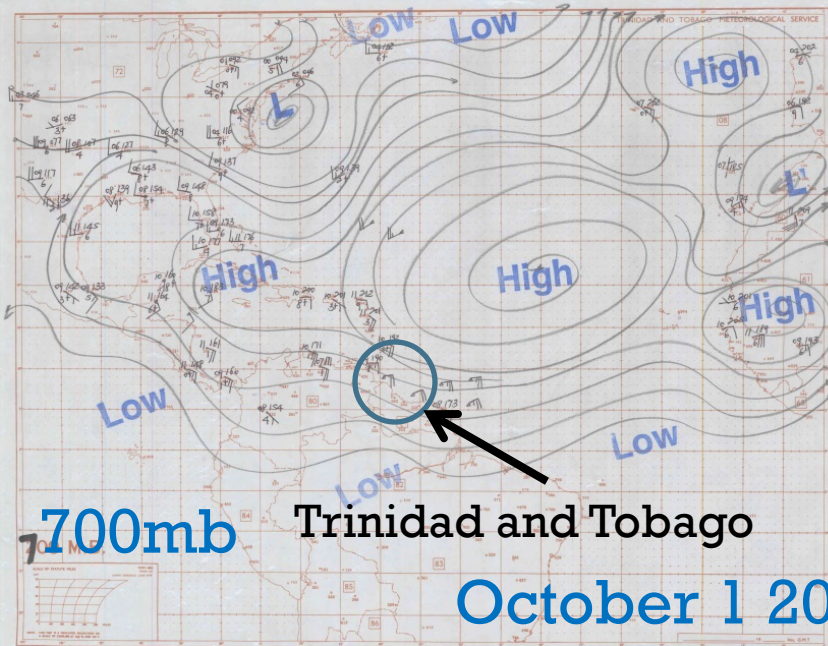
Relative Humidity and Wind Analysis– September 29 - October 13 2014

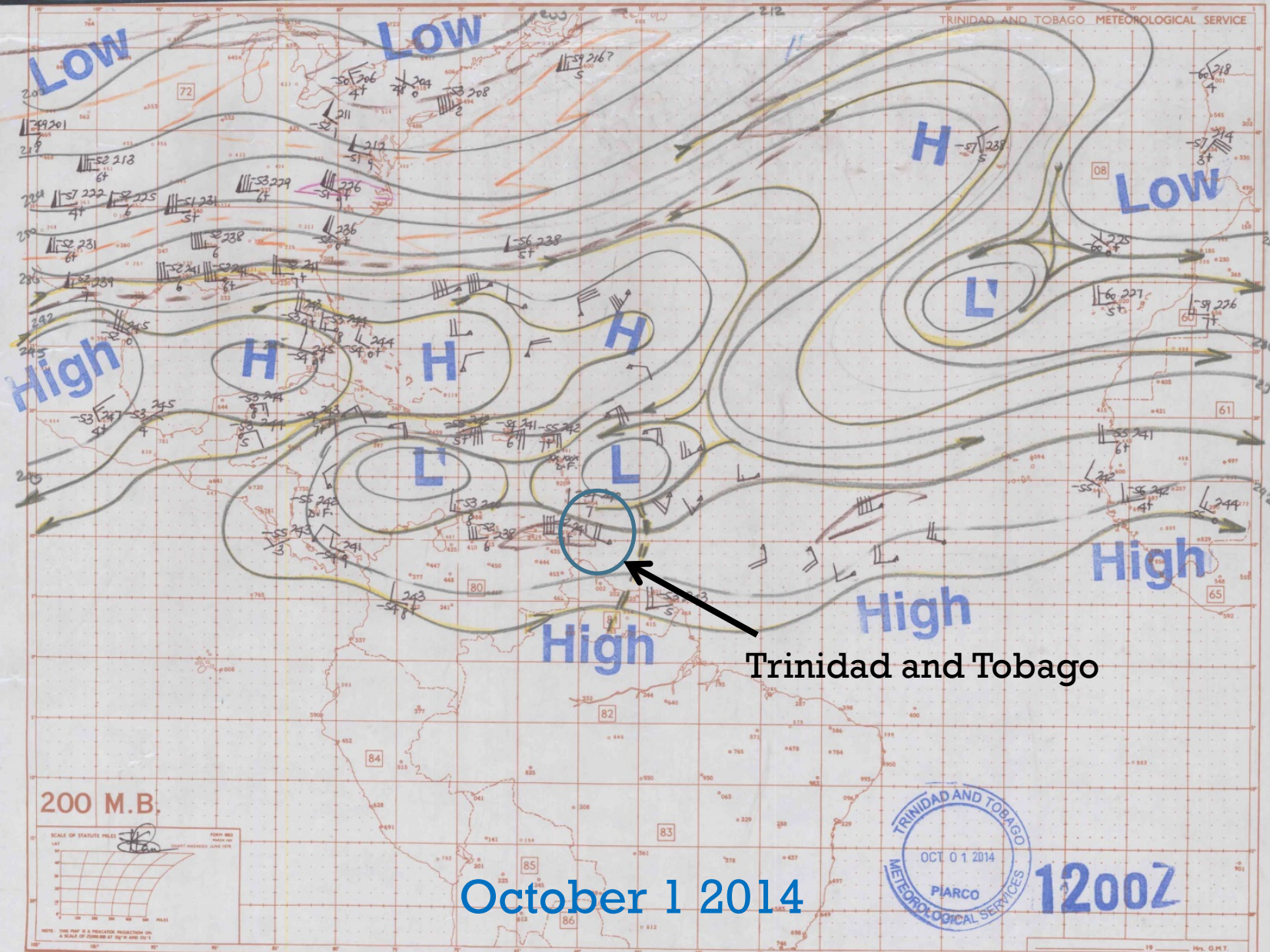


October 1 2014

Trinidad and Tobago

1200Z





October 1 2014

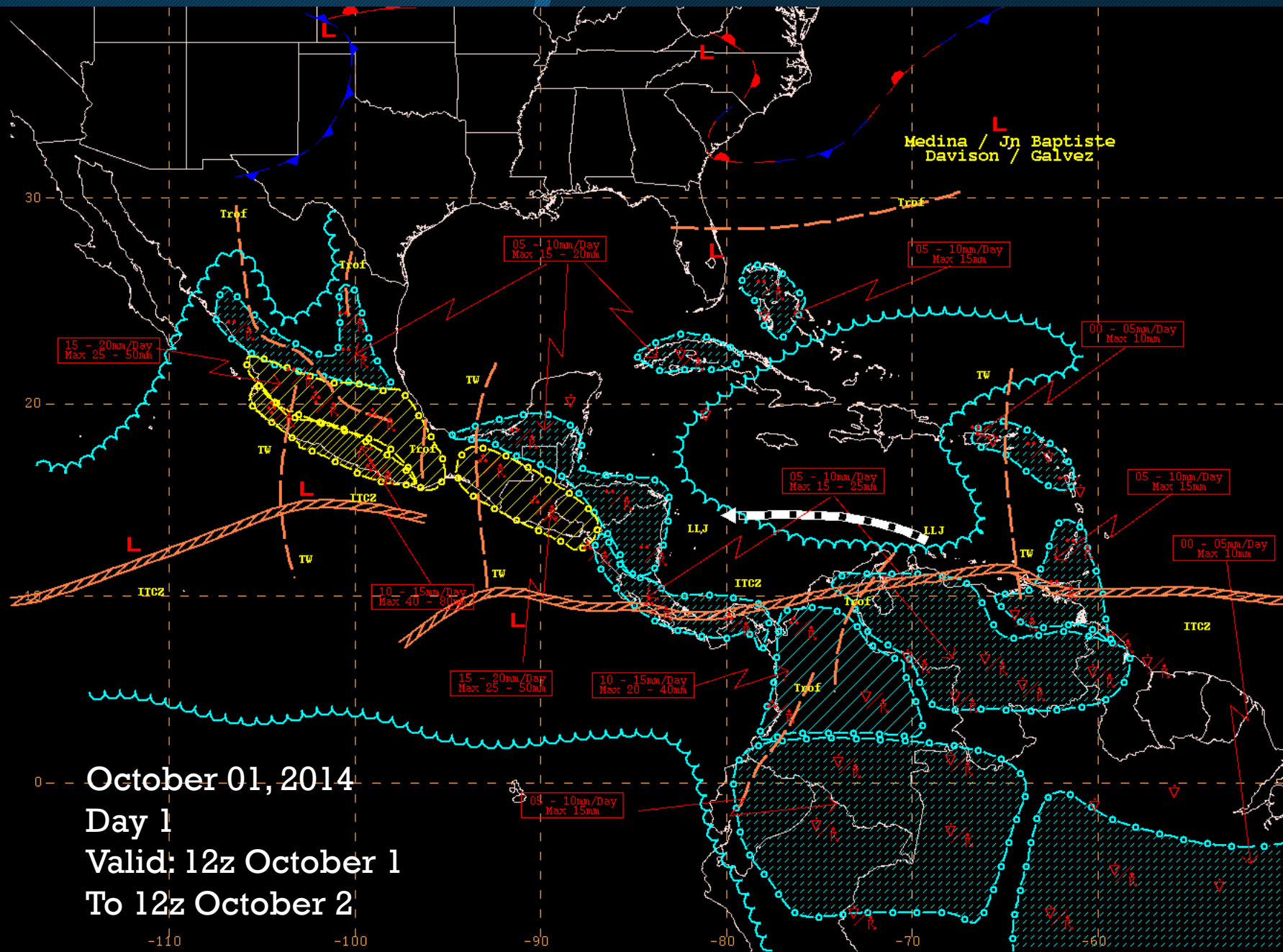


1200Z

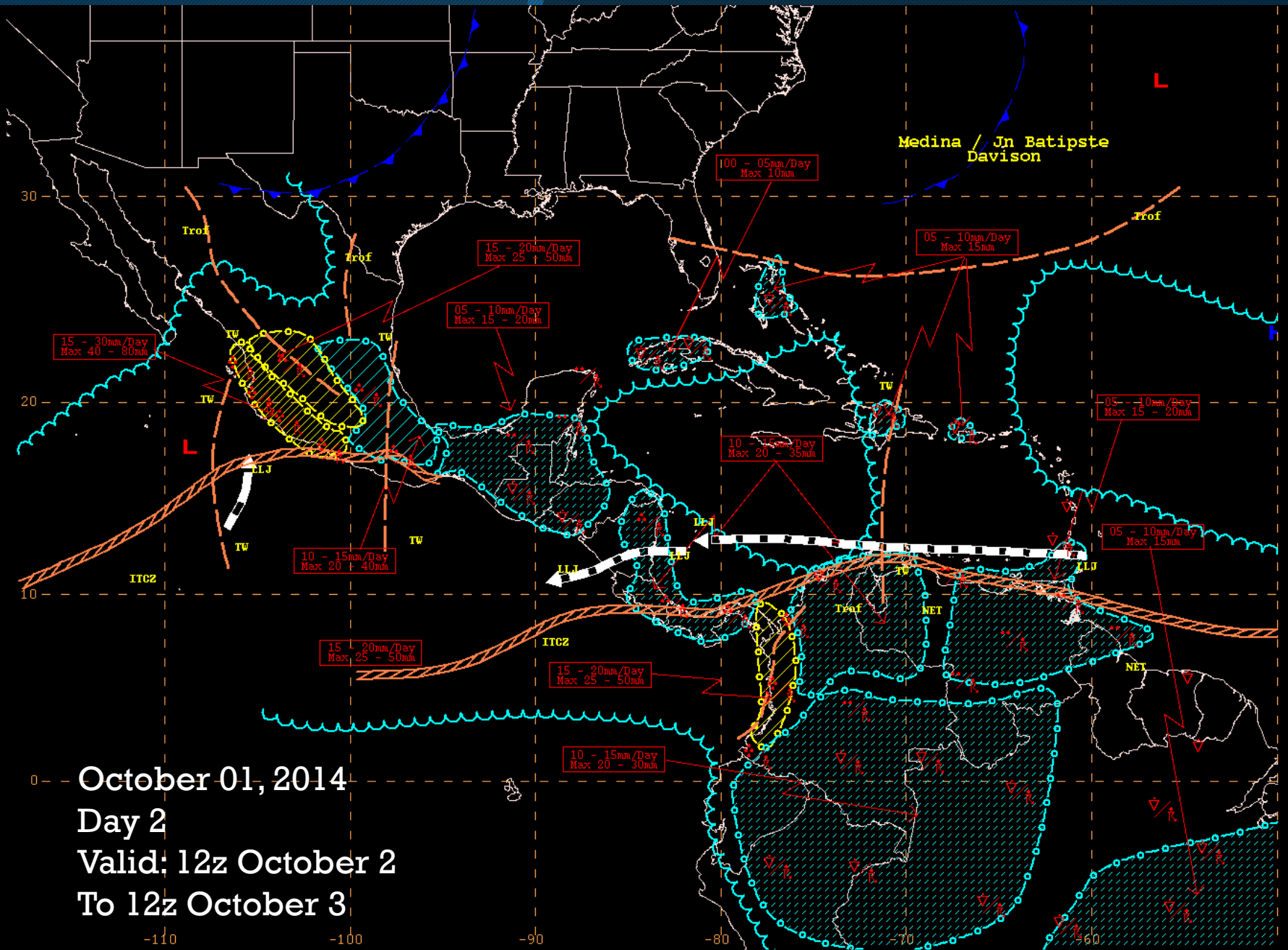
200 M.B.



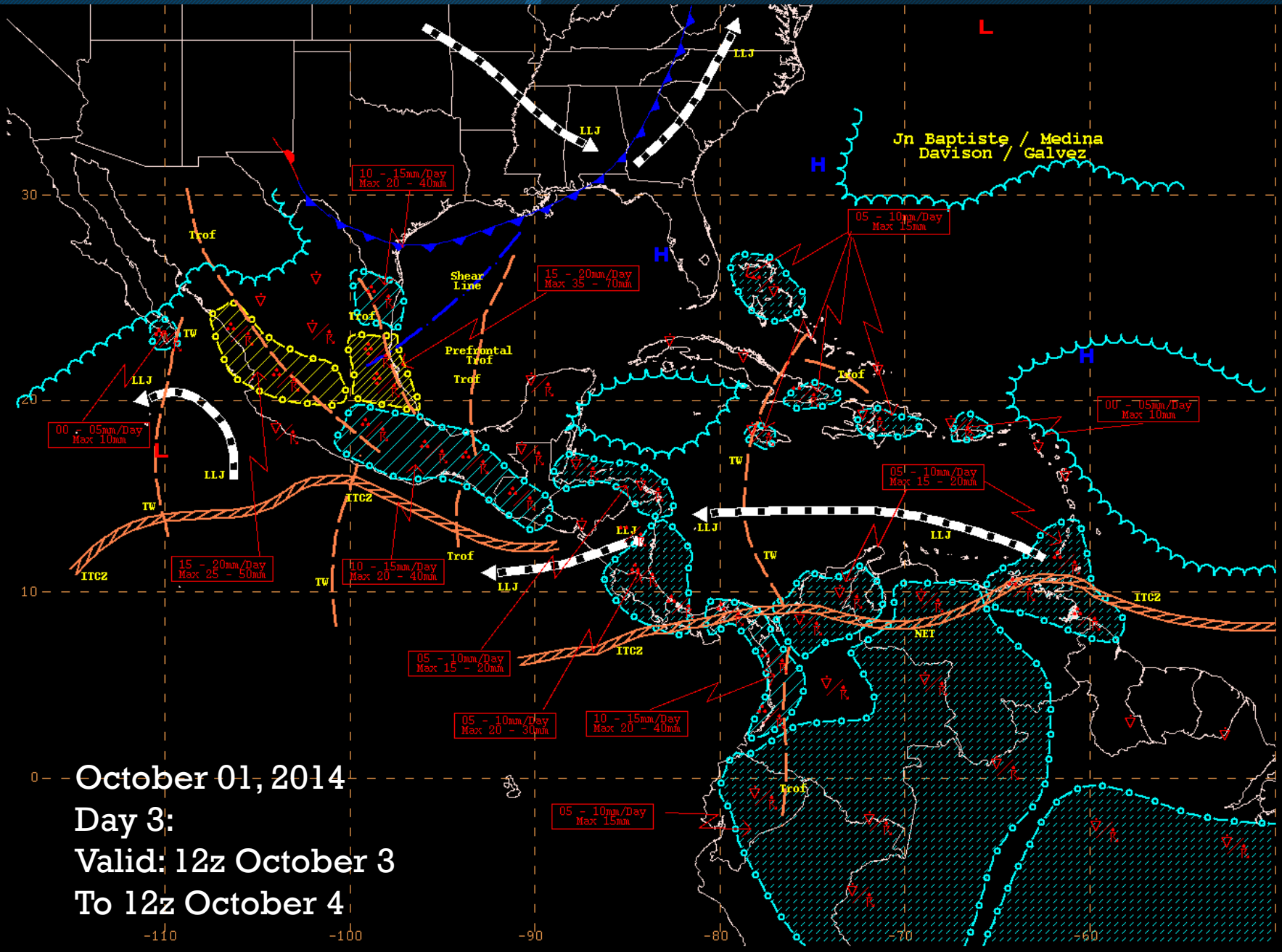
Trinidad and Tobago



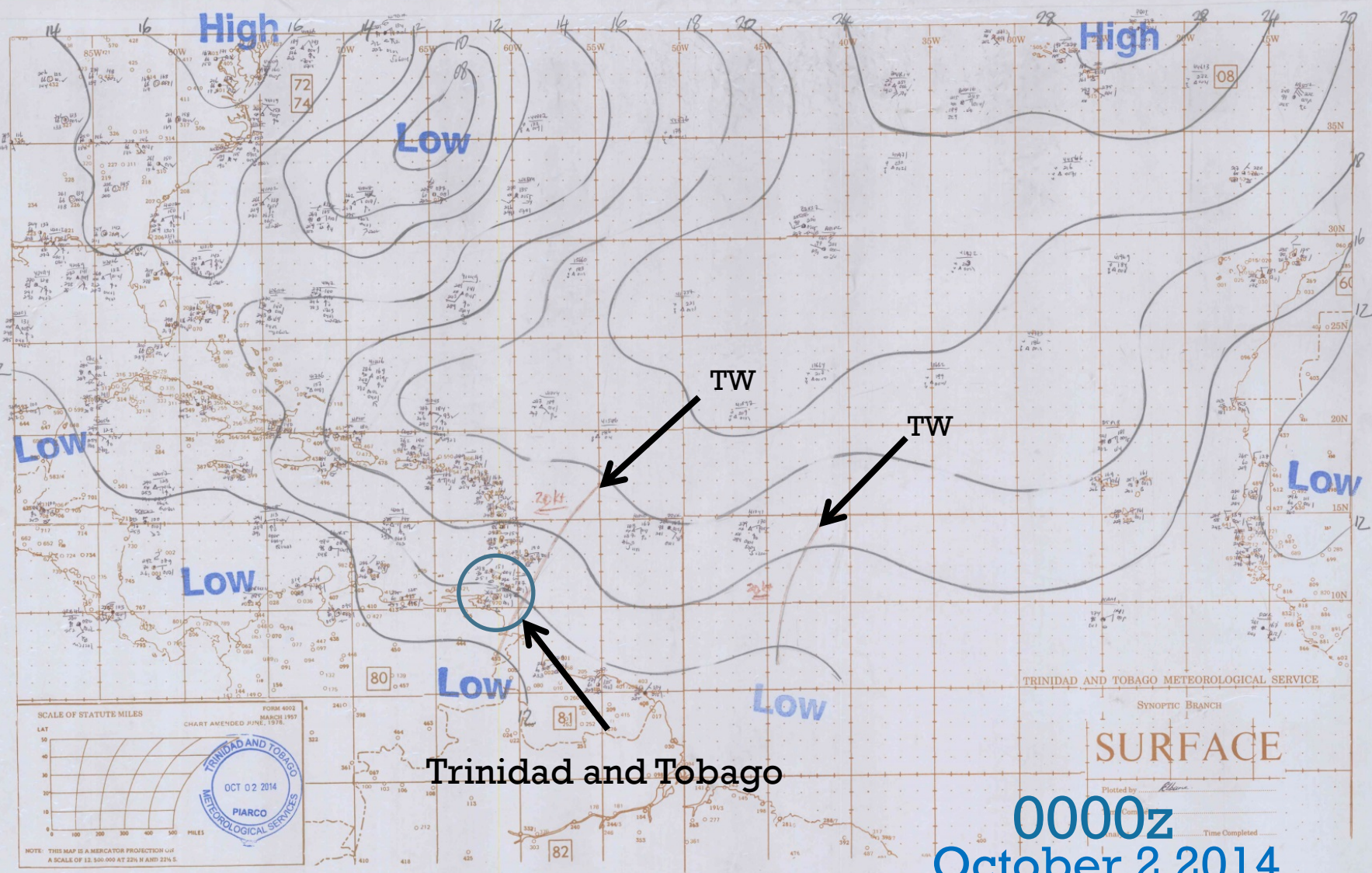
October 01, 2014
 Day 1
 Valid: 12z October 1
 To 12z October 2

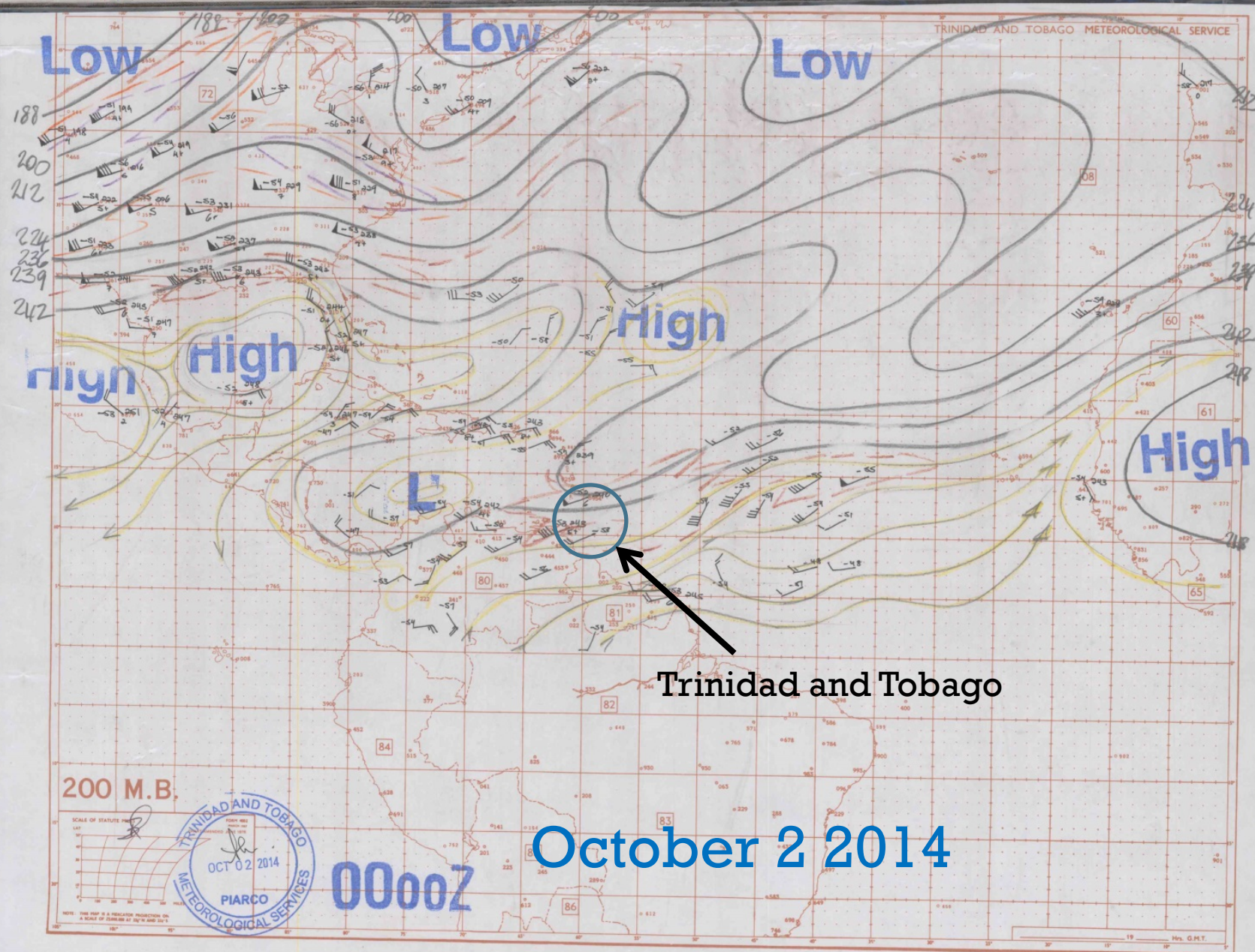


October 01, 2014
Day 2
Valid: 12z October 2
To 12z October 3



October 01, 2014
 Day 3:
 Valid: 12z October 3
 To 12z October 4





Trinidad and Tobago

October 2 2014

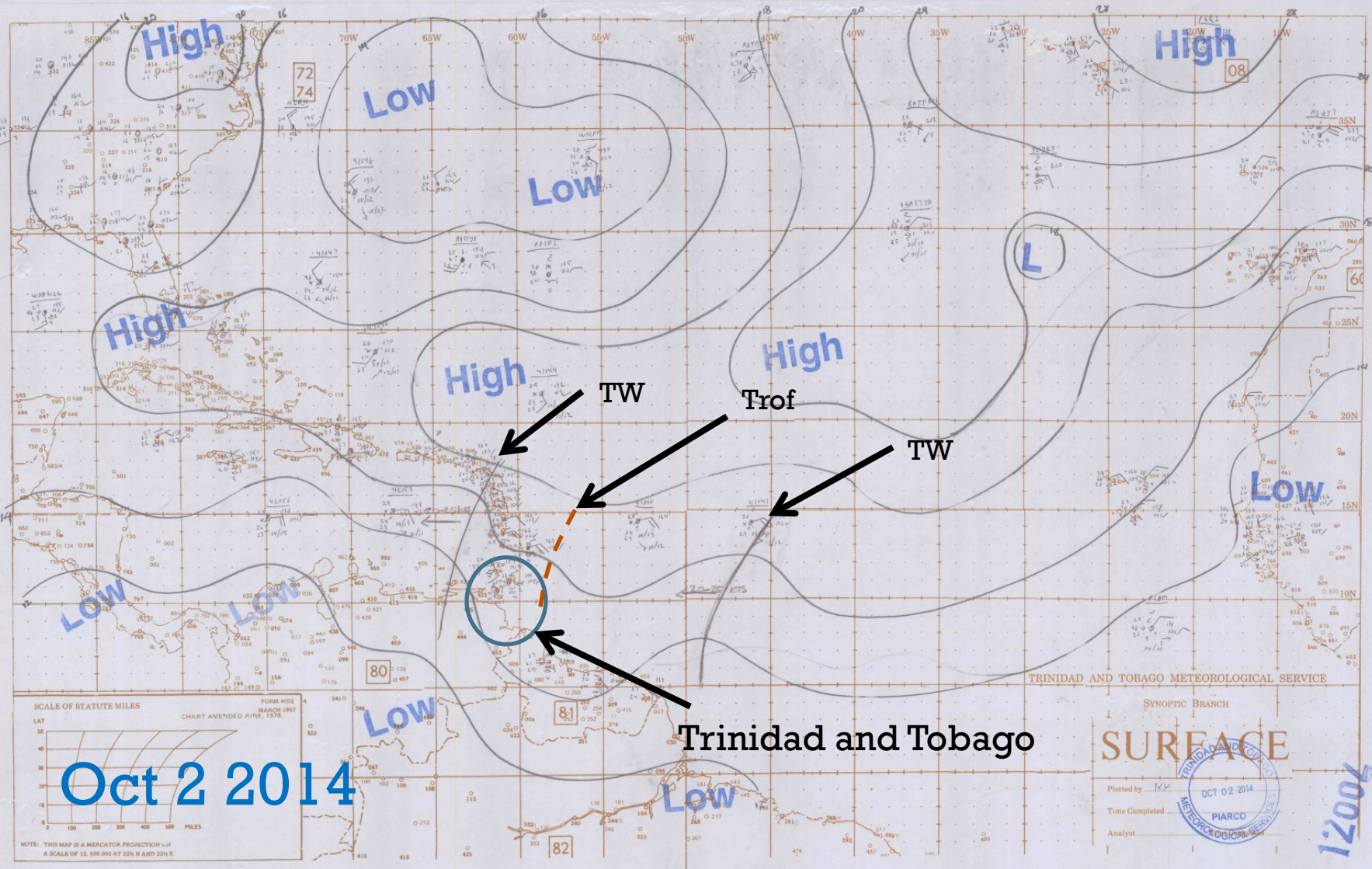
200 M.B.



0000Z

NOTE: THIS MAP IS A REPRODUCTION OF A MAP OF COURTESY OF THE U.S. AIR FORCE

19 Hrs. G.M.T.



Oct 2 2014

Trinidad and Tobago

SURFACE

OCT 02 2014

120071

TRINIDAD AND TOBAGO METEOROLOGICAL SERVICE

SYNOPTIC BRANCH

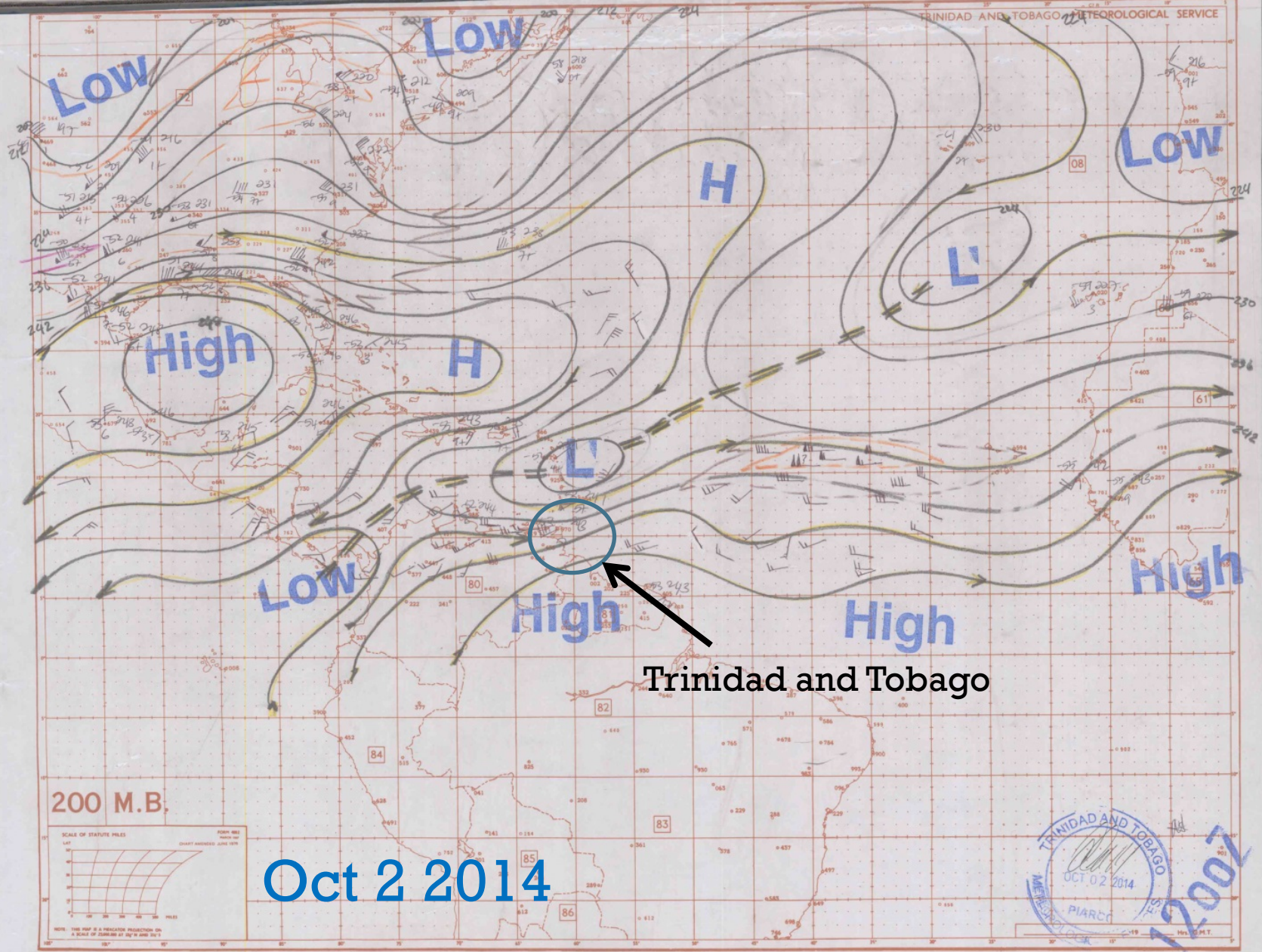
Plotted by: KCV

Time Completed

Analyst

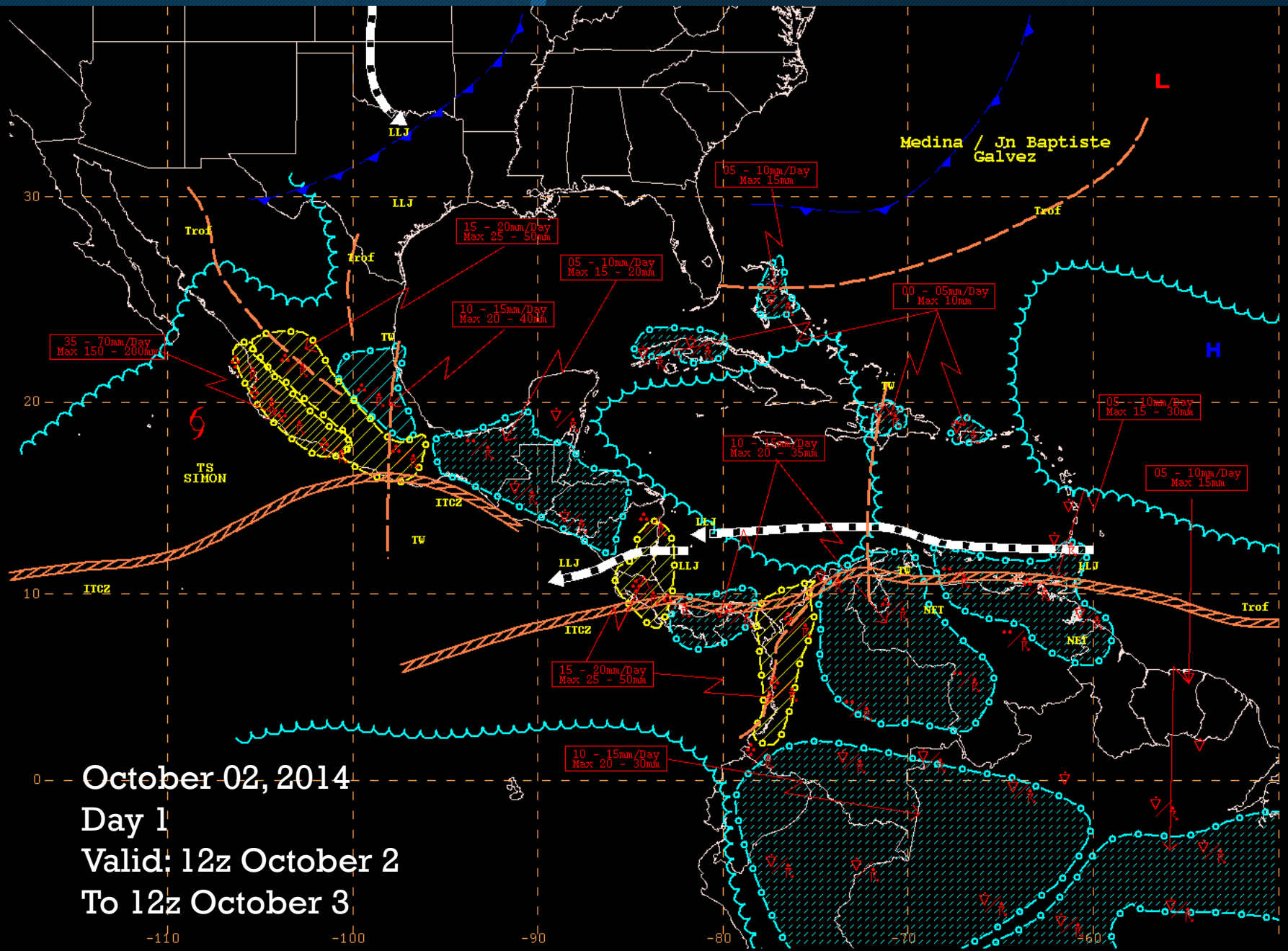
TRINIDAD AND TOBAGO METEOROLOGICAL SERVICE
PIARCO

SCALE OF STATUTE MILES
CHART AMENDED JUNE, 1978
NOTE: THIS MAP IS A MERCATOR PROJECTION ON A SCALE OF 1:3,500,000 AT 22° N AND 22° E.

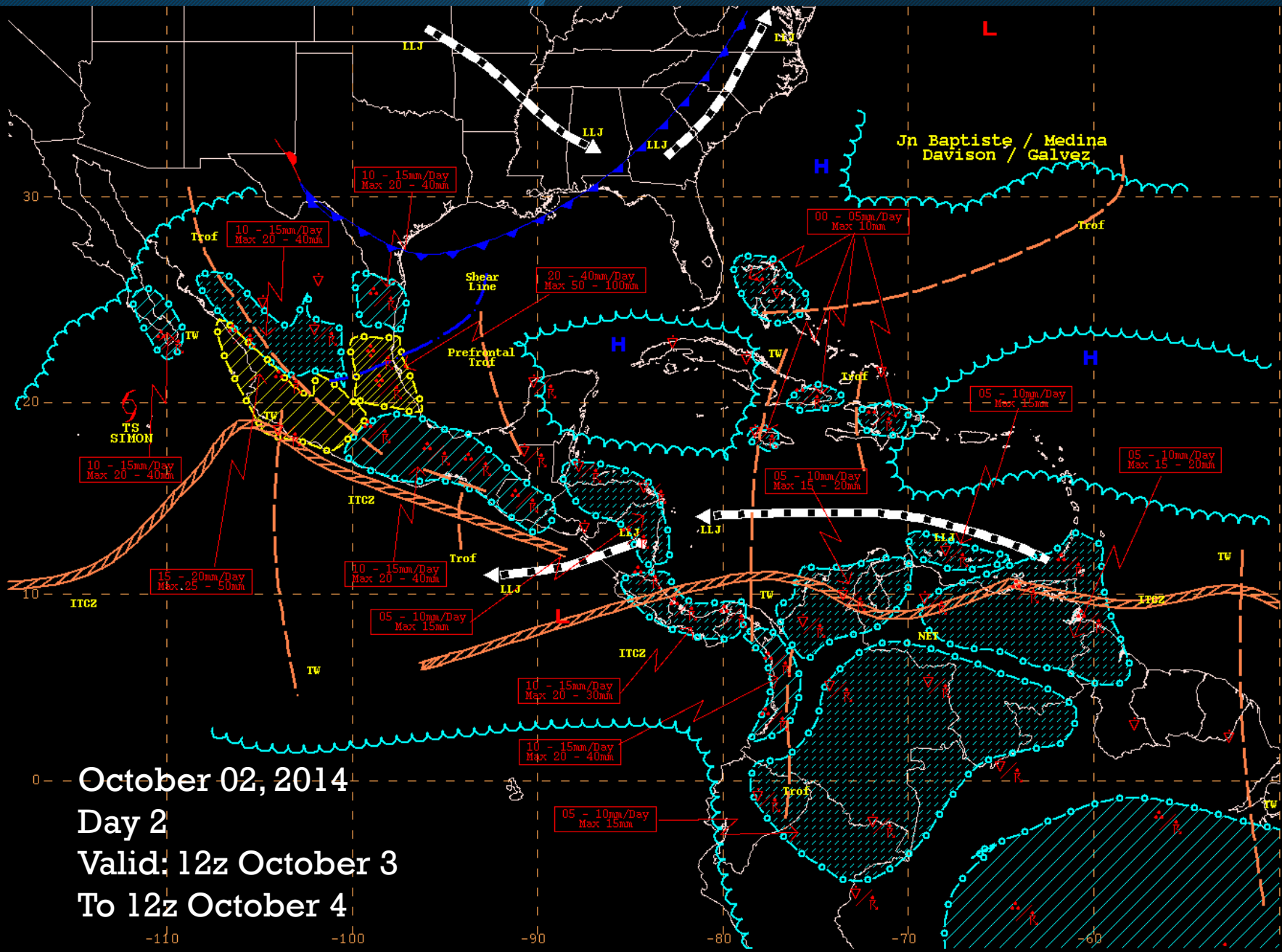


Oct 2 2014

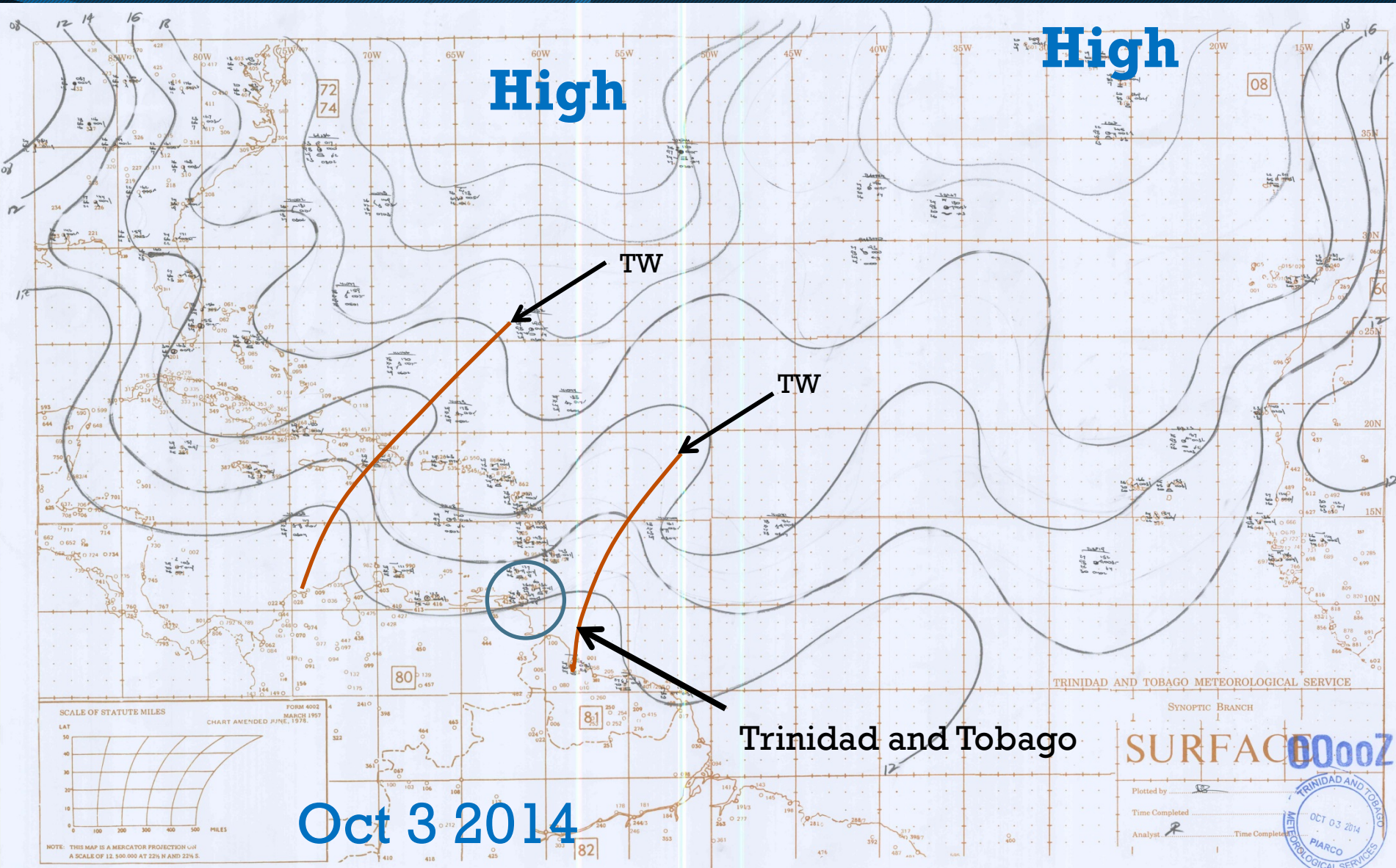
TRINIDAD AND TOBAGO
 OCT 02 2014
 PIARCO
 12007



October 02, 2014
 Day 1
 Valid: 12z October 2
 To 12z October 3



October 02, 2014
 Day 2
 Valid: 12z October 3
 To 12z October 4



High

High

TW

TW

Trinidad and Tobago

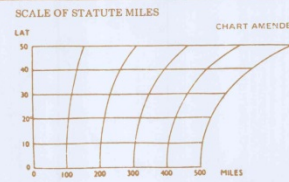
Oct 3 2014

TRINIDAD AND TOBAGO METEOROLOGICAL SERVICE

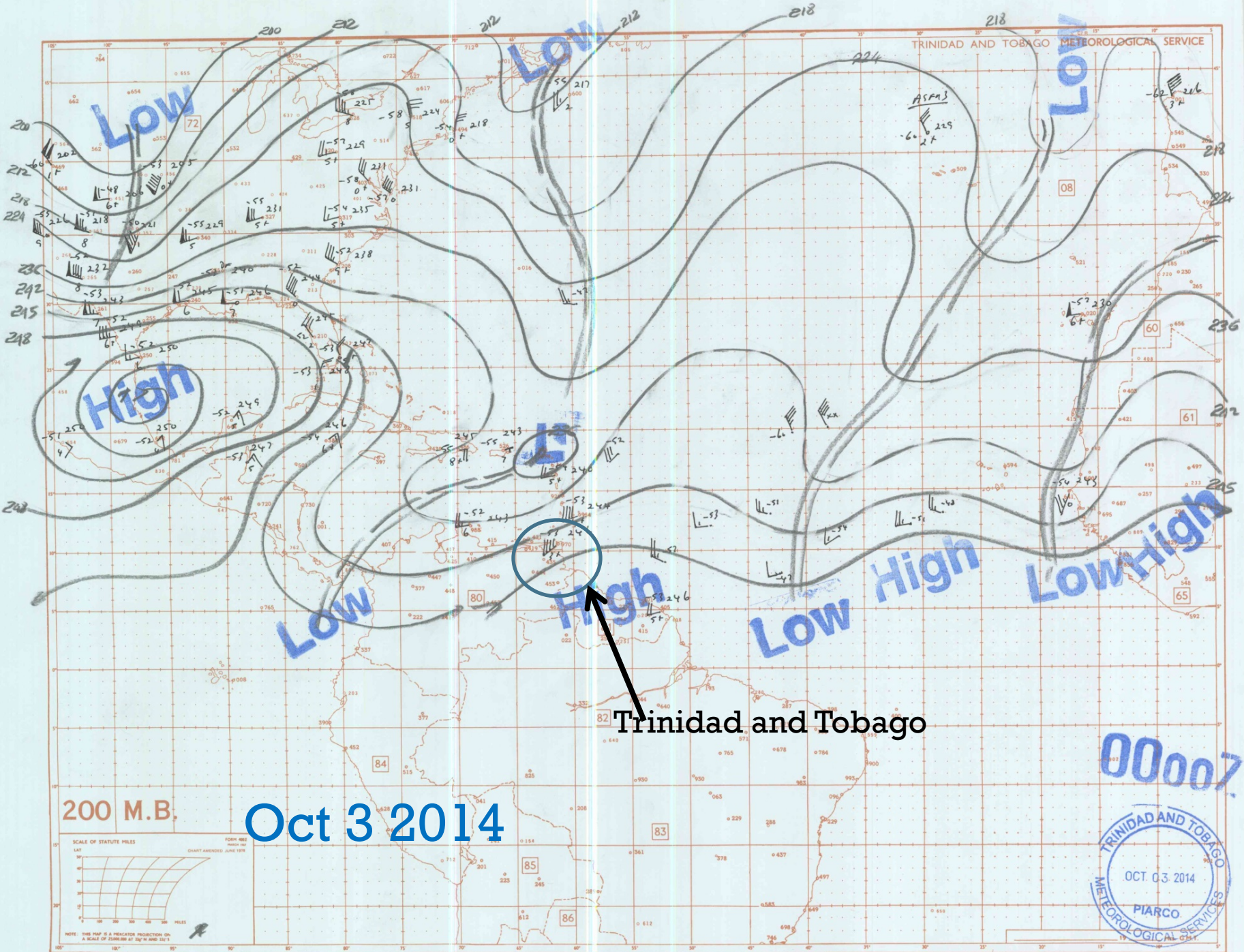
SYNOPTIC BRANCH

SURFACE 0000Z

Plotted by ...
Time Completed ...
Analyst ...
Time Completed ...



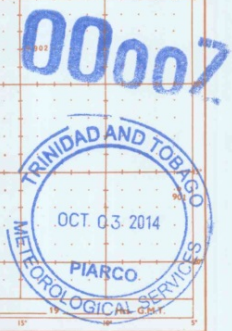
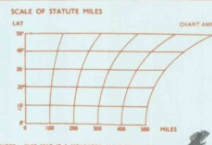
NOTE: THIS MAP IS A MERCATOR PROJECTION WITH A SCALE OF 12,500,000 AT 22°N AND 22°S.

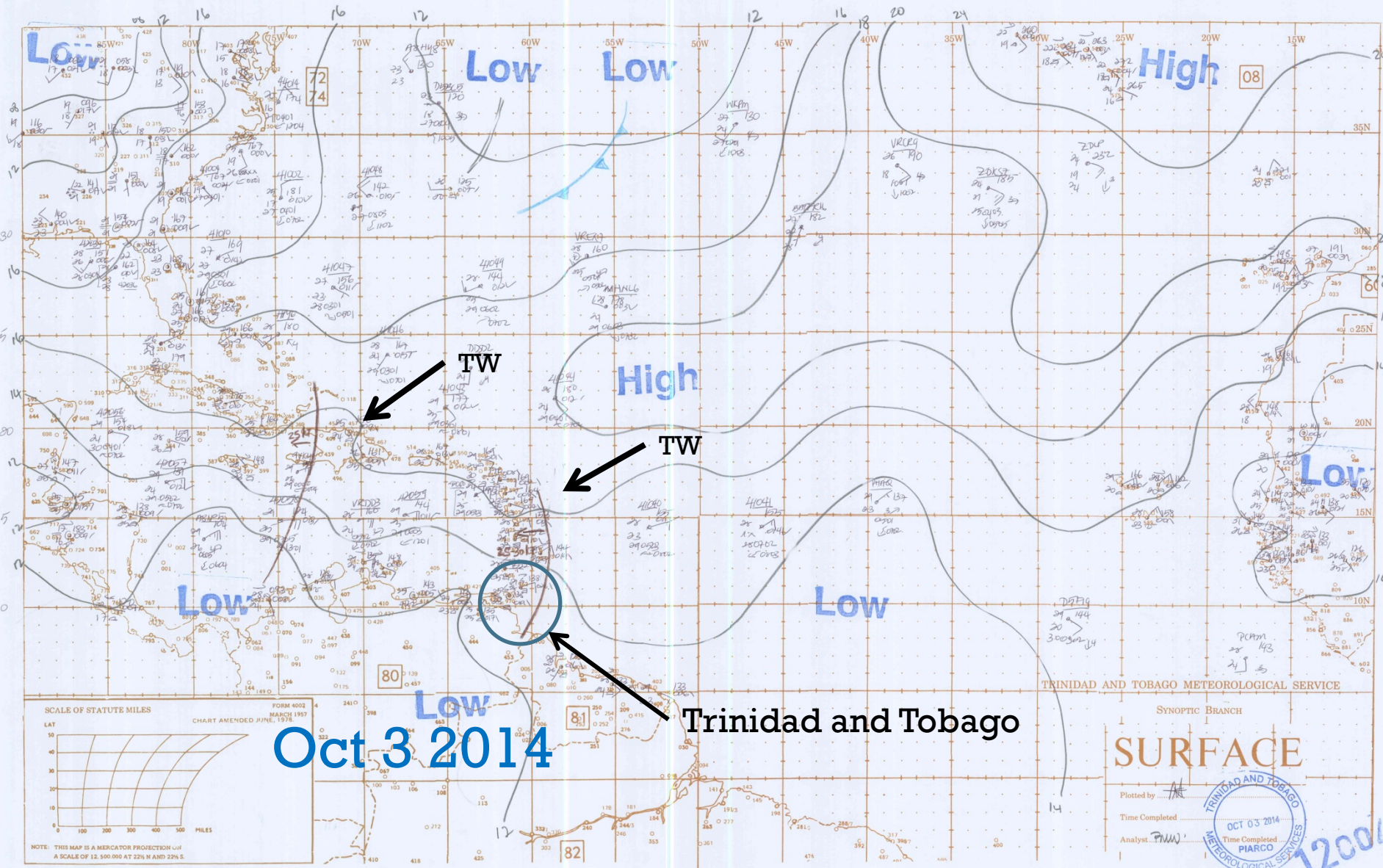


Trinidad and Tobago

Oct 3 2014

200 M.B.





Oct 3 2014

Trinidad and Tobago

TRINIDAD AND TOBAGO METEOROLOGICAL SERVICE

SYNOPTIC BRANCH

SURFACE

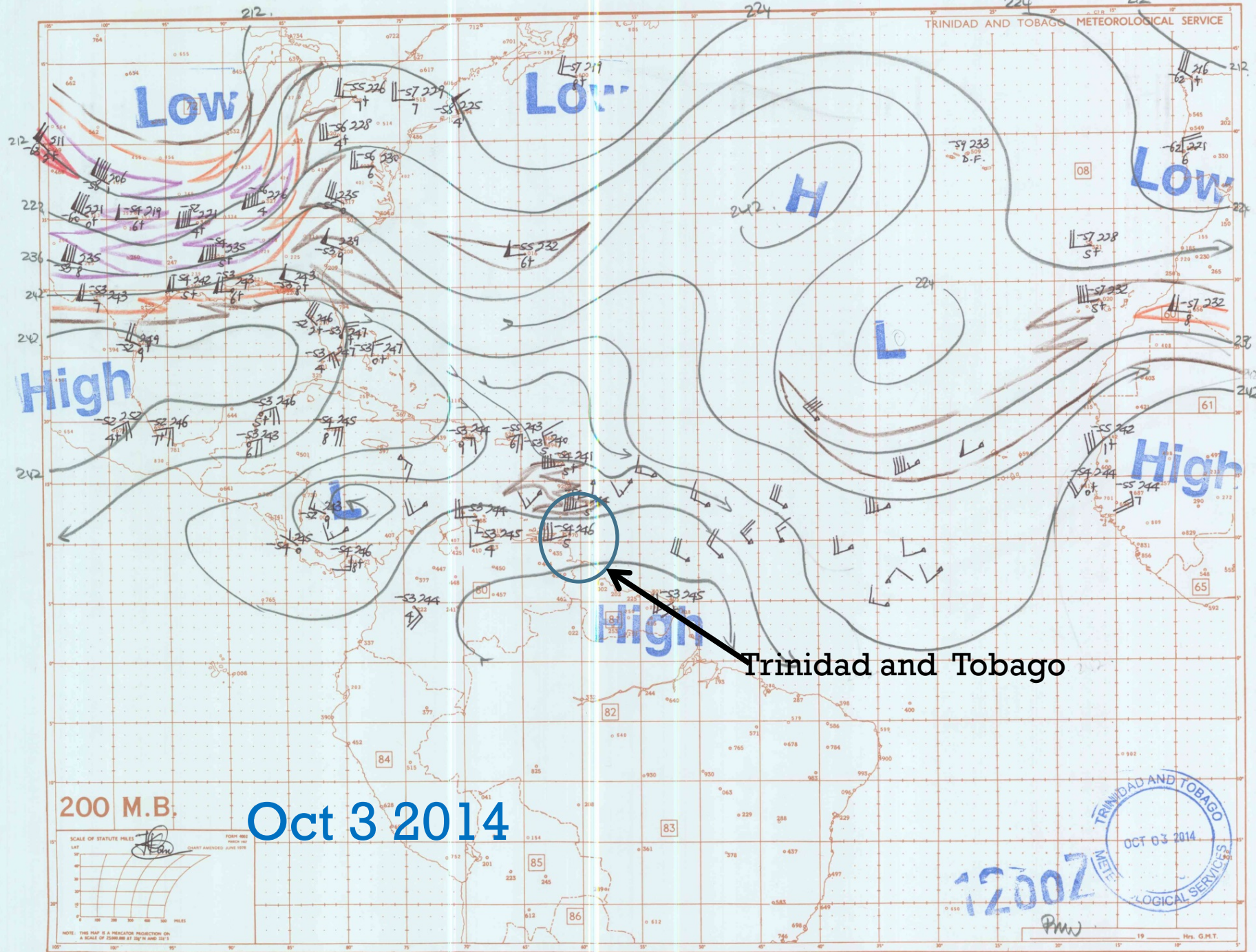
Plotted by ...
Time Completed ...
Analyst: P.M.W.



1200L

SCALE OF STATUTE MILES
FORM 4002 MARCH 1997
CHART AMENDED JUNE 1978

NOTE: THIS MAP IS A MERCATOR PROJECTION OF A SCALE OF 1:2,500,000 AT 22° N AND 22° S



High

Low

Low

H

Low

L

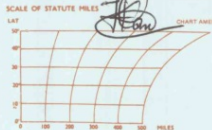
High

High

Trinidad and Tobago

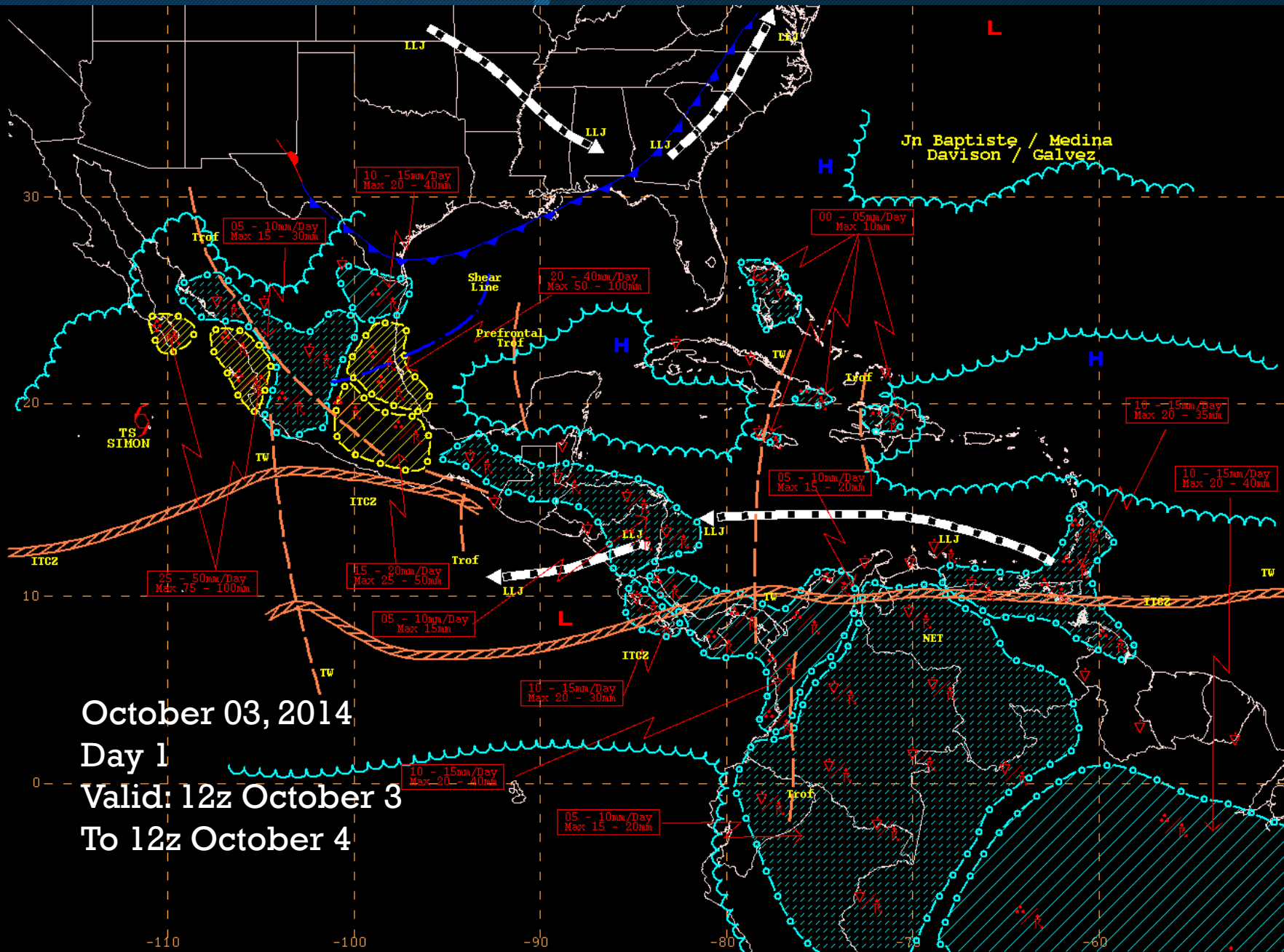
200 M.B.

Oct 3 2014

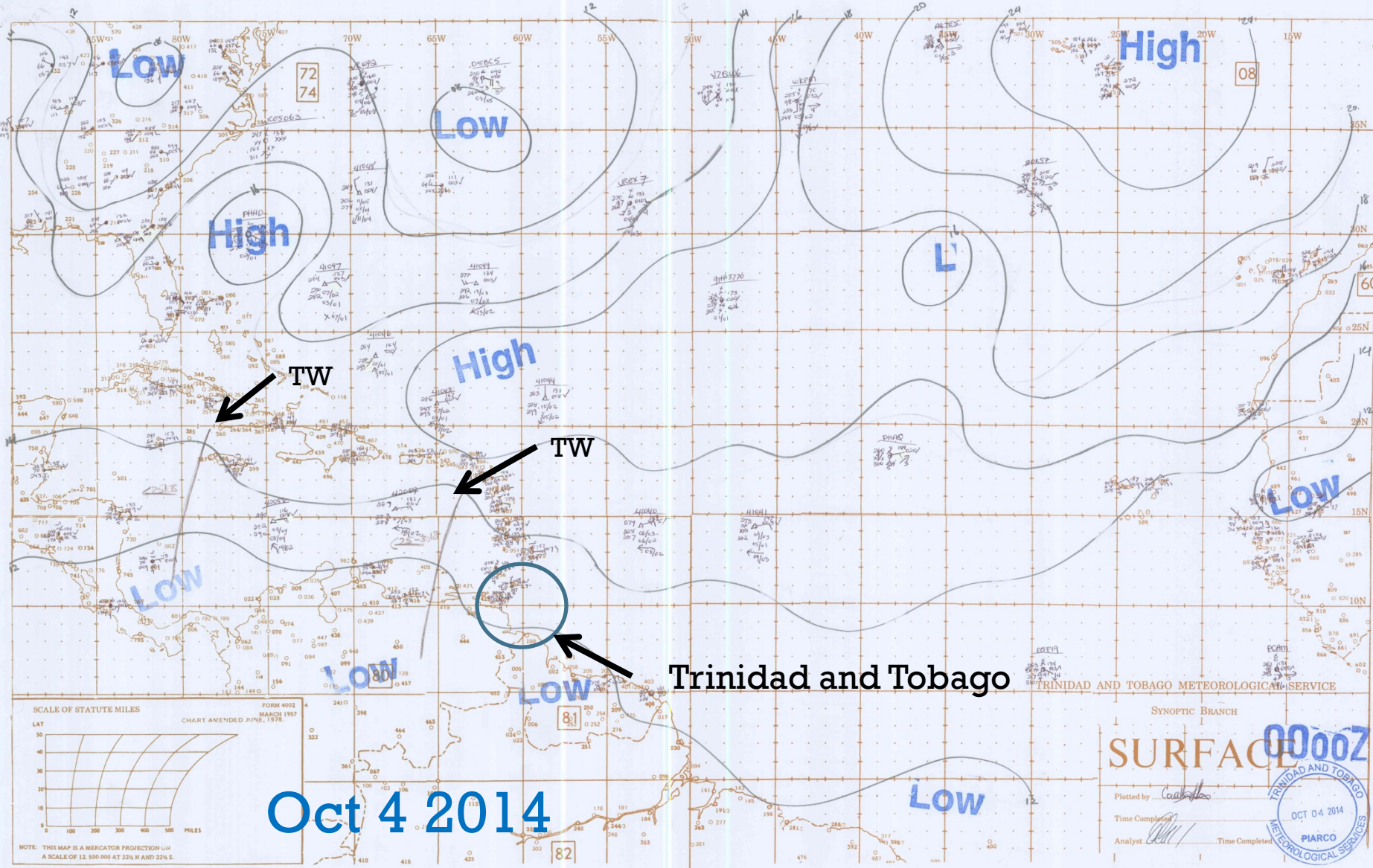


1200Z

PMW



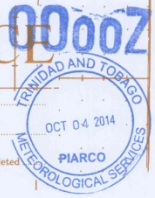
October 03, 2014
 Day 1
 Valid: 12z October 3
 To 12z October 4



Oct 4 2014

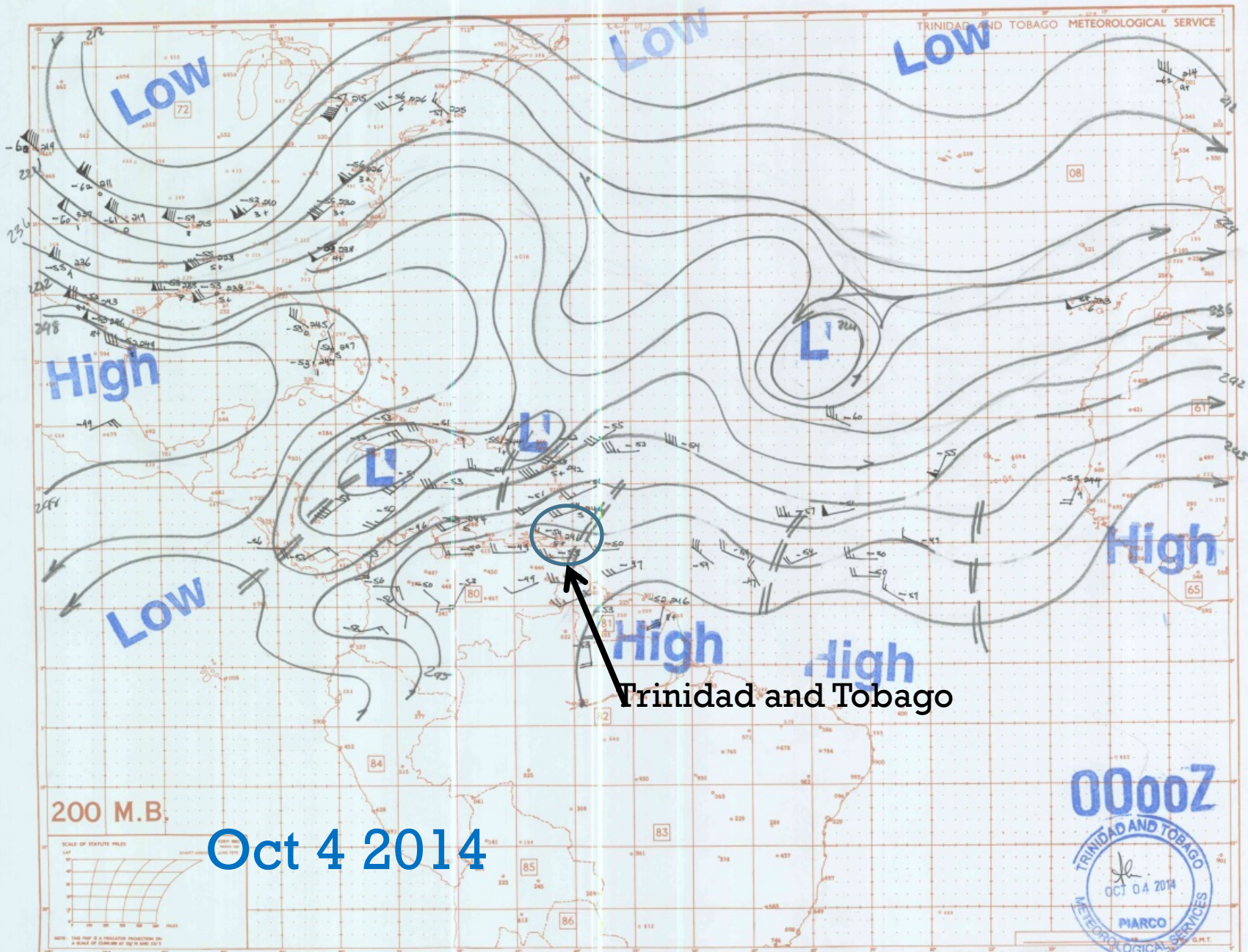
Trinidad and Tobago

SYNOPTIC BRANCH
SURFACE



Plotted by *C. Williams*
 Time Completed *11:30*
 Analyst *PIARCO* Time Completed

SCALE OF STATUTE MILES
 FORM 6002 MARCH 1957
 CHART AMENDED JUNE, 1978
 LAT
 10
 20
 30
 40
 50
 0 100 200 300 400 500
 MILES
 NOTE: THIS MAP IS A MERCATOR PROJECTION ON
 A SCALE OF 12,500,000 AT 22°N AND 22°W.



Trinidad and Tobago

Oct 4 2014

200 M.B.



Model Runs

WINGRIDDS:

- 0000z September 30;
- 0000z October 1;
- 0000z October 2 and;
- 0000z October 3

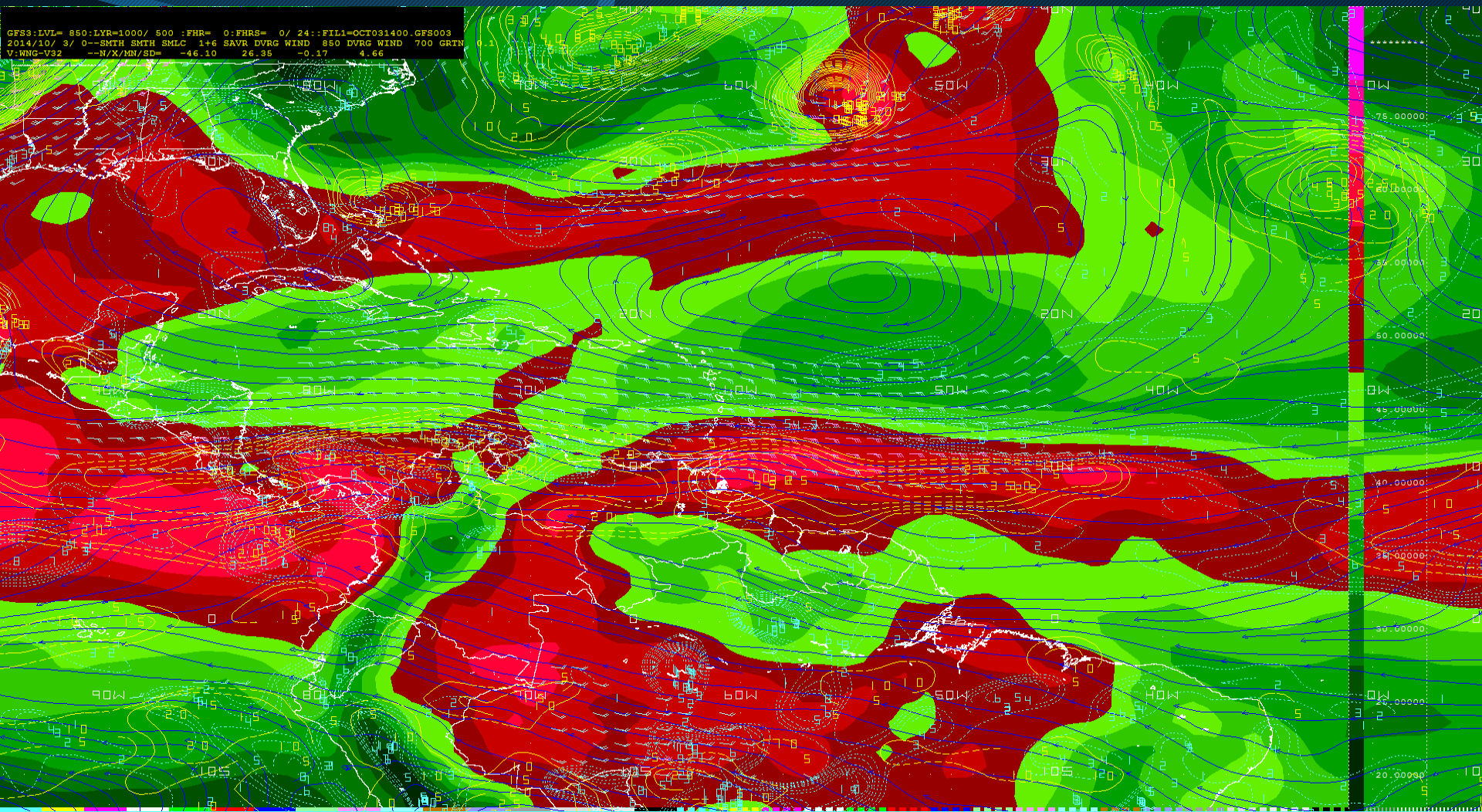
Navy Model Run –

- 0900z September 29

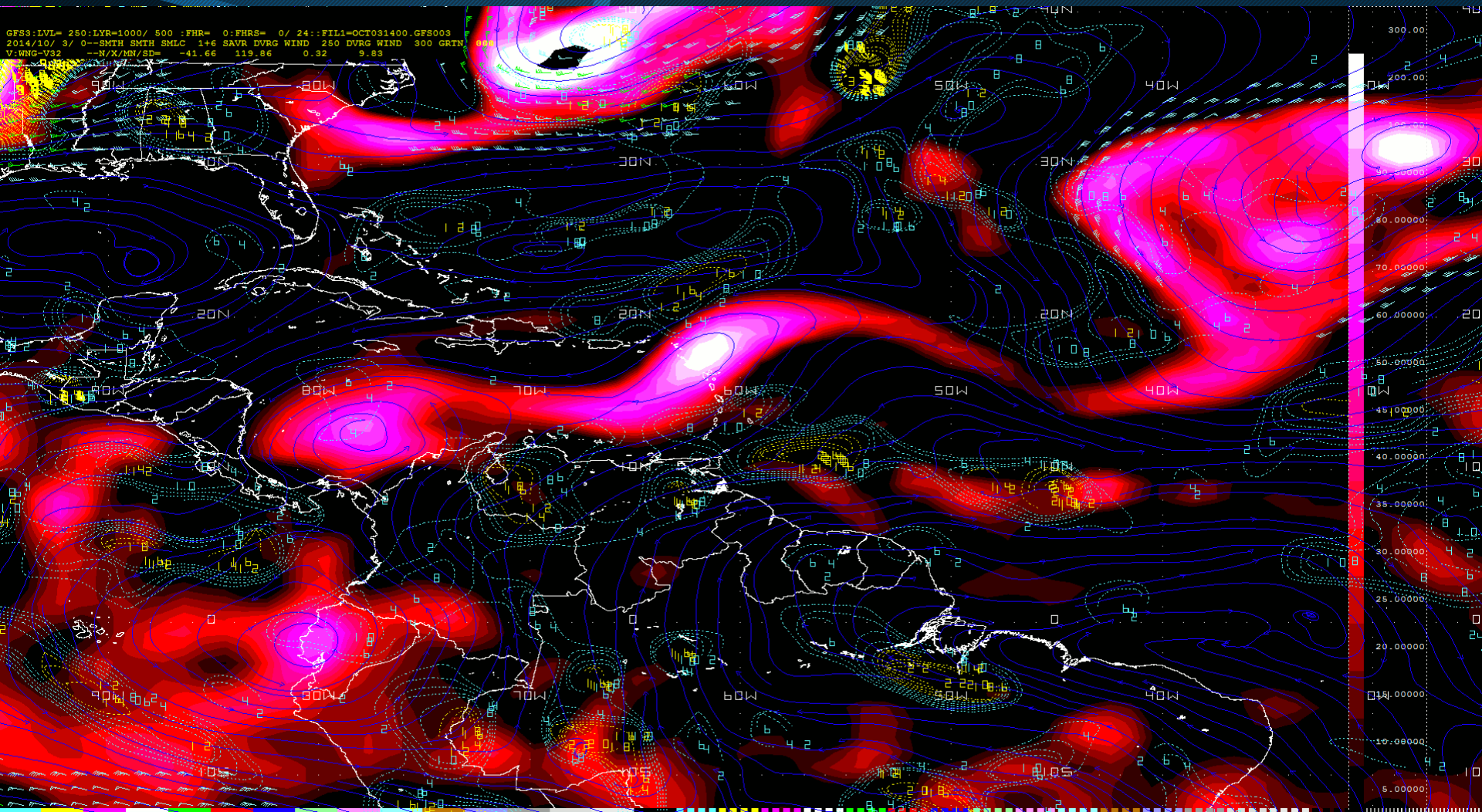
**September 30,
2014**

“WINGRIDDS Macros
- Tropical Wave
- Upper Level

GFS3: IWL= 850:LYR=1000/ 500 :FHR= 0:FHRS= 0/ 24::FILE=OCT03:1400.GFS003
2014/10/ 3/ 0--SMTH SMTH SMLC 1+6 SAVR DURC WIND 850 DURC WIND 700 GRTN
V-WNG-V32 --N/X/MN/SD-- -46.10 26.35 -0.17 4.66



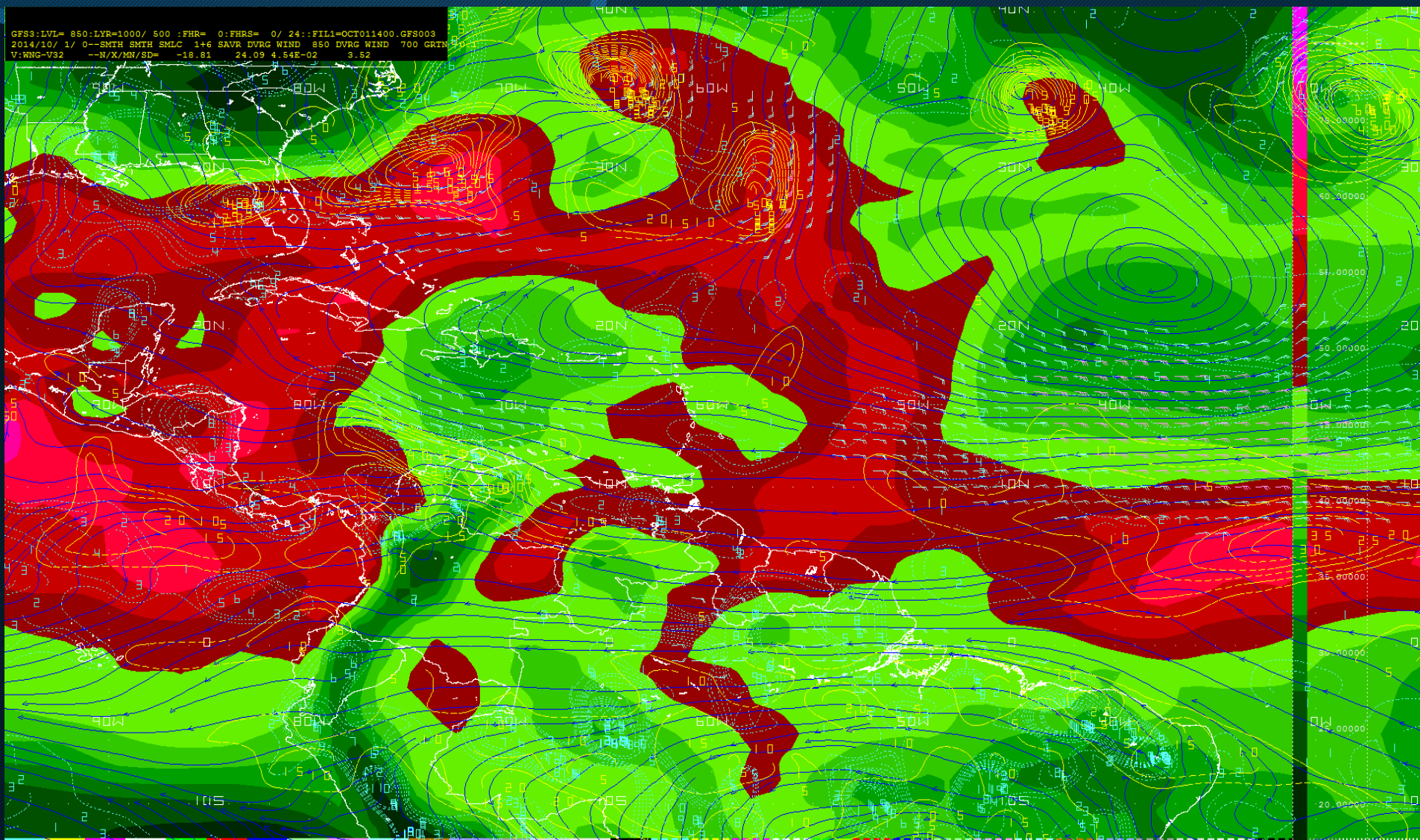
0000z Tropical/Easterly Wave Model Run – September 30 2014
Parameters displayed: PWAT (shaded green/red); Relative Vorticity (≥ 0.1 - yellow dots); 850 – 700mb layer streamlines (blue) and divergence (≥ 0.1 - blue dots)

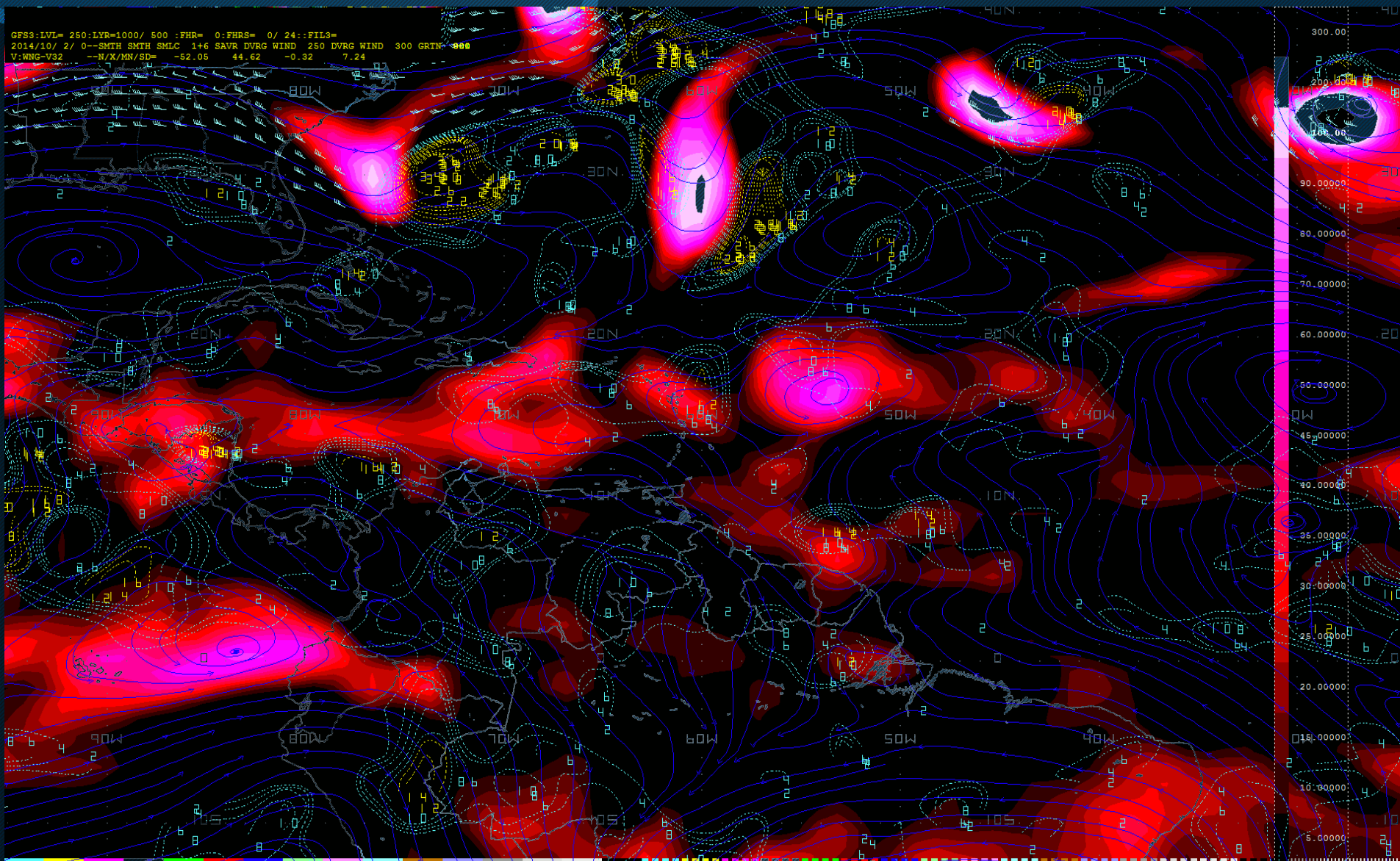


0000z Upper Level Model Run – September 30, 2014
Parameters displayed: Relative Vorticity (shaded red); 250 – 300mb
layer streamlines (blue) and divergence (yellow and blue dots)

October 1, 2014

“WINGRIDDS Macros
- Tropical Wave
- Upper Level

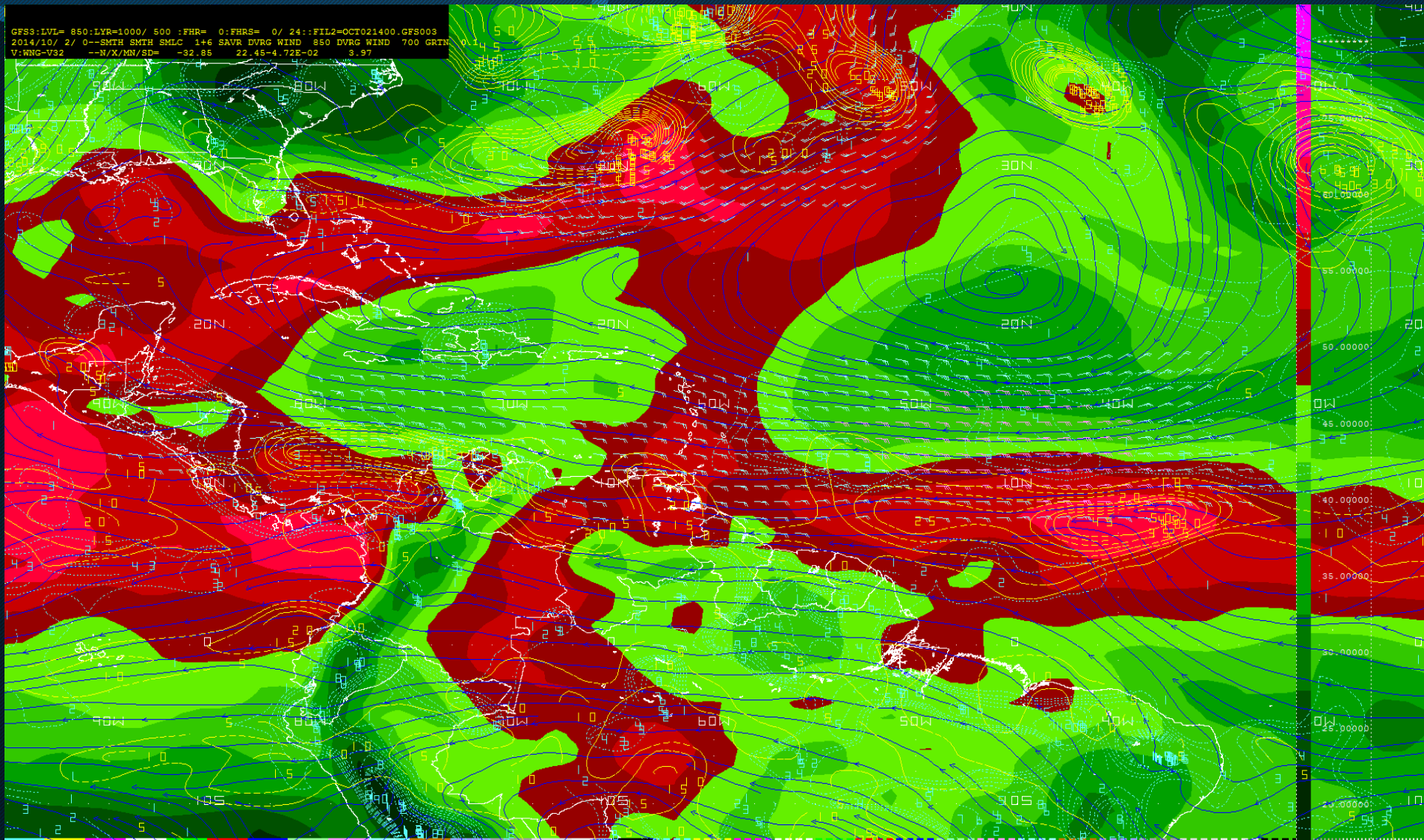




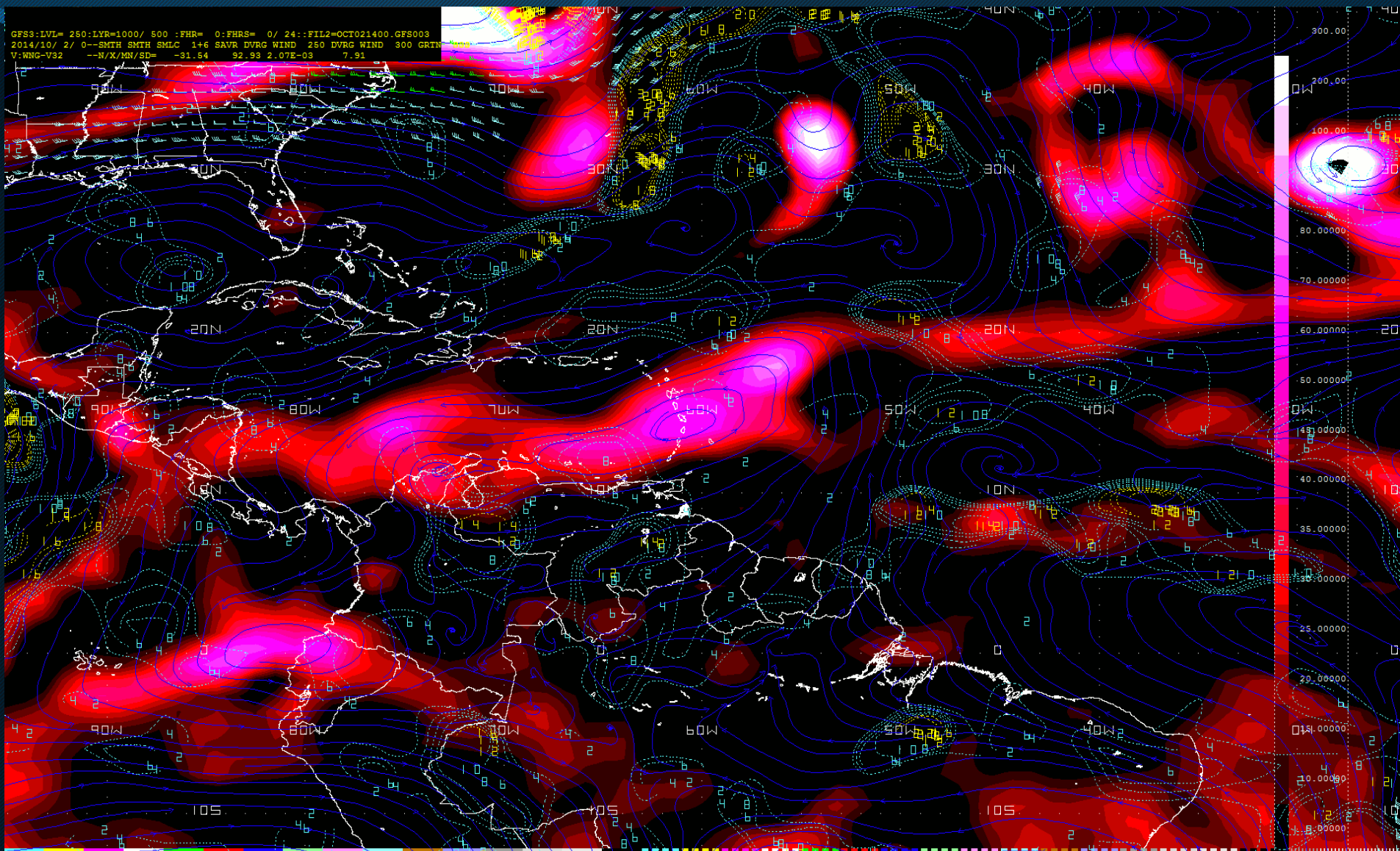
0000z Upper Level Model Run – October 1, 2014

Parameters displayed: Relative Vorticity (shaded red); 250 – 300mb layer streamlines (blue) and divergence (yellow and blue dots)

October 2, 2014



0000z Tropical/Easterly Wave Model Run – October 2, 2014
Parameters displayed: PWAT (shaded green/red); Relative Vorticity (≥ 0.1 - yellow dots); 850 – 700mb layer streamlines (blue) and divergence (≥ 0.1 - blue dots)

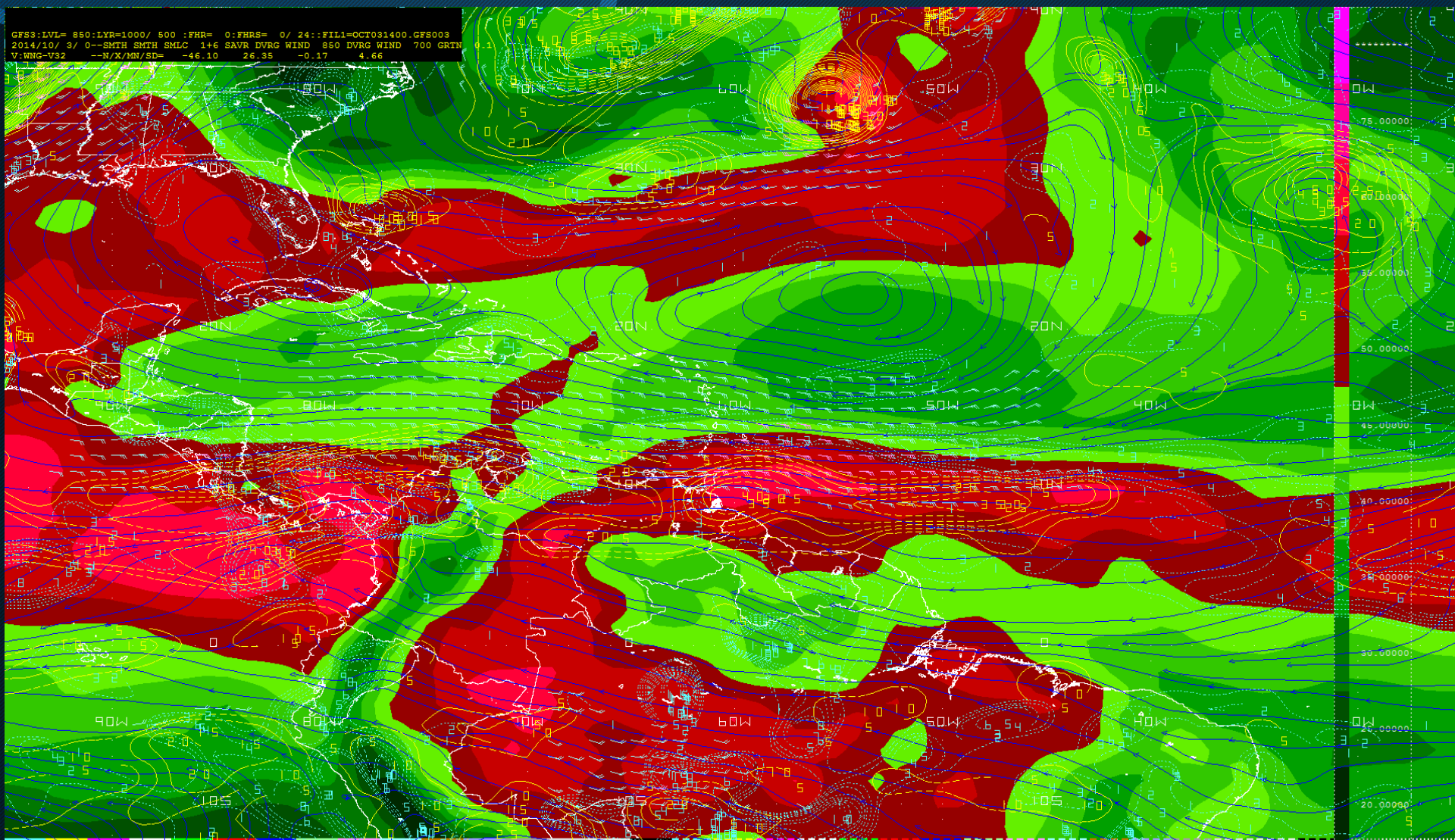


0000z Upper Level Model Run – October 2, 2014

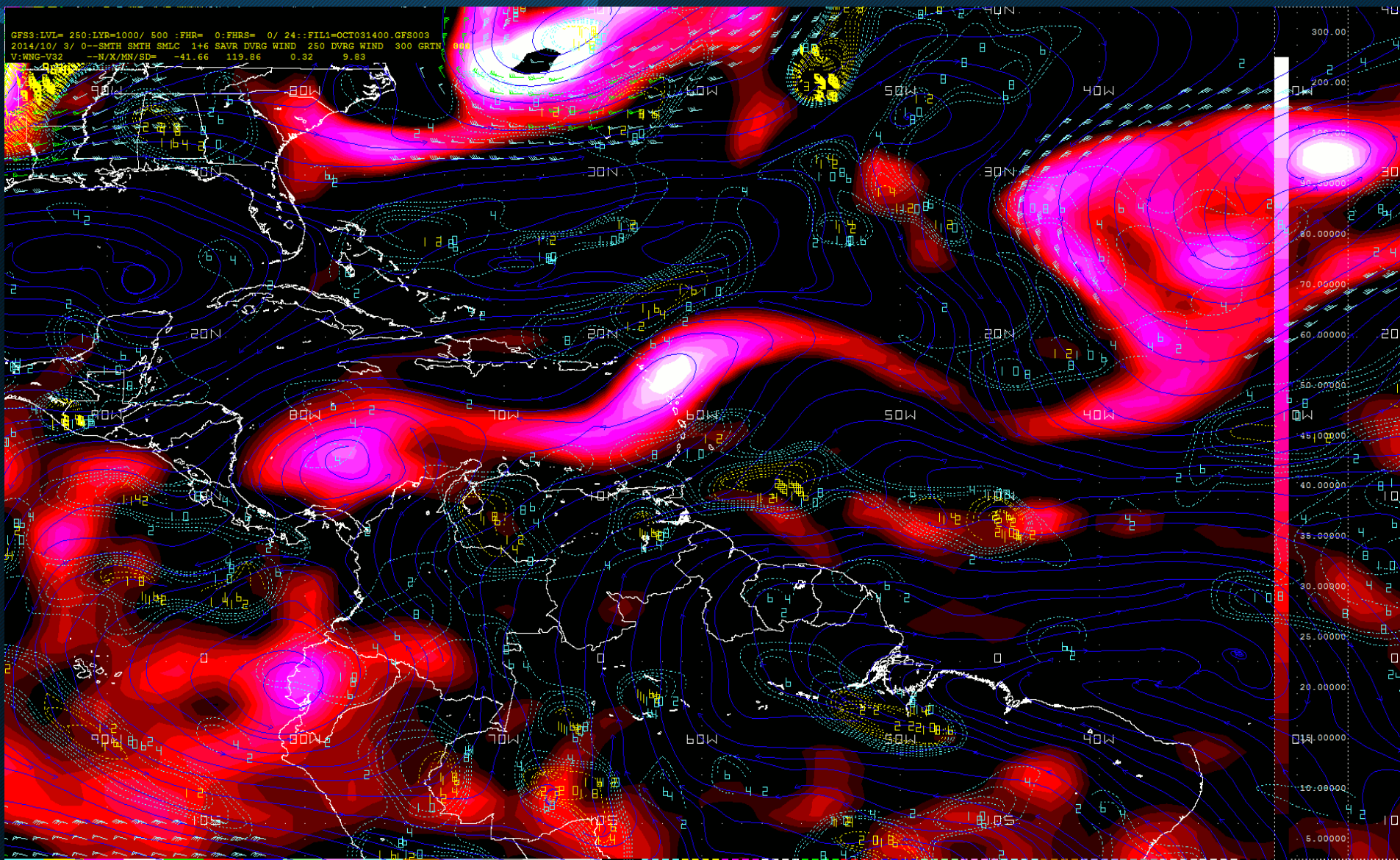
Parameters displayed: Relative Vorticity (shaded red); 250 – 300mb
layer streamlines (blue) and divergence (yellow and blue dots)

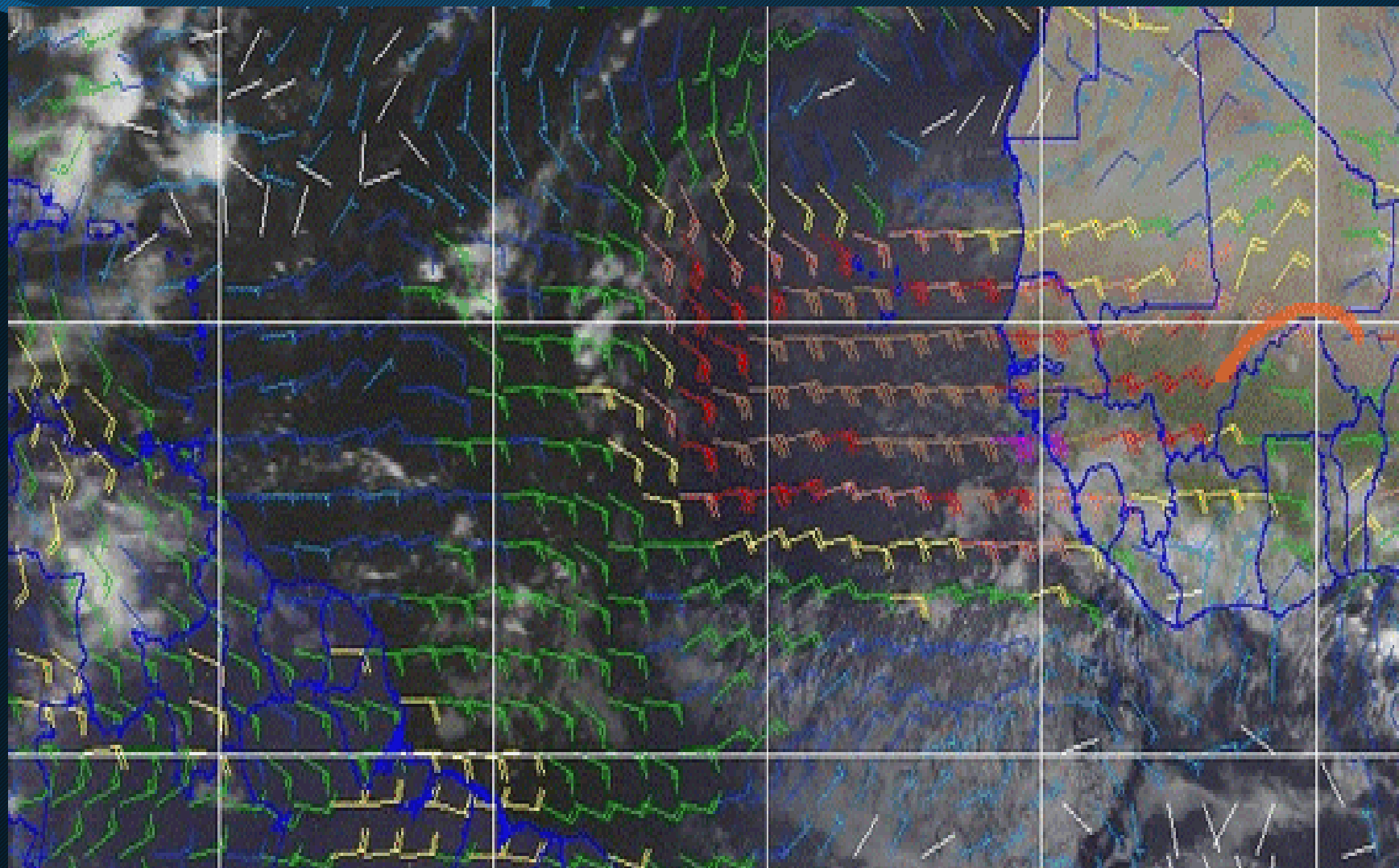
October 3, 2014

“WINGRIDDS Macros
- Tropical Wave
- Upper Level



0000z Tropical/Easterly Wave Model Run – October 3, 2014
Parameters displayed: PWAT (shaded green/red); Relative Vorticity (≥ 0.1 - yellow dots); 850 – 700mb layer streamlines (blue) and divergence (≥ 0.1 - blue dots)





Satellite and overlay of winds estimated by a navy model– 0900z
September 29, 2014

Findings

“ Passage of negatively tilted Tropical Wave – October 2nd, 2014;

“ Passage of trough – October 3rd, 2014;

“ Trade-wind Surge which assisted in the generation of other perturbations;

“ ITCZ modulated by Tropical wave and displaced North and;

“ Activity enhanced by meandering/organisation of TUTT

Timeline of Events

0700z – 0800z October 2

- **Passage of Tropical Wave;**
- **Wx:** Showers and thunderstorms into next hour
- Hourly wind and rainfall:
 - 0600z calm; 0.0mm
 - 0700z 040°/03kts; 0.7mm
 - **0800z 110°/30G46kts; 23.8mm**
 - **0900z 100°/16G29kts; 3.3mm**

0100z – 0700z October 3

- **SigWx:** Initially vicinity showers becoming moderate thunderstorms at station.
- Hourly wind and rainfall:
 - 0100z 070°/18G34kts; 1.6mm
 - 0200z 070°/14G23kts; 0.0mm
 - 0300z 070°/14G25kts; 0.0mm
 - 0400z 070°/16G31kts; 0.0mm
 - 0500z 070°/16G30kts; 1.5mm

0100z – 0700z October 3 (cont'd)

- Hourly wind and rainfall:
 - 0600z 070°/16G24kts; 1.5mm
 - 0700z 060°/10G22kts; 7.4mm
- Rainfall: 15.2mm

1900z October 3 – 0000z October 4

- **Wx:** Heavy showers and isolated thunderstorms to continuous rain
- **Hourly wind and rainfall:**
 - 1900z 090°/14kts; 0.4mm
 - **2000z 180°/14G25kts; 49.5mm**
 - **2100z 130°/08G21kts; 17.4mm**
 - 2200z 090°/10kts; 3.5mm
 - 2300z 090°/10kts; 3.8mm

1900z October 3 – 0000z October 4

- **Hourly wind and rainfall**
 - 0000z 080°/11kts; 5.9mm
- **6hr Rainfall: 80.5mm**
- **24hr total: 100.5mm**

Impacts

“Aviation”

- Suspension of flights between 1900Z Oct 3 – 0000z October 4 and;
- 7 domestic flights delayed; no cancellations.

Impacts cont'd

“Public

20z October 3 – 22z
October 4

- 4 cases of flooding (commercial and residential);
- 9 cases of landslides (roads blockages and fallen trees) and;
- 4 cases of roofs being blown off

End

“ Thank you for paying attention.

“ If your questions are hard and/or convoluted, you can save your questions for after the break. (That's a serious joke...haha)

End

**“ Questions?
“ (You can really ask them
now)**

Glossary

“ Tropical Wave Definition:
Perturbation in the easterlies
which originate over Africa as a
result of interactions of
convective activity in Ethiopia
and the African Easterly Jet.

“ Tropical Upper Tropospheric
Trough (T.U.T.T):
An upper atmospheric trough
that enhances convection in the
tropics. They tend to separate
the subtropical ridge from the
sub-equatorial ridge.

Glossary (cont'd)

“ Easterly Wave:
perturbation in the
easterlies. Does not
originate over the African
continent.

“ Trade-wind Surge:
a marked increase in the
speed of the trade winds

Glossary (cont'd)

“ Inter-Tropical
Convergence Zone
(ITCZ):

An area of convergence
extending from west Africa,
where the northeast and
southeast trades converge.