



Aibonito Christmas 2009 Flood Event

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Aibonito Christmas 2009 Flood Event

Vaguada-“like”= a spell of rainy weather when a cold (“drier”) air mass from the continent comes down into the Caribbean basin...

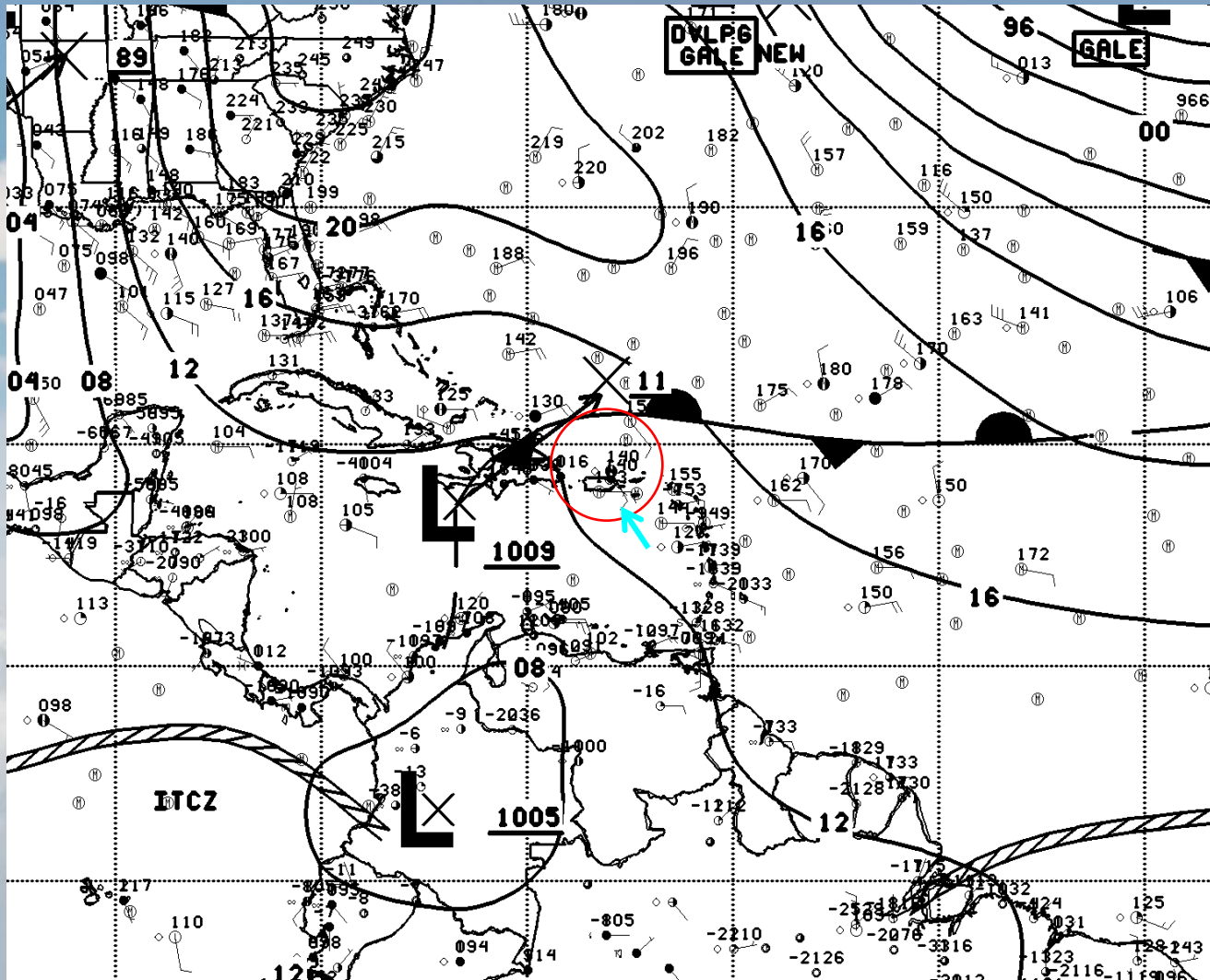
Notes...Meteorological Category ... likely to cause heavy rain across region.

Aibonito Christmas 2009 Flood Event

- Vaguada - Flood producing event for Puerto Rico ... a polar trough in prevailing westerlies that lie above the lower level easterly trade winds.
- These systems have been known to produce heavy rains with associated flooding.

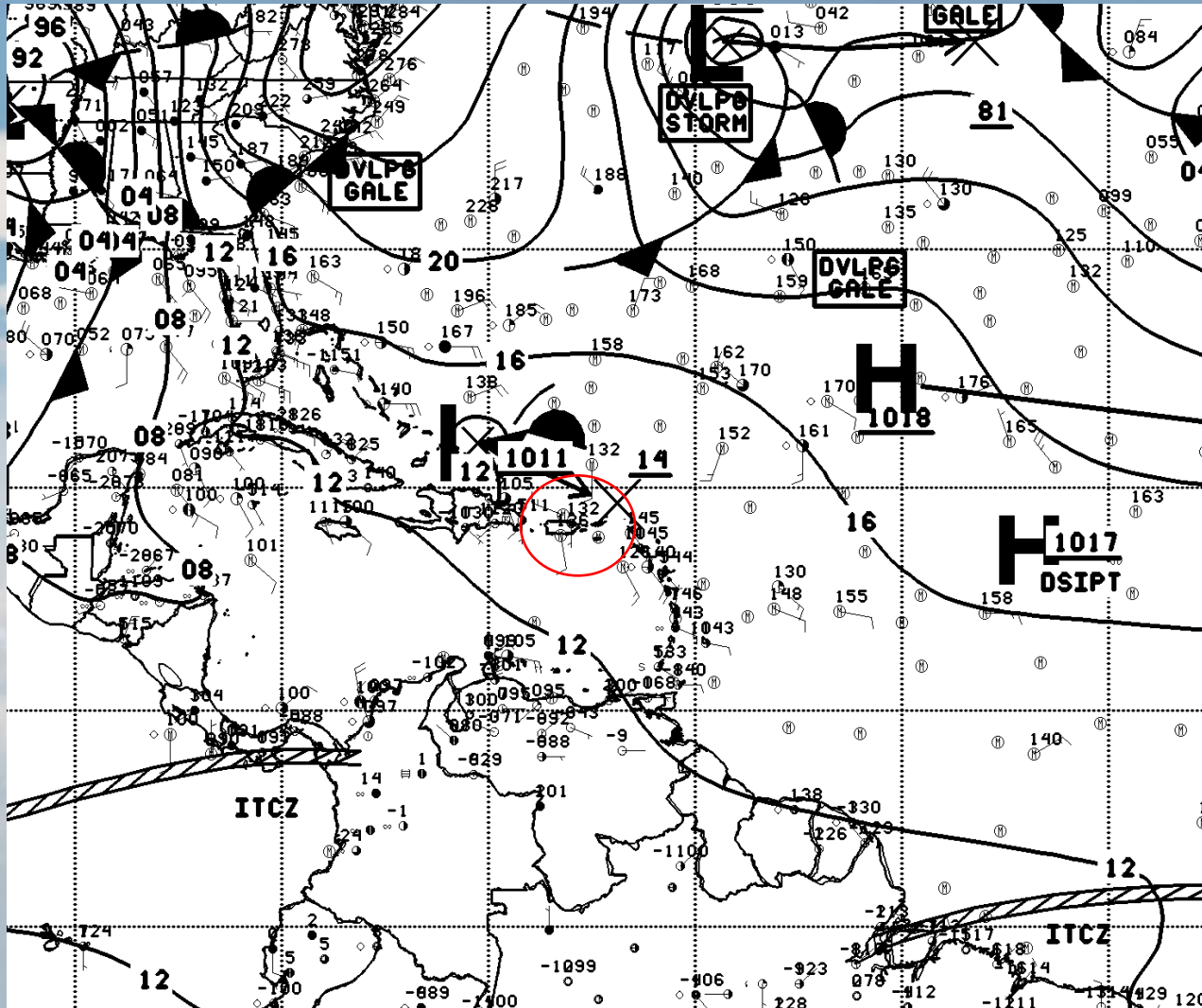
Notes... Meets some of the same criteria ... although more like a dry boundary from a stationary front.

Aibonito Christmas 2009 Flood Event ... 12/24



Notes...A weak stationary front draped across the region ... also you can see the inflow of moisture into the boundary ... convergence and strong convection. Blue arrows show the low level flow into Puerto Rico.

Aibonito Christmas 2009 Flood Event ... 12/25



Notes... The following day after the interaction and modification ... just a hint of a feature left.

Aibonito Christmas 2009 Flood Event

- Vaguada continued – occurs primarily during the winter and very rarely during the early summer and late fall.
- Rainfall patterns can range from high intensity localized rains to more general longer duration light to moderate rainfall.
- These systems have the potential to cause serious flood problems over Puerto Rico.

Notes... This weather setup is not unusual for this period ... this time it resulted in high intensity rainfall in the Aibonito area.

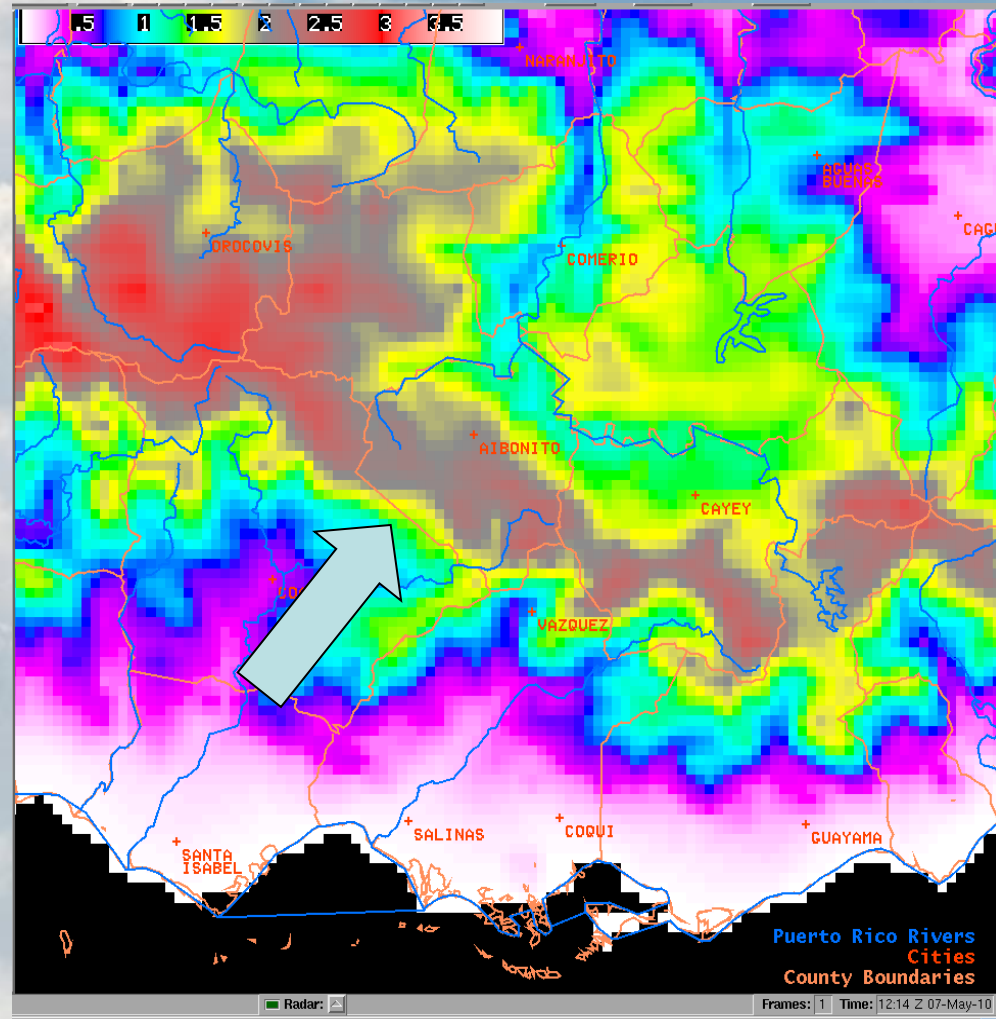
Aibonito Christmas 2009 Flood Event

- Weather Setup – On December 24th a weak short wave moved across the Western Atlantic passing across PR during the late evening into the night.
- Strong low level moisture was also moving over PR in south southwest flow.
- This was all enhanced by a 250 mb jet of southwest winds with core velocities reaching 78 knots. (For a more detailed meteorological write up see this analysis)

Notes... There is a more detailed write up on the meteorological components that were in place for this event. Please use the link the view the write up.

Aibonito Christmas 2009 Flood Event

- **Aibonito** is a small mountain town in Puerto Rico located in the Mountain range of Cayey, north of Salinas; south of Barranquitas.
- **Aibonito** is located on a relative high elevation at 2,401 ft/731 m above sea level.



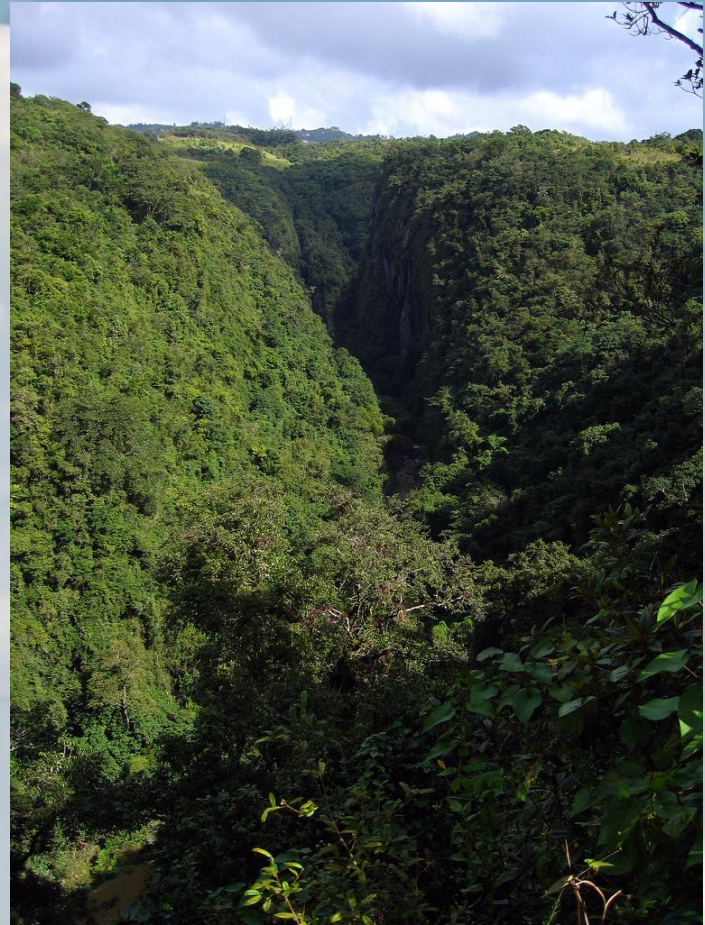
Aibonito Christmas 2009 Flood Event



Notes...It is in the South Eastern Interior of the Island.

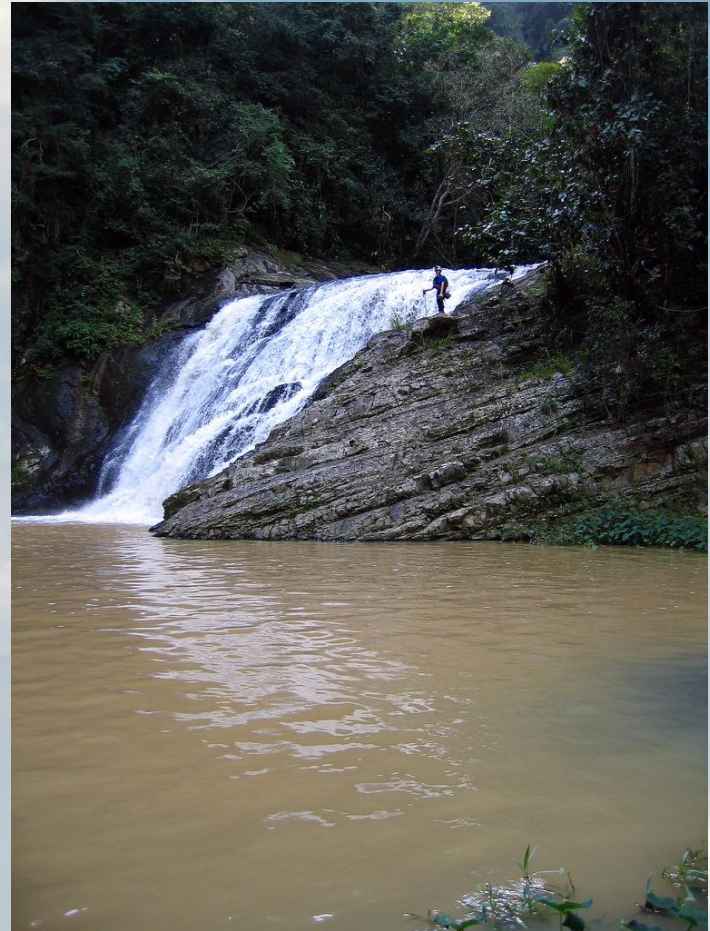
Aibonito Christmas 2009 Flood Event

- Mountains; Asomante -2,042 ft, La Sierra- 2,394 ft and the Torre Degetau- 2,109 ft.
- Rivers; Río de Aibonito, Río Cuyón, Río de la Plata and Río Usabón



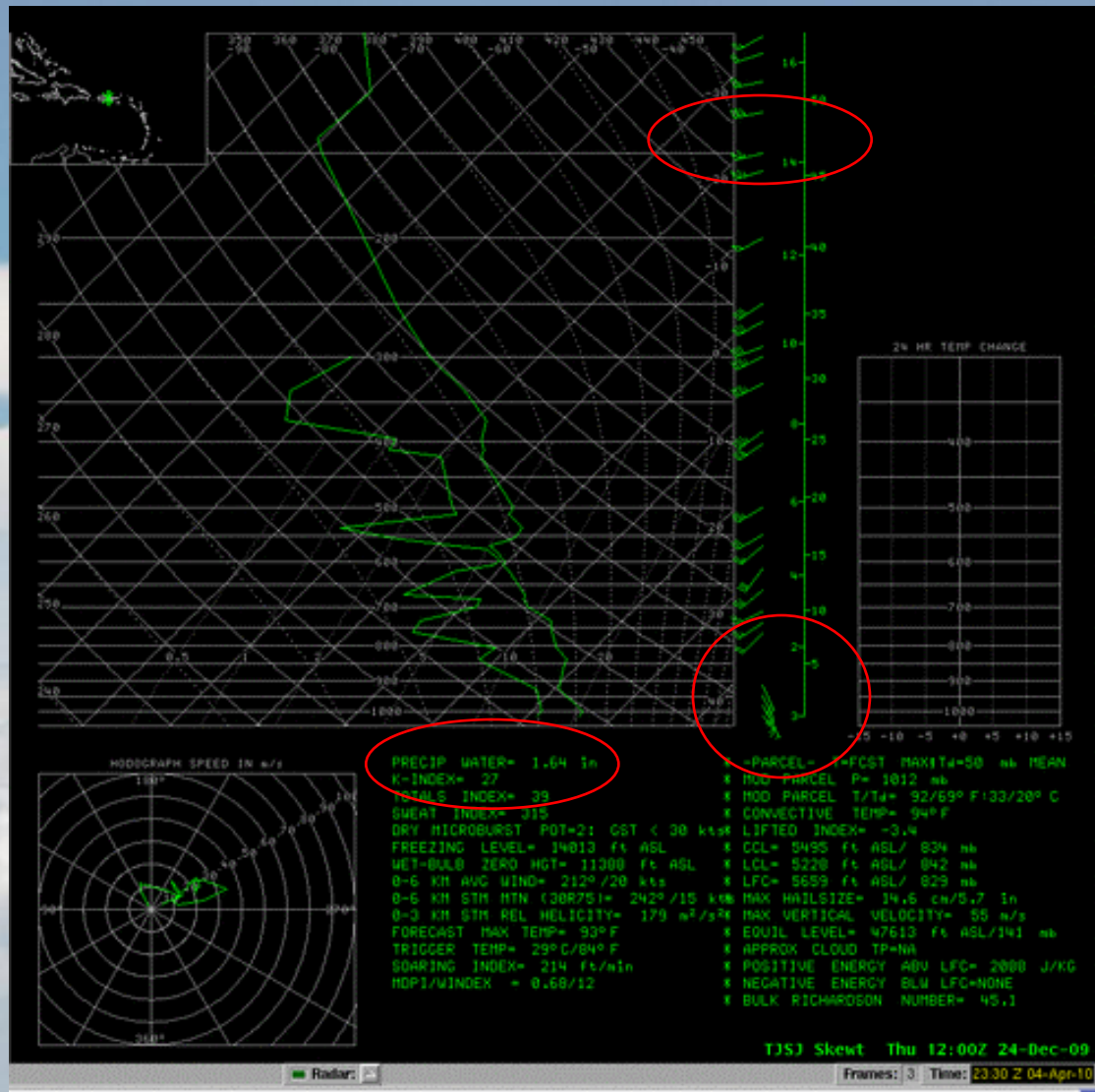
Notes...It is a mountainous community with Canyons, Waterfalls, small rivers and “larger” rivers ... the Usabon and the Rio de La Plata (the longest River on the island) which runs all the way to the north coast of Puerto Rico runs through Aibonito.

Aibonito Christmas 2009 Flood Event



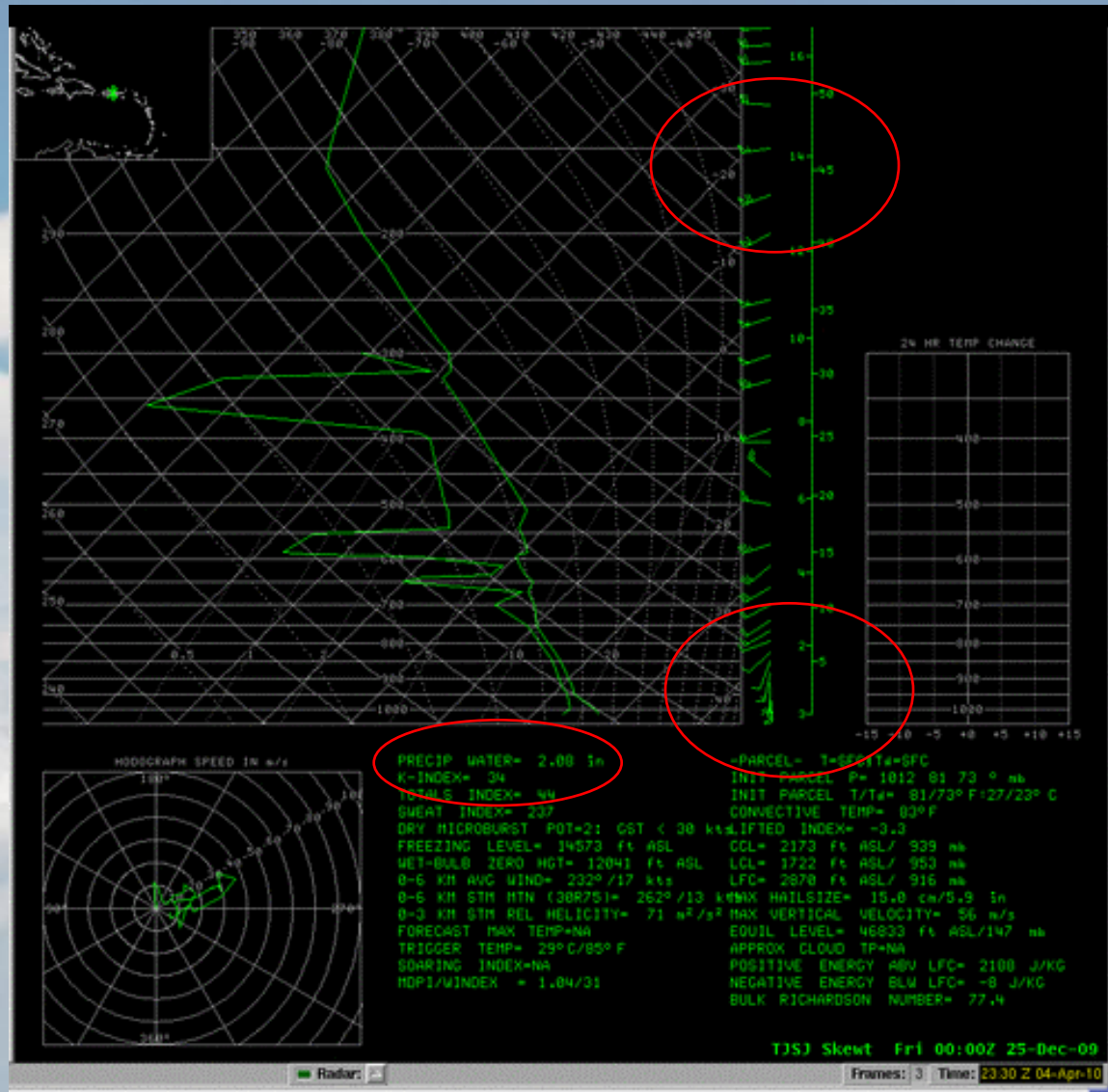
Notes... The steep slopes of this mountainous area is famous for beautiful views - canyons and waterfalls.

Aibonito Flood Event 2009



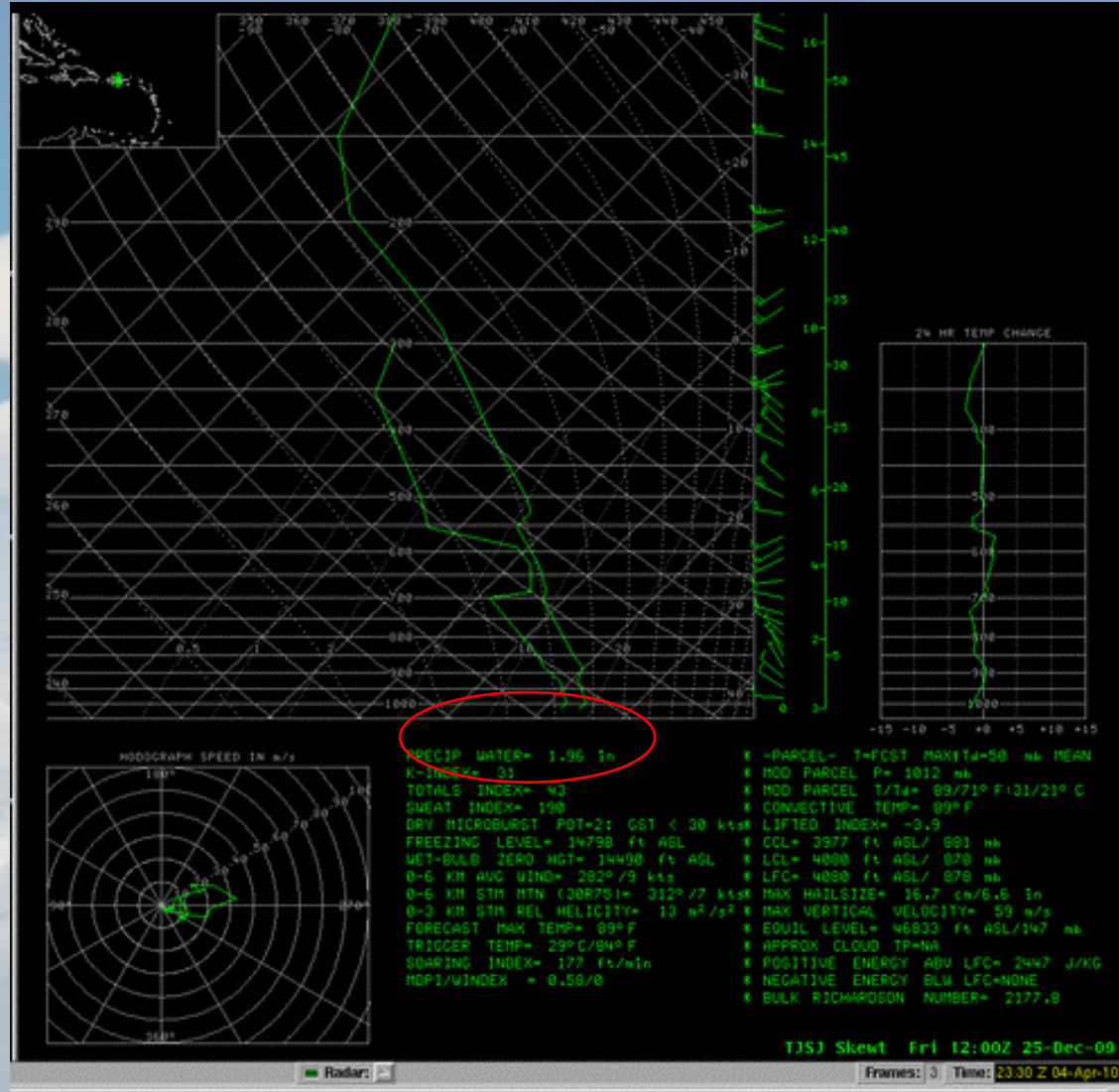
Notes... This Skew T plot early Thursday morning shows the precipitable water values of 1.64 inches. Surface winds from the south southeast and mid and upper level winds form the southwest – west. Upper level winds are in excess of 70 knots.

Aibonito Flood Event 2009



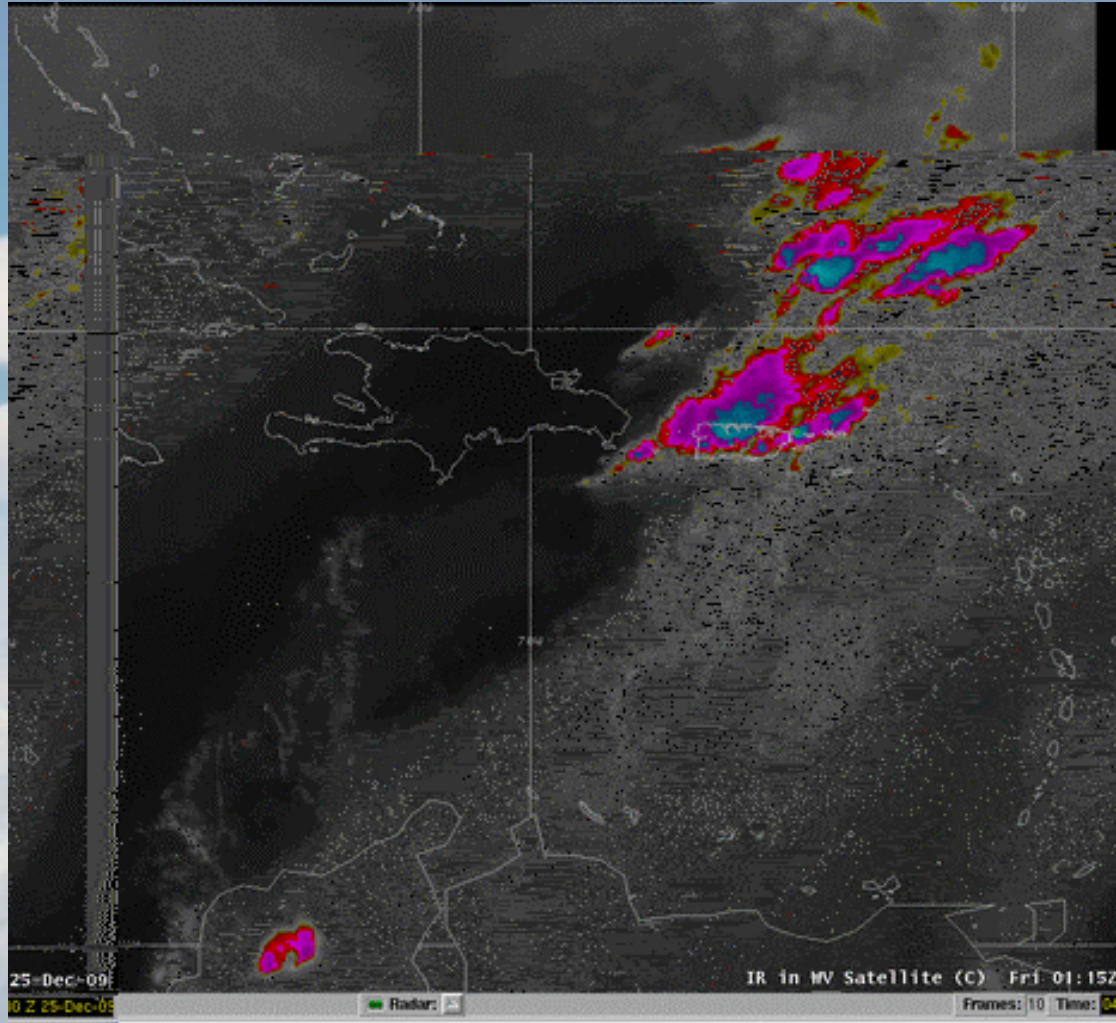
Notes.. This Skew T for the evening of the event shows precipitable water of 2.00 inches ... low level winds out of the south southwest and upper level winds in excess of 60 knots.

Aibonito Flood Event 2009



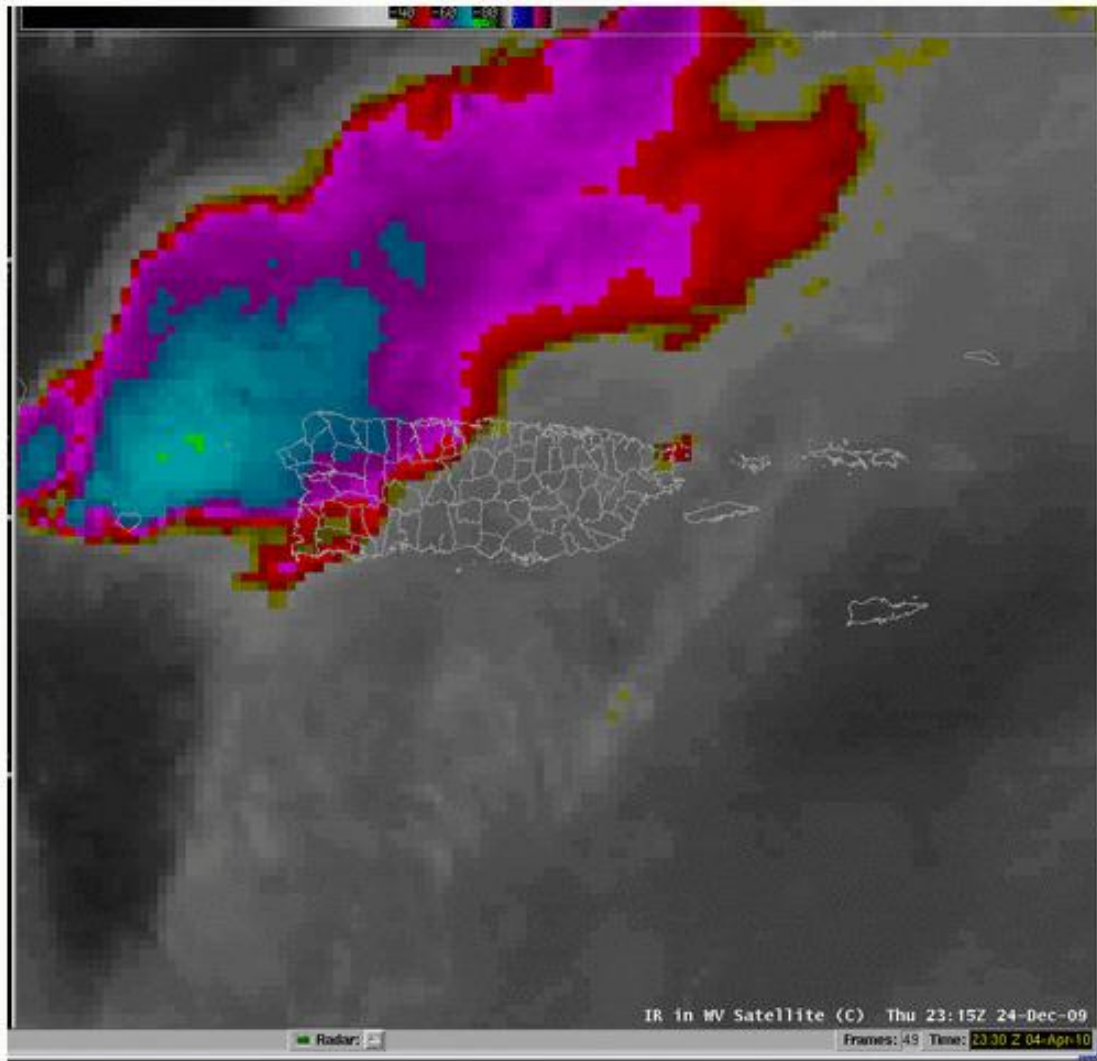
Notes... This Skew T plot from the morning of the 25th... Christmas morning ... shows a wet sounding but the winds have shifted to the west northwest through all of the levels. No more low level inflow from the south.

Aibonito Flood Event 2009



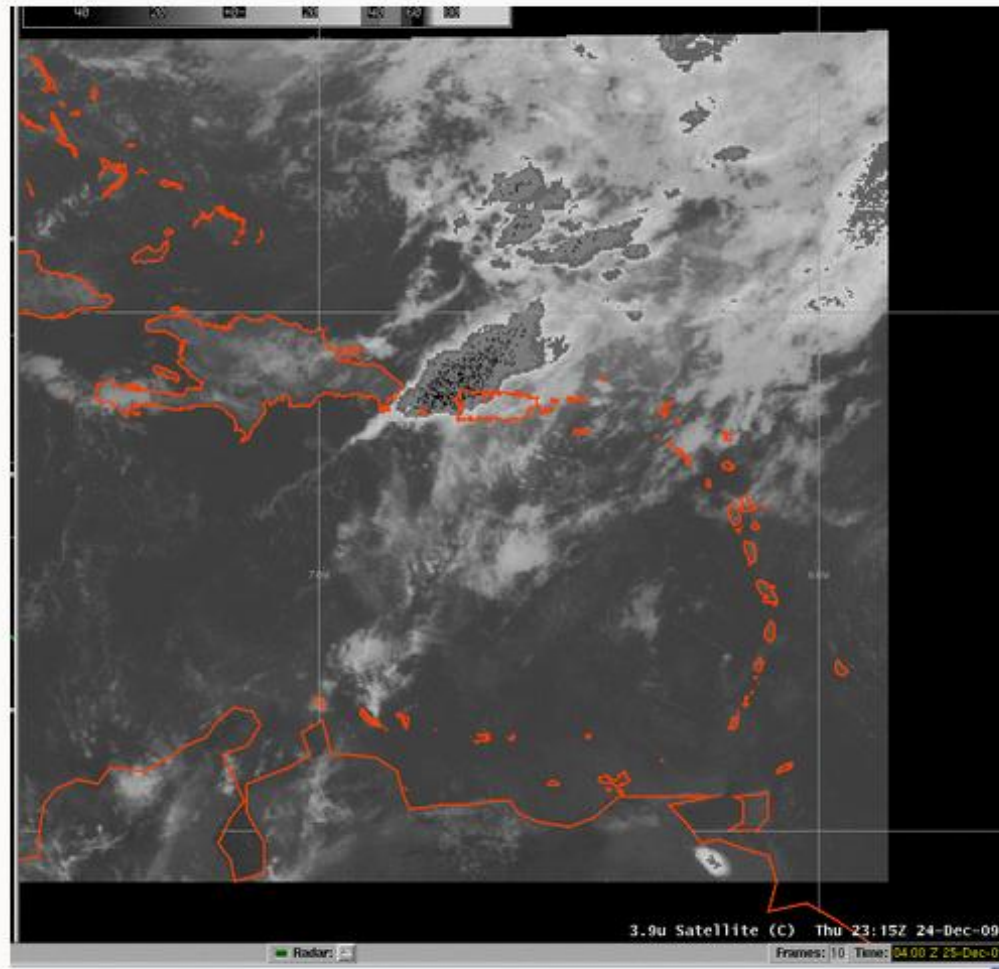
Notes...IR Satellite imagery shows the dry line indicating some type of frontal boundary moving in from the west northwest. If you could see this clearly, you would see the low level flow from the south southwest converging with the upper level flow from the west northwest - all interacting with the Sierra de Cayey.

Aibonito Flood Event 2009



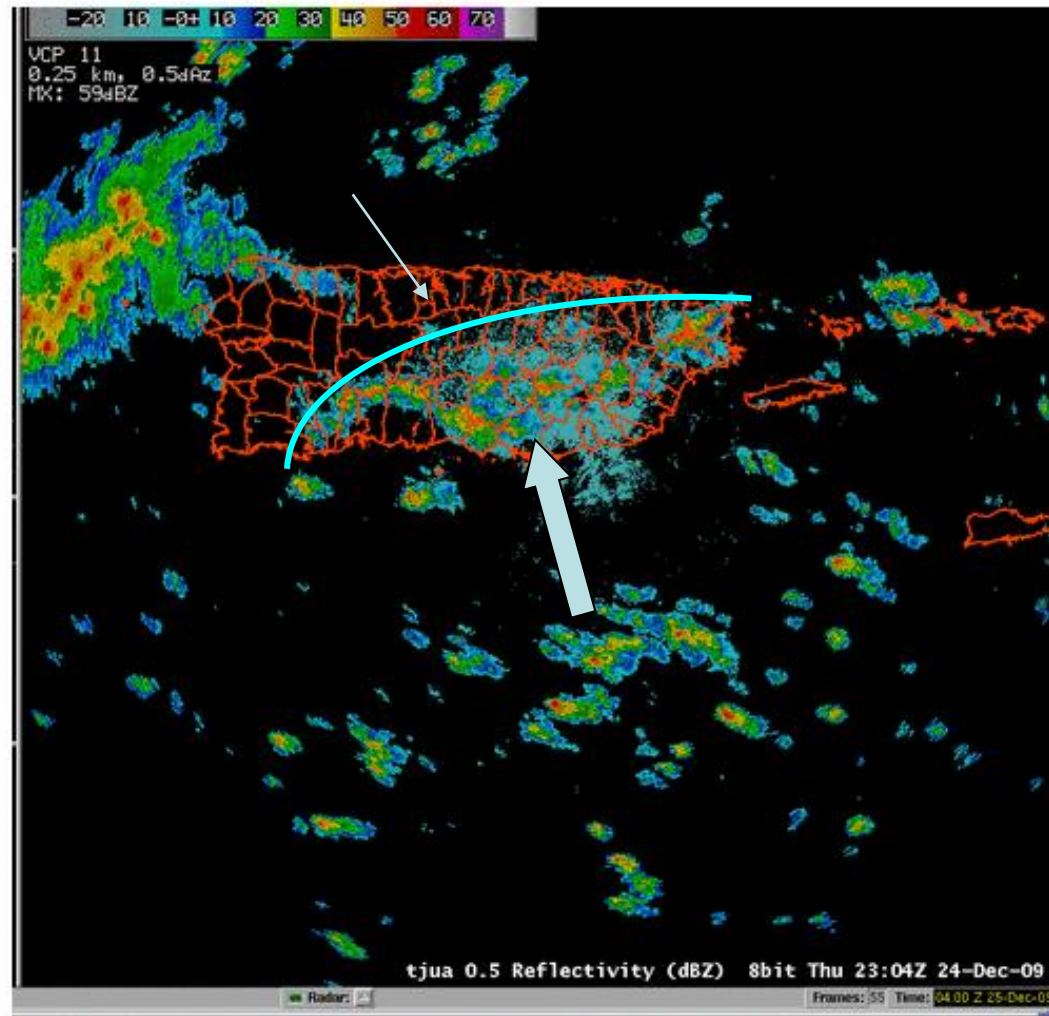
Notes...the motion of the rainfall and the converging flows.

Aibonito Flood Event 2009



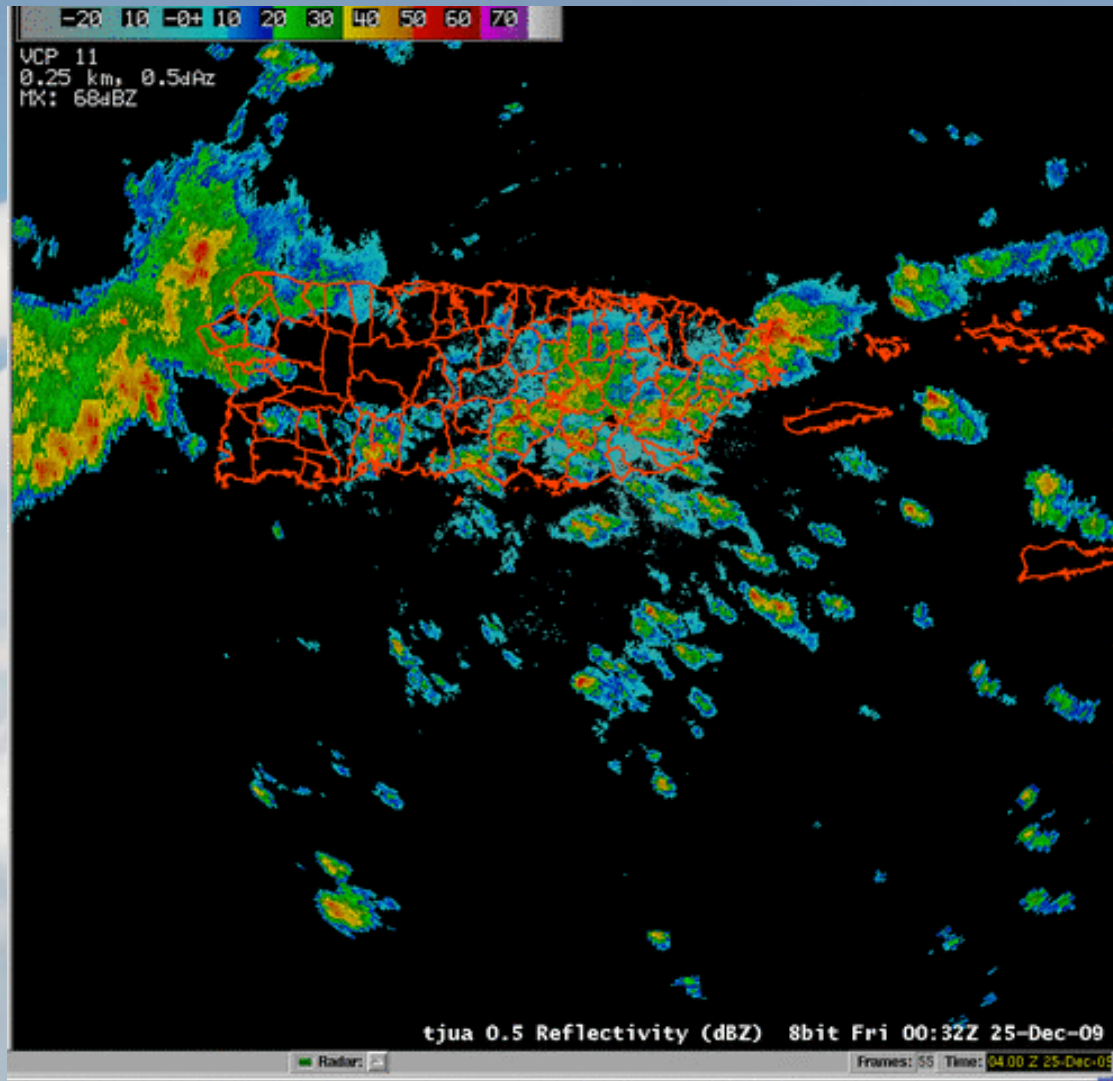
Notes...the water vapor loop clearly shows the edge of the front dropping through the Caribbean basin.

Aibonito Flood Event 2009



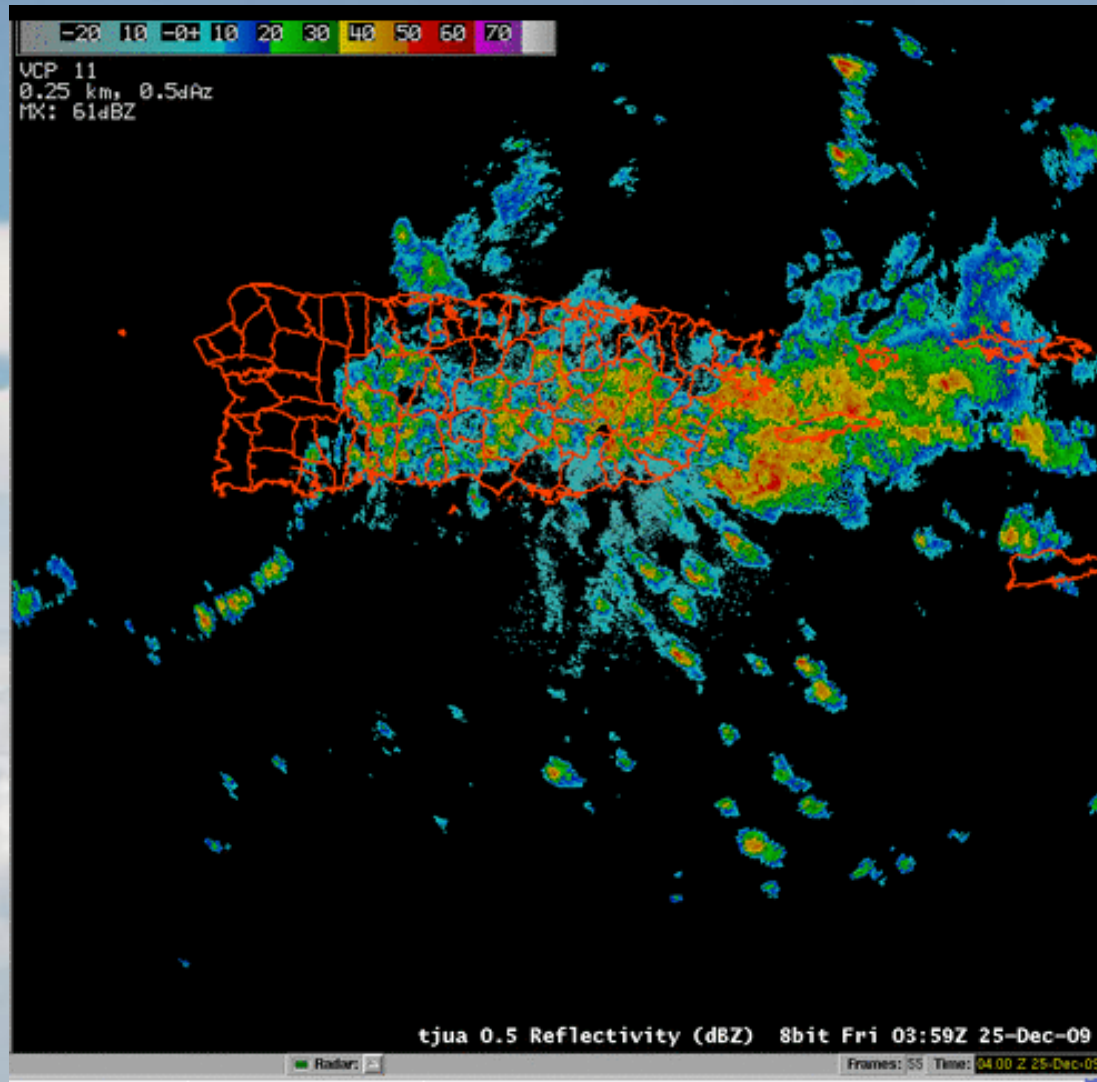
Notes...Radar imagery shows the inflow from the south just as the front is dropping down through Puerto Rico.

Aibonito Flood Event 2009



Notes... Radar imagery during event.

Aibonito Flood Event 2009



Notes...Radar imagery as rainfall exiting the east coast of Puerto Rico.

Aibonito Christmas 2009 Flood Event ... Impacts

- By the evening of December 24th, a Flood Watch was issued for most of Puerto Rico and the U.S. Virgin Islands as heavy rain began to cover the area due to shower and thunderstorm development.
- Several flash flood warnings were issued across the eastern portion of the island due to the heavy rain.

Aibonito Christmas 2009 Flood Event ... Impacts

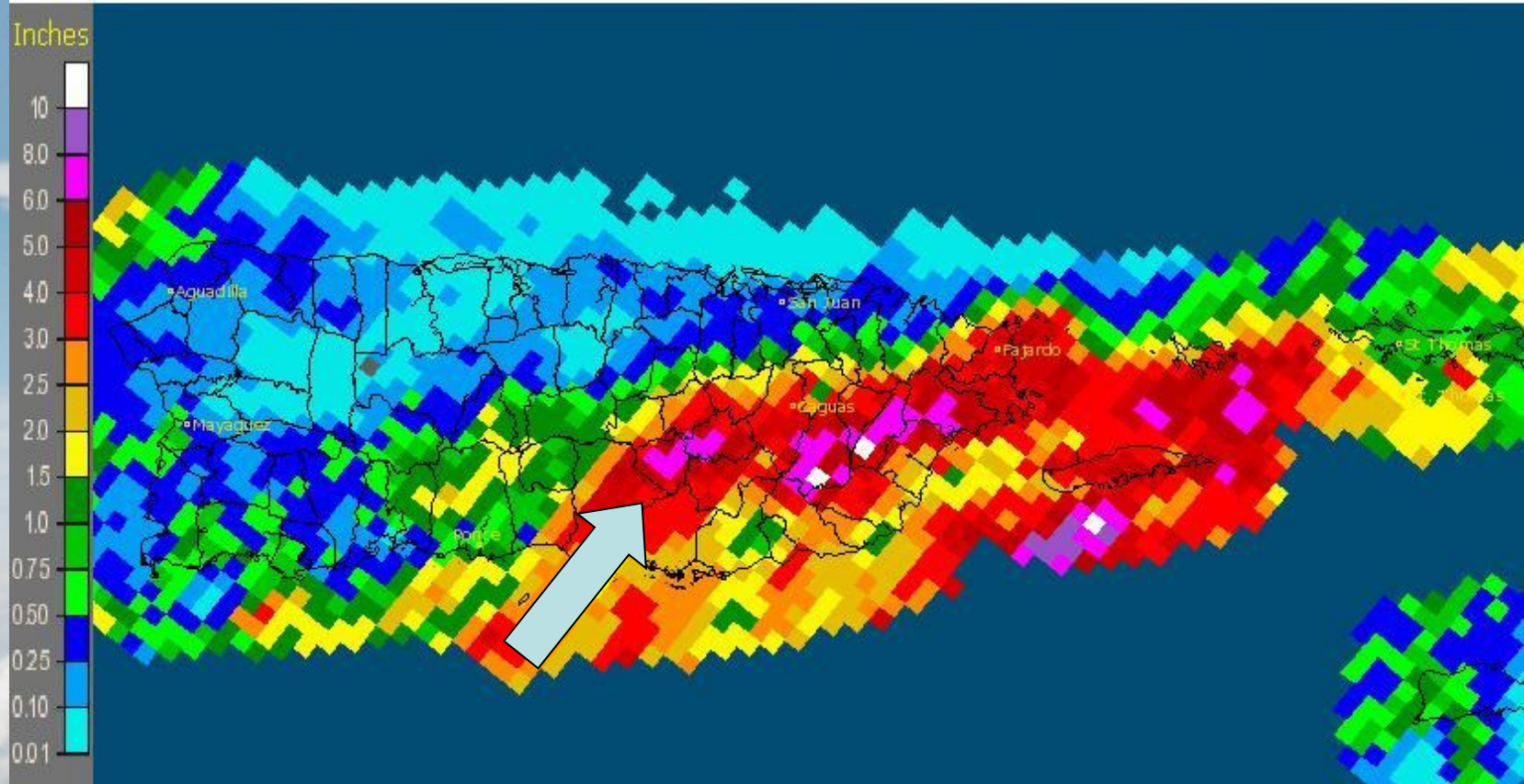
- The highest 24-hour precipitation total for the month of December was 9.00", which fell in Aibonito on the 25th of the month.
- The highest weekly rainfall also occurred in Aibonito, where 9.19" of rainfall accumulated the week ending December 25th.

Aibonito Christmas 2009 Flood Event ... Impacts

- Maximum rainfall reports from this event ranged from 5 to 9 inches.
- The two highest reports in Puerto Rico were 7.13 inches in San Lorenzo and 9.0 inches in Aibonito.

Aibonito Flood Event 2009

San Juan, PR (SJU): 12/25/2009 1-Day Observed Precipitation
Valid at 12/25/2009 1200 UTC- Created 3/19/10 4:30 UTC



Notes... The 24 hour rainfall totals area shown graphically here. The arrow shows the municipality that experienced the worst flooding. It is not only about the rainfall total amounts but also the slope and the rainfall intensity.

Aibonito Flood Event 2009... Impacts

Top Six 24 Hour Rainfall Reports

- ALPP4 9.00 :AIBONITO 1S, PR (PR)
- SLGP4 7.13 :QUEB BLANC/SAN LOREN (PR)
- VAMP4 6.44 :BARRIO MONTONES RAIN (PR)
- SLMP4 6.25 :QUEB ARENAS RAIN (PR)
- GUV4 5.96 :LAS PIEDRAS CON RAIN(PR)
- NGKP4 5.96 :R BLANCO NR FLORIDA(PR)

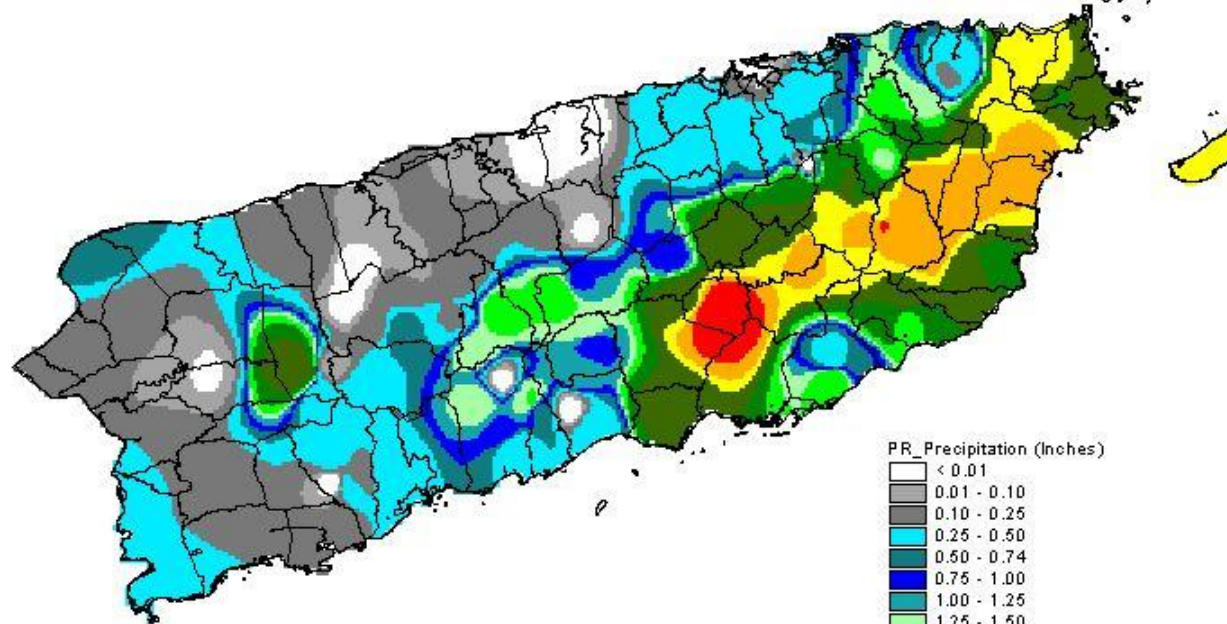
Notes... Rain gage totals.

Aibonito Flood Event 2009



Preliminary Precipitation Gage Analysis for Puerto Rico

24-hour Precipitation Ending 7AM EST, 12/25/2009



PR_Precipitation (Inches)

< 0.01
0.01 - 0.10
0.10 - 0.25
0.25 - 0.50
0.50 - 0.74
0.75 - 1.00
1.00 - 1.25
1.25 - 1.50
1.50 - 2.00
2.00 - 3.00
3.00 - 4.00
4.00 - 5.00
5.00 - 7.00
7.00 - 9.00
9.00 - 11.00
11.00 +
No Data



Produced by the Southeast River Forecast Center

Notes... Gage only.

Aibonito Christmas 2009 Flood Event ... Impacts

- Flash Flooding in Aibonito, Fajardo, Las Piedras and Naguabo.
- Rapid and significant rises were also noted on the Rio Fajardo, Rio Naguabo, Rio Gurabo, Rio de La Plata and the Rio Grande de Loiza and many of its tributaries.

Aibonito Flood Event ... Impacts



Notes...Heaviest rainfall right through central Aibonito... the headwaters of the tributaries in Caonillas and Robles ... 8 to 9 inches in a few hours.

Aibonito Christmas 2009 Flood Event ... Human Impacts

- The Family Department is provided aid to families hurt by the Christmas Day flooding in Aibonito .
- Agency Secretary Yanitsia Irizarry said that of the 57 homes affected, 23 were a total loss.
- The areas most affected are the San Luis and Municipal sectors and the Rabanal, La Plata and Cuyón wards.

Aibonito Christmas 2009

Flood Event ... Human Impacts

- Gov. Fortuño signed an executive order declaring the municipality of Aibonito as an emergency zone after heavy rains on Christmas Eve.
- Barrio Pueblo, Sector San Luis, Sector la Joya del Chino, the San José urbanization, Barrio Robles, Barrio La Plata, Barrio Pasto, Barrio Cuyón, Sector La Represa and Barrio Caonillas were the areas most affected.

Aibonito Christmas 2009

Flood Event ... Human Impacts

- The Health Department offered vaccines for the H1N1 virus free of charge.
- The Health Department also called up officials to inspect and evaluate the area for dengue prevention, citing...“We know that after significant rain events we have to deal with other problems, such as possible dengue contagion from standing water, as well as other conditions that could threaten the health of these communities...”
- The governor said officials would also provide mental health treatment ...“It’s very sad that hundreds of children haven’t been able to enjoy this long-awaited night [Christmas Eve]...”

Aibonito Christmas 2009

Flood Event ... Human Impacts

(photo acknowledgements to Univision)



Aibonito Christmas 2009

Flood Event ... Human Impacts

(photo acknowledgements to Univision)



Notes... Christmas Morning 2009!