

Severe Thunderstorm & Flash Flooding in Brewster County on May 10, 2020

Synopsis

On Sunday May 10, thunderstorms were forecasted to develop along the higher terrain in south western parts of Texas. Weak upper level winds in place would mean that any thunderstorm that developed would be slow moving. Also, a moderately unstable air mass with 2000 J/kg of CAPE was in place. This instability would help any thunderstorm that developed to intensify and become strong to severe. Throughout the evening, thunderstorms would develop on the higher terrain and become almost stationary, barely moving at all. One storm in particular that formed in far southern Brewster County, over Big Bend National Park, became the dominant storm. This storm went on to produce severe wind gusts and major flash flooding across southern portions of the park.

Big Bend National Park Storm

The storm in southern Brewster County formed late Sunday evening and with moderate amounts of instability in place the storm had plenty of fuel to strengthen and become severe. This severe thunderstorm consistently produced severe wind gusts throughout its life span, as seen in Figure 1 below. The highest measured wind gust was 73 mph at the Castolon Mesonet station! The biggest concern with this storm however was that it was almost entirely stationary. This thunderstorm produced some incredible rainfall rates around the Castolon area. The Castolon Mesonet 1-minute rainfall rates, also seen in Figure 1, show that 2 inches of rain fell in a little less than 40 minutes! These extreme rainfall rates lead to some major flash flooding in the area. The Rio Grande spiked nearly 14 feet in one hour at Castolon following the heavy rainfall (Figure 2). While no one was present (due to the closure of the park) to document the flash flooding as it was occurring, evidence of the event was clearly present when examined by the NWS Midland survey team. Multiple areas of thick mud deposits, seen in Figure 3 below, some several inches thick, were present along Santa Elena Canyon Rd in the southern parts of the park. Large areas of Mesquite trees and various other plants were uprooted along several established stream beds and along temporary washouts.

Time	Temp	Humidity	Wind	Wind Gusts	Pressure	Clouds	1 Minute Rainfall			
09:17 PM	62	62.3	62.9	-0.6	60.5	021 31 41	21	30.09	95	0.01
09:16 PM	61.8	61.8	62.0	-0.2	60.1	030 34 42	24	30.09	94	0.01
09:15 PM	61.9	61.7	61.7	0.0	60.4	036 33 46	24	30.08	95	0.02
09:14 PM	62	62.3	62.5	-0.2	60.7	032 32 42	24	30.09	96	0.03
09:13 PM	61.4	61.7	62.1	-0.4	60	022 31 37	21	30.09	95	0.05
09:12 PM	61.2	61.4	61.8	-0.4	59.6	037 32 38	24	30.09	95	0.04
09:11 PM	60.8	61.0	61.6	-0.6	58.9	033 29 35	21	30.09	94	0.05
09:10 PM	60.5	60.5	61.2	-0.7	58.2	023 30 37	20	30.08	92	0.06
09:09 PM	60	60.6	61.1	-0.5	57.9	076 35 30	27	30.08	93	0.04
09:08 PM	59.7	60.0	60.3	-0.3	57.8	018 30 38	26	30.09	93	0.04
09:07 PM	59.6	59.6	59.7	-0.1	57.9	018 30 38	23	30.08	94	0.05
09:06 PM	60.2	59.7	59.7	0.0	58.2	023 31 37	23	30.09	93	0.06
09:05 PM	60.5	60.4	60.8	-0.4	58.7	012 32 37	24	30.09	94	0.06
09:04 PM	60.8	60.7	61.1	-0.4	58.4	003 34 34	25	30.09	92	0.08
09:03 PM	60.7	61.0	61.5	-0.5	58.3	354 30 37	22	30.09	92	0.08
09:02 PM	60.5	61.1	62.1	-1.0	58	336 34 37	28	30.08	92	0.10
09:01 PM	59.2	60.1	61.3	-1.2	54.9	329 47 35	38	30.07	86	0.03
09:00 PM	58.7	59.3	60.1	-0.8	53.9	333 44 34	36	30.07	84	0.03
08:59 PM	58.2	59.1	59.8	-0.7	54.8	326 51 60	41	30.05	88	0.02
08:58 PM	56.8	58.2	58.7	-0.5	54.4	337 34 44	28	30.08	92	0.02
08:57 PM	55.4	56.7	57.8	-1.1	53.9	357 25 27	17	30.10	95	0.03
08:56 PM	54.9	55.0	56.2	-1.2	53.6	005 27 36	18	30.10	96	0.03
08:55 PM	54.9	55.2	56.0	-0.8	53.8	021 34 38	24	30.10	96	0.05
08:54 PM	54.1	55.0	56.5	-1.5	52.8	036 34 41	27	30.10	95	0.09
08:53 PM	54.4	53.3	54.8	-1.5	52.1	014 40 45	27	30.11	92	0.12
08:52 PM	55.7	55.9	57.3	-1.4	53.9	019 42 51	35	30.12	94	0.13
08:51 PM	55.5	56.2	57.6	-1.4	54.3	326 39 59	33	30.11	96	0.14
08:50 PM	54.9	54.4	55.6	-1.2	53.1	338 47 57	37	30.09	93	0.09
08:49 PM	56.2	55.7	56.2	-0.5	54.5	336 49 59	40	30.10	94	0.09
08:48 PM	57.3	56.3	56.2	0.1	55.3	324 57 73	45	30.08	93	0.08
08:47 PM	58	57.7	57.6	0.1	55.7	311 48 64	40	30.08	92	0.03
08:46 PM	57.9	58.8	59.3	-0.5	55.5	308 36 51	30	30.09	92	0.04
08:45 PM	56.4	57.6	58.6	-1.0	55.2	309 42 53	34	30.08	96	0.02
08:44 PM	55.6	56.0	56.5	-0.5	53.8	298 38 47	31	30.08	94	0.03
08:43 PM	55.9	55.6	56.2	-0.6	53.5	302 42 48	36	30.07	92	0.03
08:42 PM	56.5	56.3	57.4	-1.1	53.9	293 30 63	41	30.06	91	0.04
08:41 PM	58	56.7	57.4	-0.7	54.3	275 47 63	41	30.04	87	0.03
08:40 PM	61.4	58.8	58.9	-0.1	56.1	265 58 64	52	30.02	83	0.03
08:39 PM	64.7	61.9	61.8	0.1	58.6	260 54 63	46	30.01	81	0.00
08:38 PM	67	64.1	63.7	0.4	59.5	250 51 58	43	30.01	77	0.00
08:37 PM	68.9	66.8	66.3	0.5	58.9	254 46 51	39	30.01	71	0.00
08:36 PM	70.6	69.0	68.5	0.5	58.7	252 45 53	38	30.00	66	0.00

Figure 1: Data from the Castolon Mesonet station, shown in 1 minute increments, in the southern part of Big Bend National Park. The red highlighted areas are when the station measured wind gusts meeting severe criteria. The green highlighted numbers show the high rainfall rates over the ~40 minute time frame.

Figure 2: The Rio Grande River gauge at Castolon showing a rise nearly 14 feet in one hour following the heavy rain.

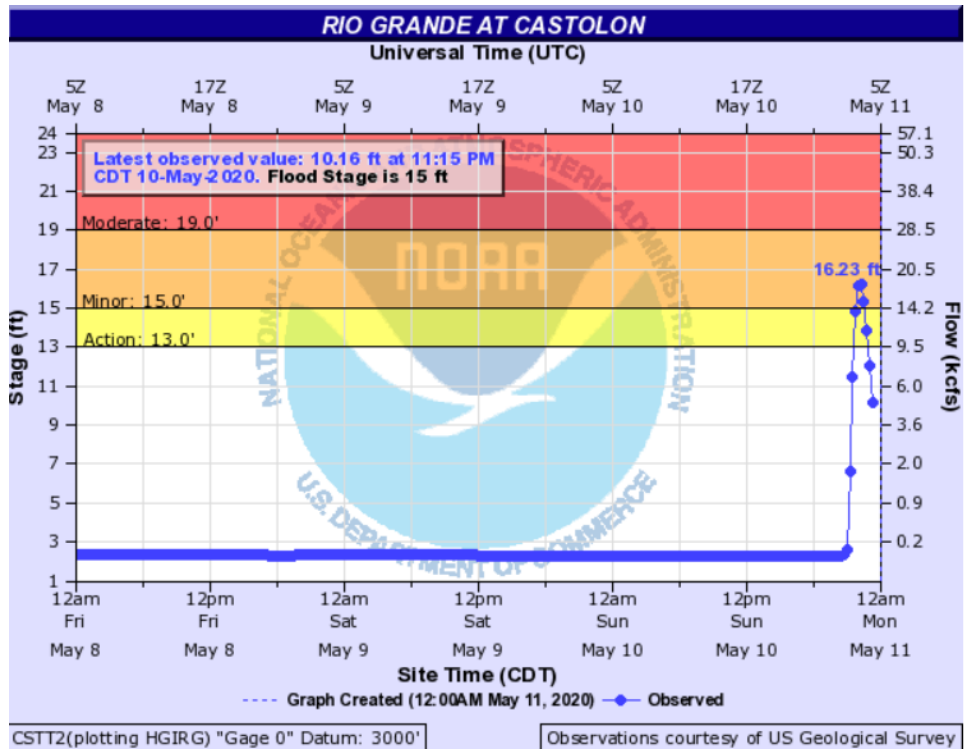


Figure 3: An area along Santa Elena Canyon Rd where a mud deposit had been cleared. Notice the area on the left where the mud hadn't been cleared yet; this mud deposit was several inches thick.

