



Applying the WPC Excessive Rainfall Outlooks in Decision Support

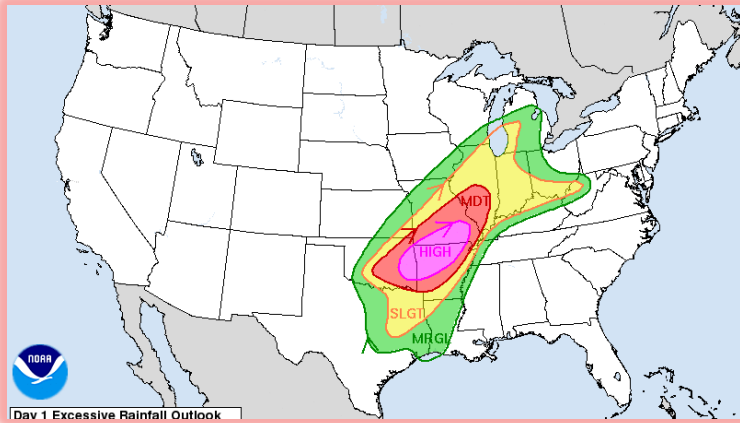
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²Cooperative Institute for Research in Environmental Studies

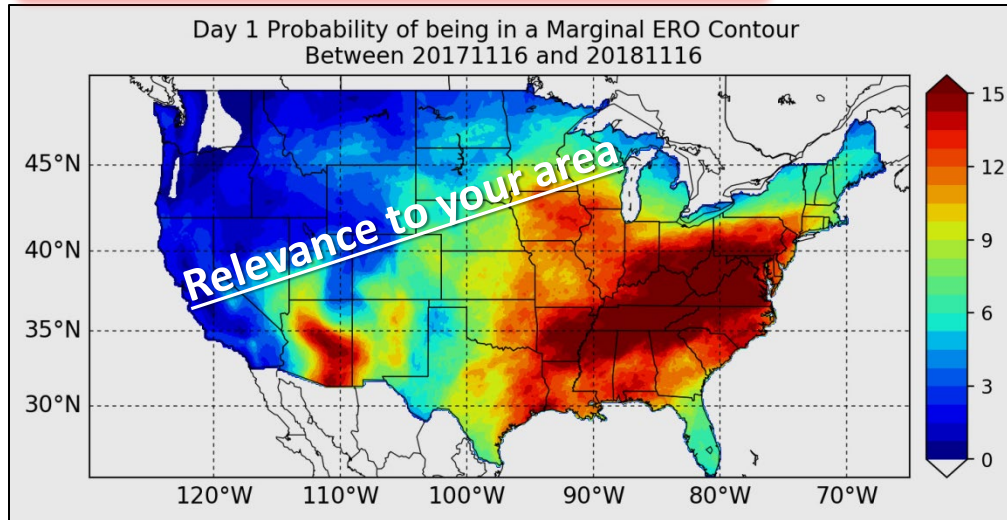
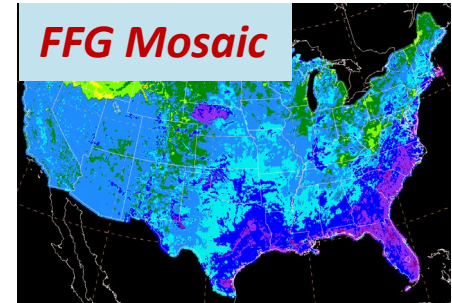


WPC Excessive Rainfall Outlooks for Days 1, 2, 3



The probability of rainfall exceeding Flash Flood Guidance within 25nm (40km) of a point.

Always 12 UTC – 12 UTC



Marginal	5 – 10 %
Slight Risk	10 – 20 %
Moderate Risk	20 – 50 %
High Risk	>50%

Simple Guide to Update Times

Early Morning

08:30Z

Afternoon

20:00Z

Check all three Outlooks early in the morning and again in the afternoon, right when most thunderstorms are forming.

Day 1 Outlook Only...

16:00Z

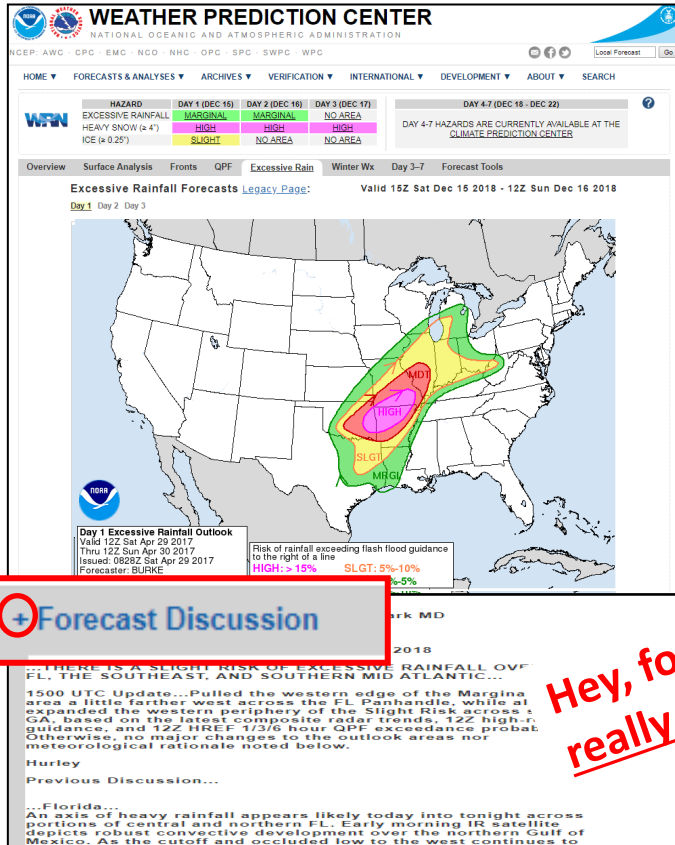
Day 1 updated more frequently... also watch for unscheduled updates

01:00Z



High Risk skill on Day 3 was subject of an FY18-19 DOC/NOAA effort to prioritize flash flood forecasting (DOC Agency Priority Goal FY19)... Result is High Risk category extended to Day 3

Value-Added Discussion



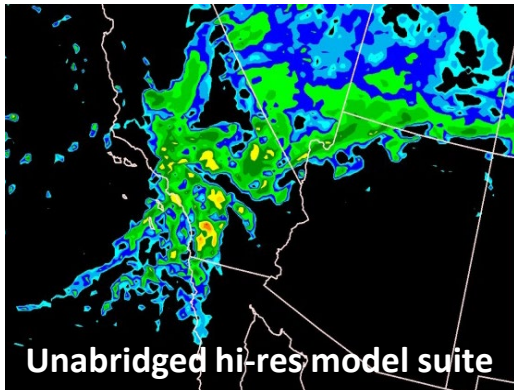
- Meteorological reasoning, scenarios, rain rates

- Location and Timing Details/Uncertainty

Hey, forecaster, what do you really think is going to happen?

- Antecedent conditions

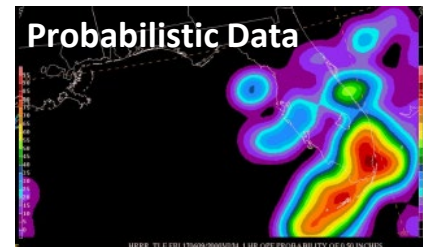
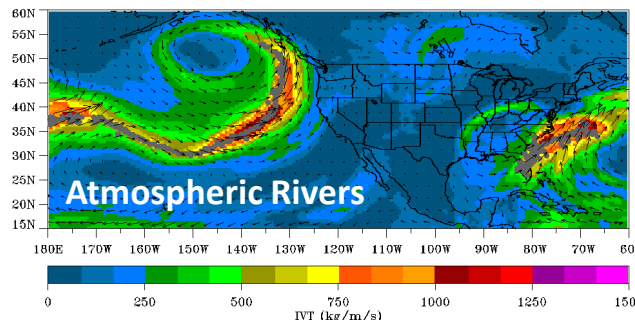
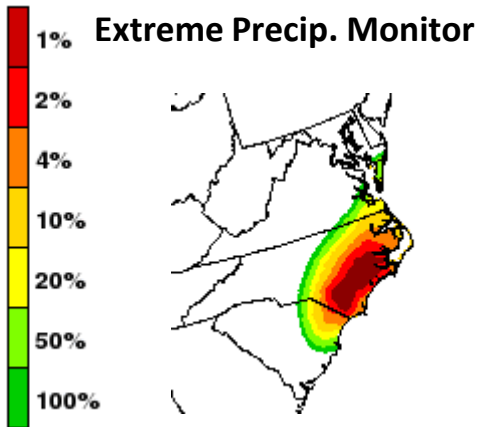
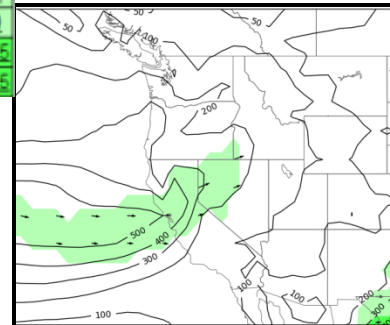
Science Inputs - Meteorology



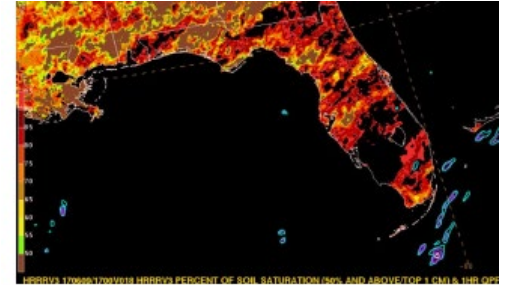
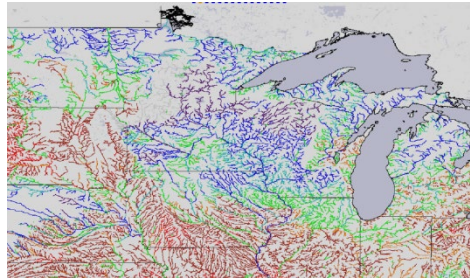
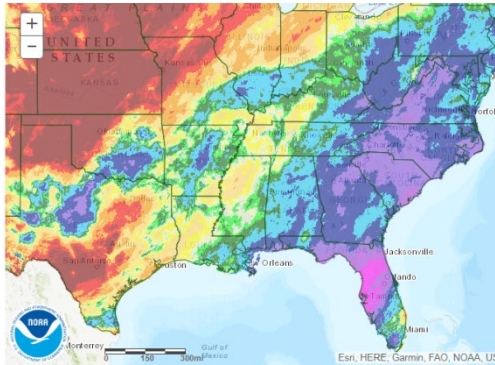
WFO Western U.S. Table Nov 18, 2018 12Z Run

		Z	T	U	V	WSP	SLP	Q	PW	IVT	
0	Sun	12Z	97.5	MIN	MIN	1	97.5	90	MIN	MIN	90
6	18th	18Z	10	0.5	0.5	1	90	90	MIN	MIN	90
12	Mon	00Z	10	0.5	2.5	99	90	10	MIN	MIN	90
18	19th	06Z	10	0.5	1	99.5	90	10	MIN	MIN	90
24		12Z	10	0.5	0.5	99.5	90	10	MIN	MIN	97.5
30		18Z	10	0.5	0.5	99.5	97.5	10	MIN	MIN	97.5

Regular synthesis on a National Scale,
WPC forecasters are well calibrated



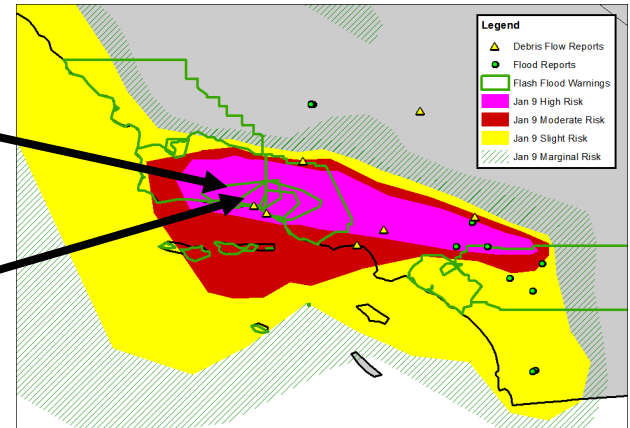
Science Inputs - Hydrology



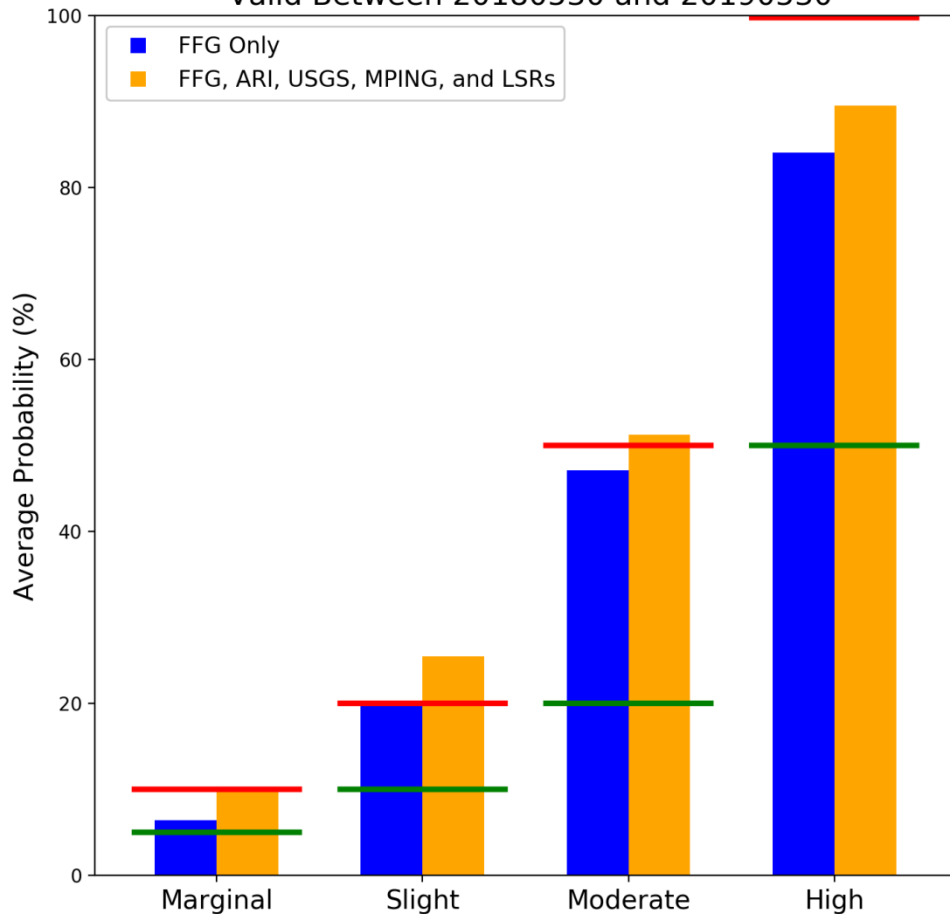
- Montecito, CA, debris slide...
Day 1 High Risk expanded

Local Office Input

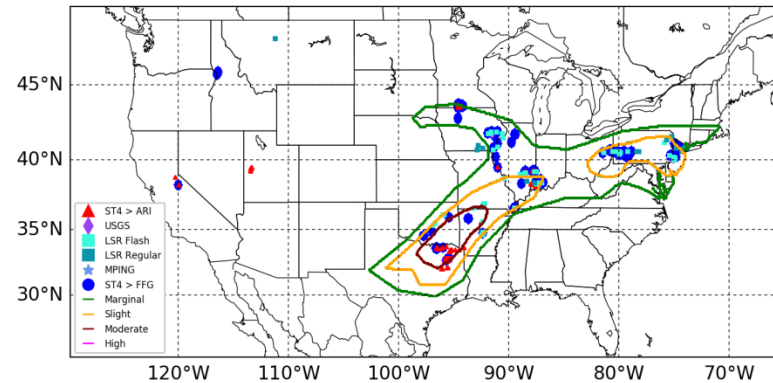
- NWS Collaboration calls
 - Upgrades to Moderate, High Risk
 - Introduction of Slight Risk during Monsoon
 - Any other time as needed



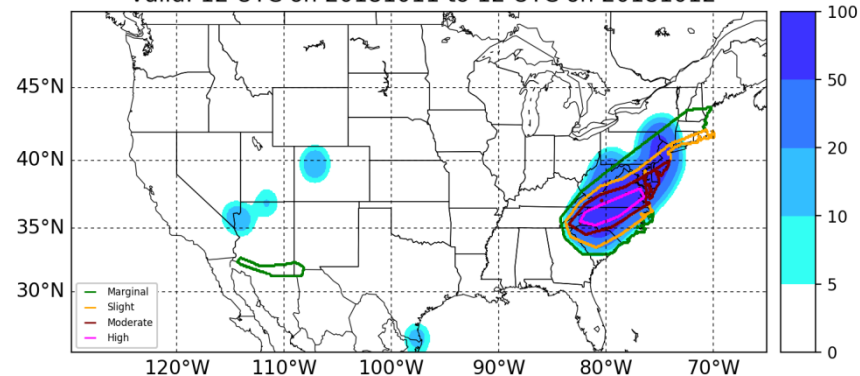
Day 1 ERO Verification Valid Between 20180530 and 20190530



WPC Day 1 ERO With ST4 > FFG Verification: Issued 09 UTC Valid: 12 UTC on 20190529 to 12 UTC on 20190530



WPC Day 1 ERO With ALL Practically Perfect: Issued 09 UTC Valid: 12 UTC on 20181011 to 12 UTC on 20181012

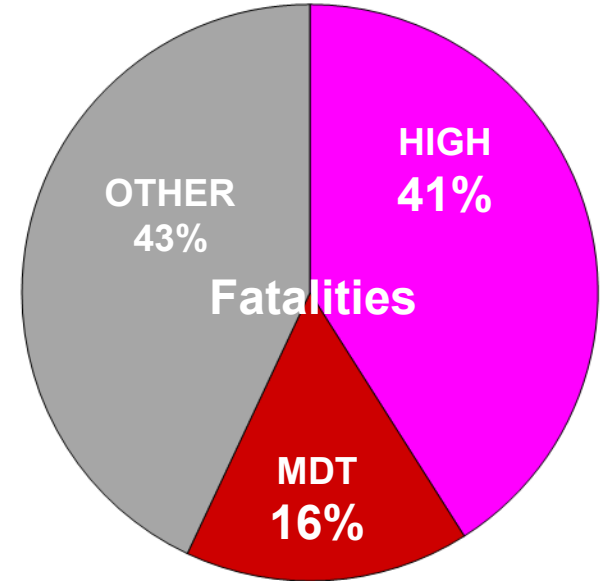
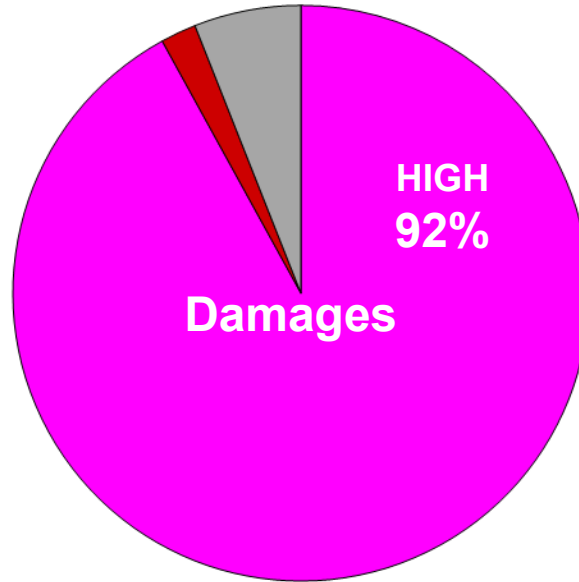


WPC High Risks are a BIG DEAL

2014 to 2017, High Risk on 4% of days, but accounted for:

9/10 of ALL flood-related **damages**

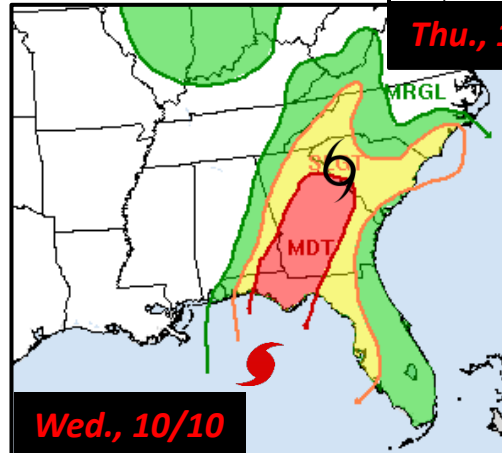
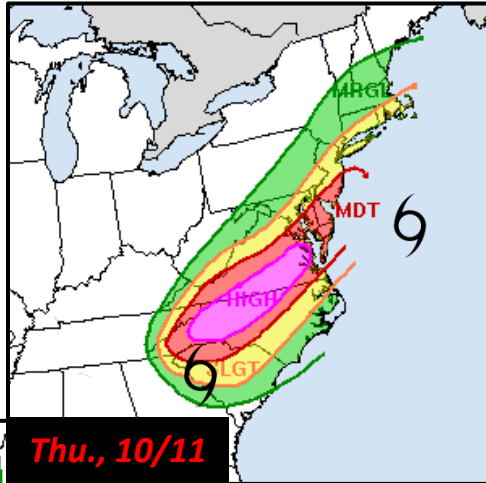
2/5 of ALL flood-related **fatalities**



Includes flood, flash flood, heavy rain, and debris flow Storm Data.



Hurricane Michael, October 2018



- Scenarios/Placement/Insight:

“...hi-res in rare territory, predicting 4”/hour rates”

“...expanded High and Moderate Risk westward to capture wet antecedent conditions...”

“...southern Maryland...coordination with local offices yielded Moderate, but High Risk may be considered (in later updates)”

- Discernment: High Risk reserved for Oct. 11th when higher rain rates and wet soils dictated a greater threat to life/property.

Day 1 Upgrade, July 2018

Up to 2.5" in 1 Hour @ Flagstaff
15 homes, 3 high schools damaged

- Day 1, 1:00am: Upgrade to Slight Risk

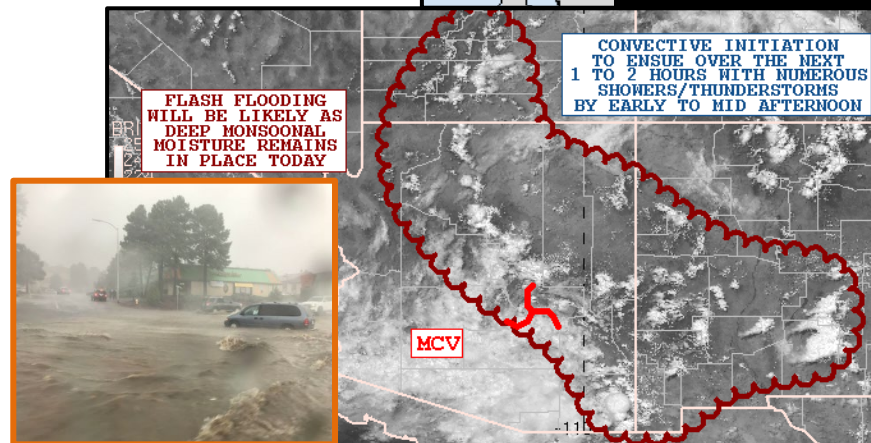
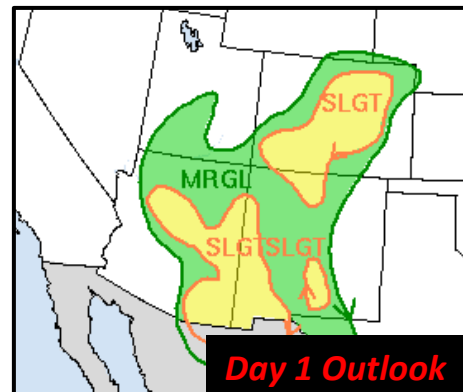
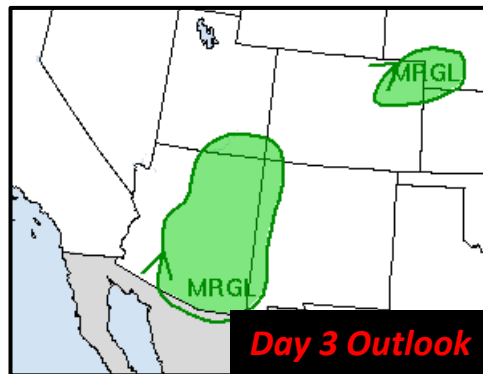
“Precipitable water anomalies +2.5 st. dev.”
“HREF neighborhood probabilities signal...heavy amounts...in high terrain.”

- 7:00am: WFO issues Flash Flood Watch

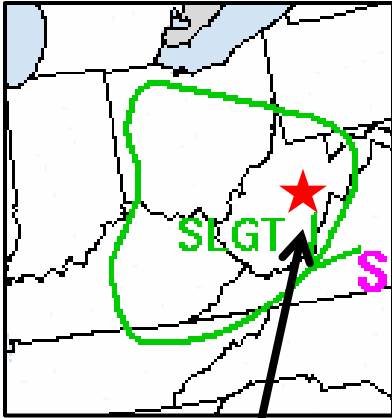
- 11:00am: WPC mesoscale discussion

“Flash Flooding Likely... rates could exceed 2”/hr

- 1:00pm: WFO Flash Flood Warning



Slight Risk can be Deadly

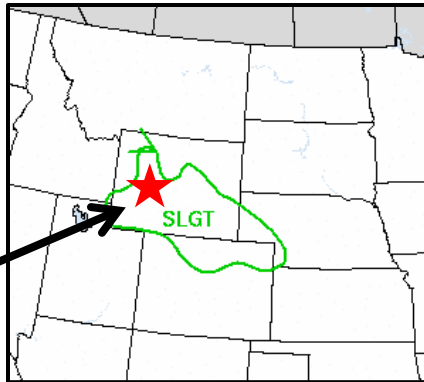


23 Fatalities

\$1.20 Million
Damage

- Slight Risk is still much above the climatological daily neighborhood risk of a flash flood.

Outlook: "High precipitable water and moderate instability will carry a risk of local flash flooding...most organized in KY/WV"

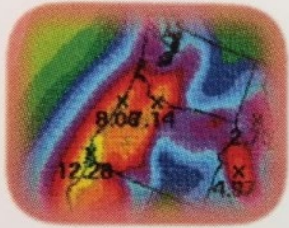


- This Slight Risk in Wyoming remained steady from Days 3, 2, 1

Outlook: "Steady and enhanced upslope flow will inundate Wyoming"

Mesoscale: "Several hour period...likely to produce flash flooding...some significant."

Thank you!



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AMS 47th Annual Conference on Broadcast Meteorology / Fifth Conference on Weather Warnings and Communication
June 13, 2019