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Air Force Weather Ensemble Prediction Suite

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Purpose



- **Show examples of available Air Force Weather Agency ensemble products made operational 28 March 2012.**



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AFW Ensemble Prediction Suite (AFWEPS)



- **Global Ensemble Prediction Suite (GEPS)**
 - **Combination of GFS, GEM, and NOGAPS ensembles**
 - **Post-processed at AFWA (62 total members)**
 - **00/12Z cycles daily (available t+11)**
- **Mesoscale Ensemble Prediction Suite (MEPS)**
 - **10 members of WRF-ARW with unique physics configurations**
 - **Initial conditions are deterministic UM, GFS, GEM, and NOGAPS (with LIS and Navy SST for land surface)**
 - **20 km northern hemisphere and tropical stripe domains to 144 hours run at 18Z with online dust**
 - **4 km domains once per day to 60 hours (see slides at end for domains)**



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Output JAAWIN



In honor of our heritage and partnership with FNMOCC...

This is where we used to be.

We are now here....

Click on menu for region of choice, and different pre-staged products are available

- Global for GEPS
- Mesoscale for MEPS

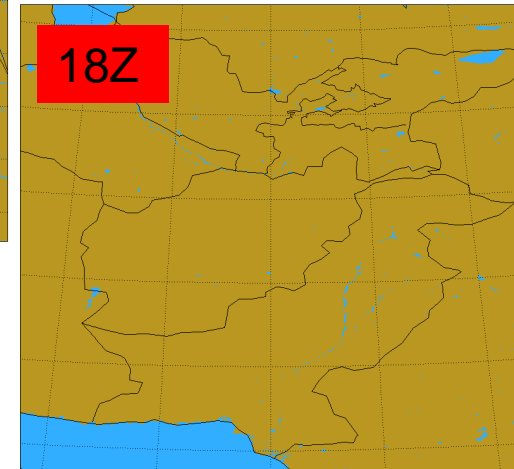
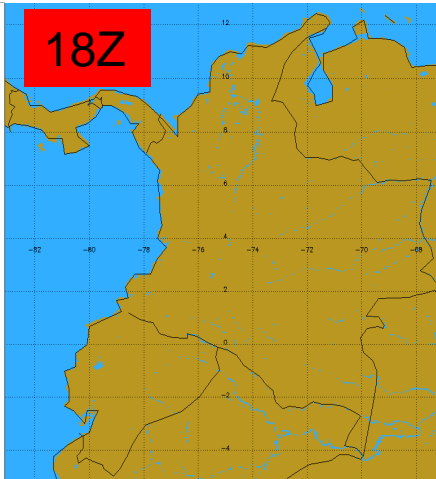
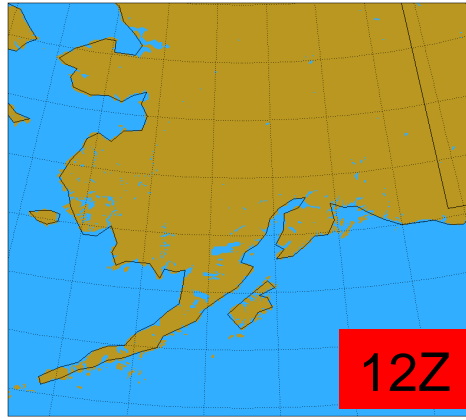
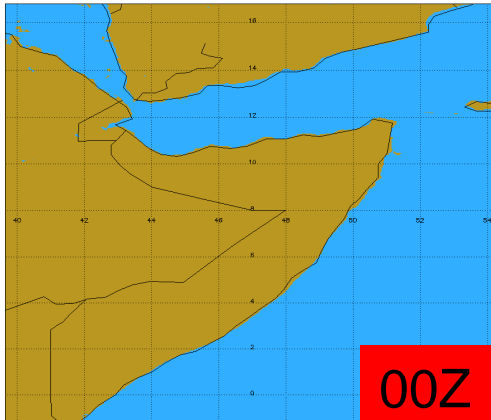
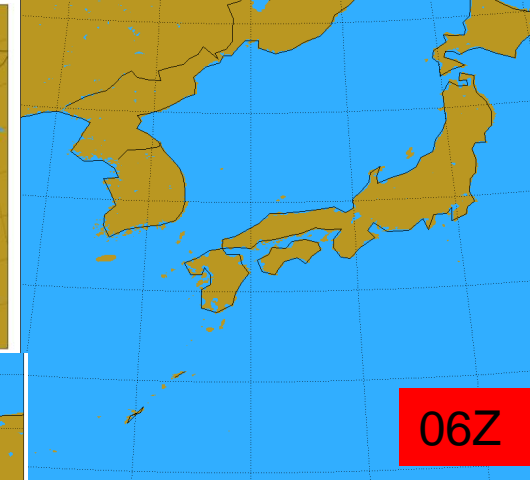
For Point Probability (PEP) bulletins, there is no clickable map, but you can manually enter any ICAO you like in the URL after selecting one of the defaults linked here.



4 km MEPS domains



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Currently running in production—more planned as new hardware becomes available

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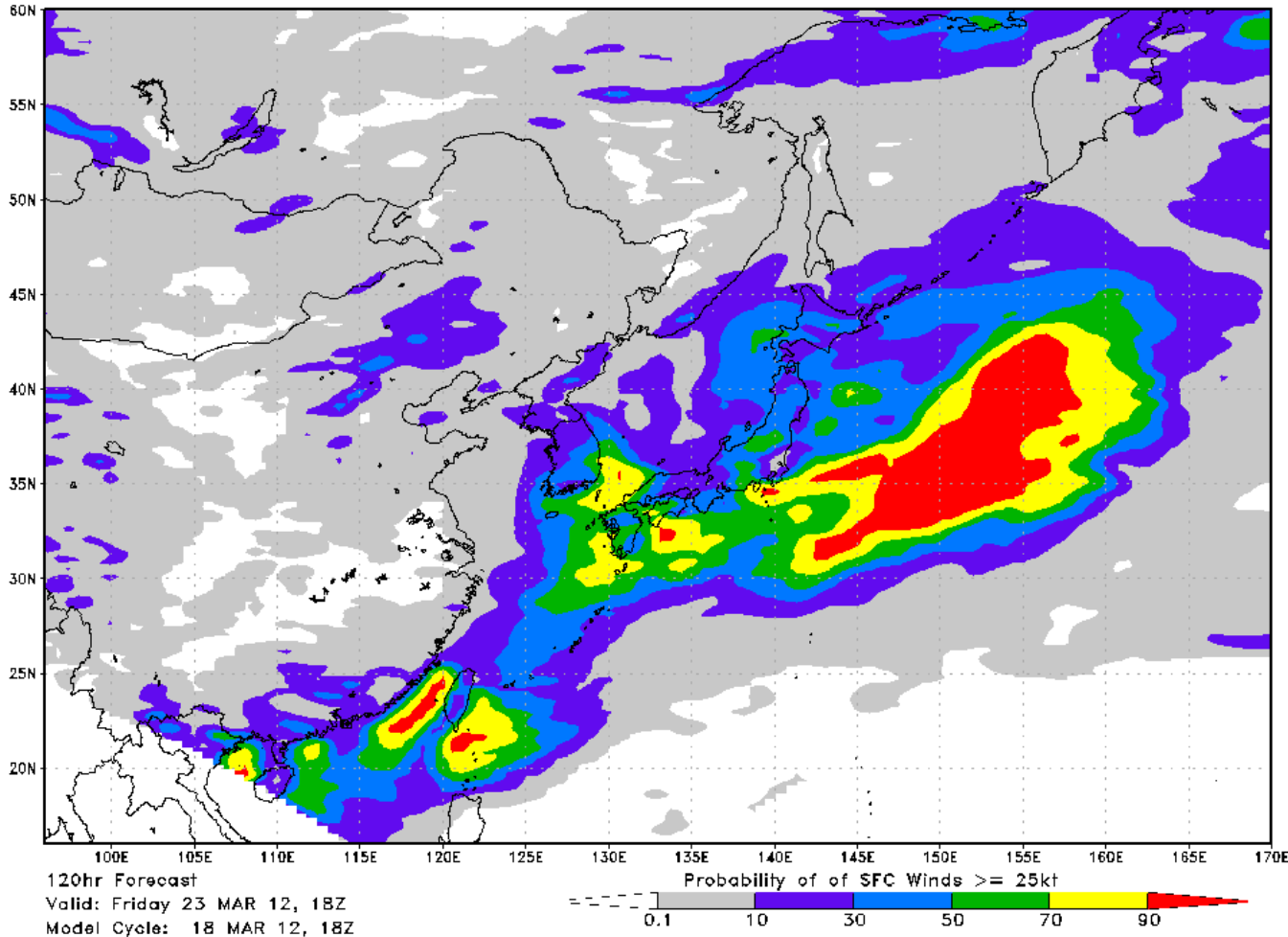


Probabilities



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Valid: Friday 23 MAR 12, 18Z



Ensemble member outputs are combined into probabilities by simply counting how many members are above and below the threshold of significance (with some smoothing).

These can be used both to improve deterministic forecasts, and also to alert users to the level of weather risk depending on their sensitivity to weather.

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Convection-Allowing

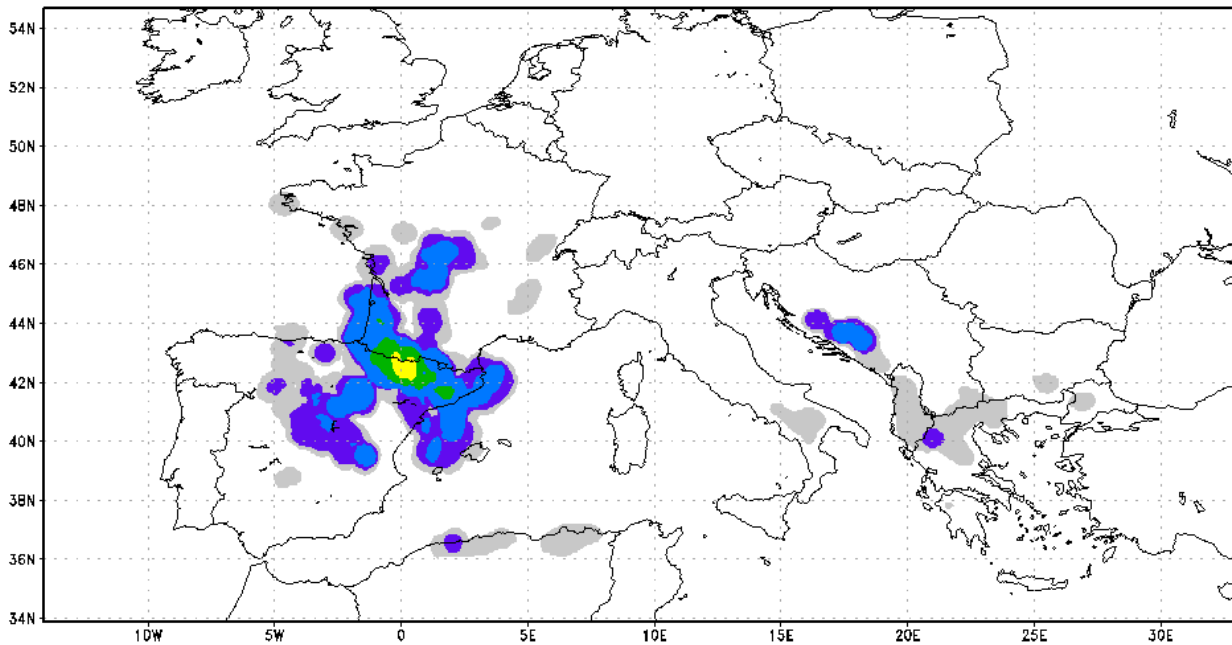


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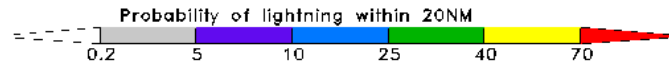
Valid: Wednesday 21 MAR 12, 15Z

4 km domains are convection-allowing, meaning updrafts and downdrafts are explicitly predicted.

This allows for much more precise prediction of convective impacts from lightning, wind, hail, tornadoes, and precipitation.



051hr Forecast
Valid: Wednesday 21 MAR 12, 15Z
Model Cycle: 19 MAR 12, 12Z



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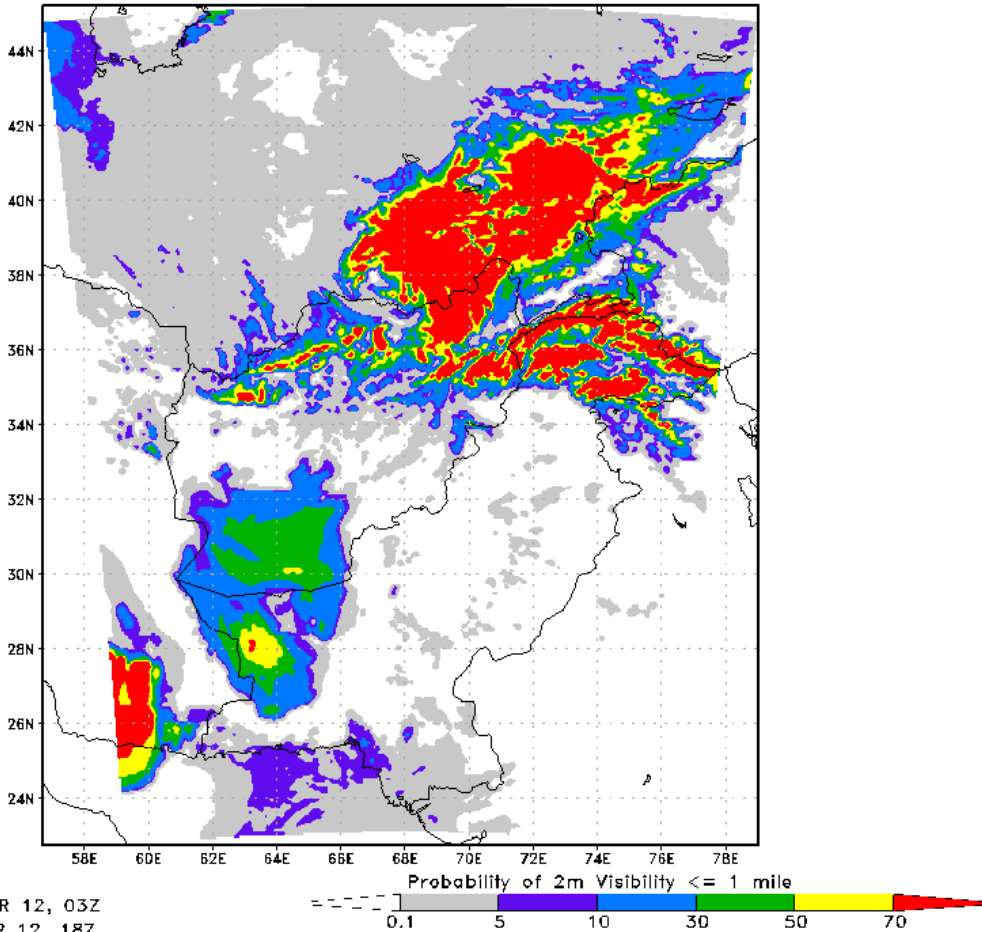


Online dust



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Valid: Monday 19 MAR 12, 03Z



In certain domains, dust is lofted and advected as part of the model (WRF-CHEM) to help with dust forecasting.

In this image you can see the visibility restriction product, with snow/precip related restrictions in the north, and dust related restrictions in the south.

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Diagnostics

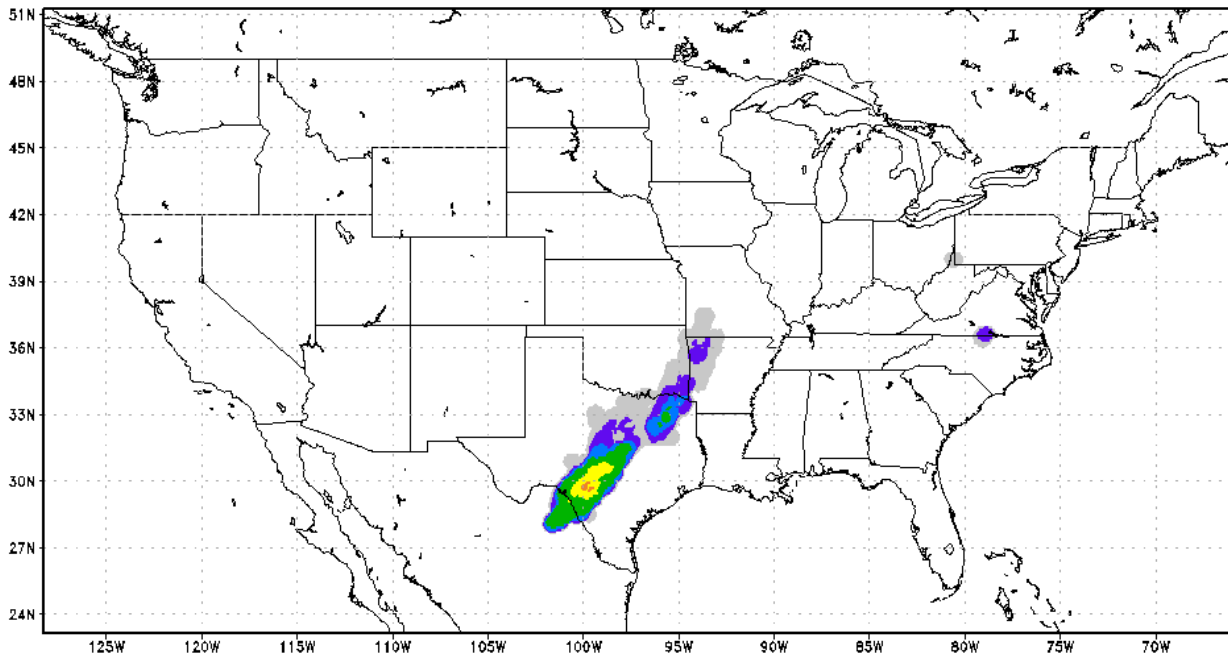


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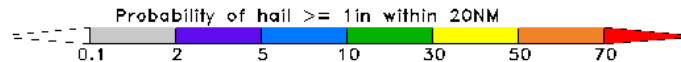
Valid: Tuesday 20 MAR 12, 03Z

Algorithms are used throughout AFWEPS to discern probabilities of phenomena not explicitly predicted by the model.

Tornadoes, Hail, Lightning, Snowfall, Wind Gusts, Precipitation Type, Visibility, Ceiling, etc



Q27hr Forecast
Valid: Tuesday 20 MAR 12, 03Z
Model Cycle: 19 MAR 12, 00Z



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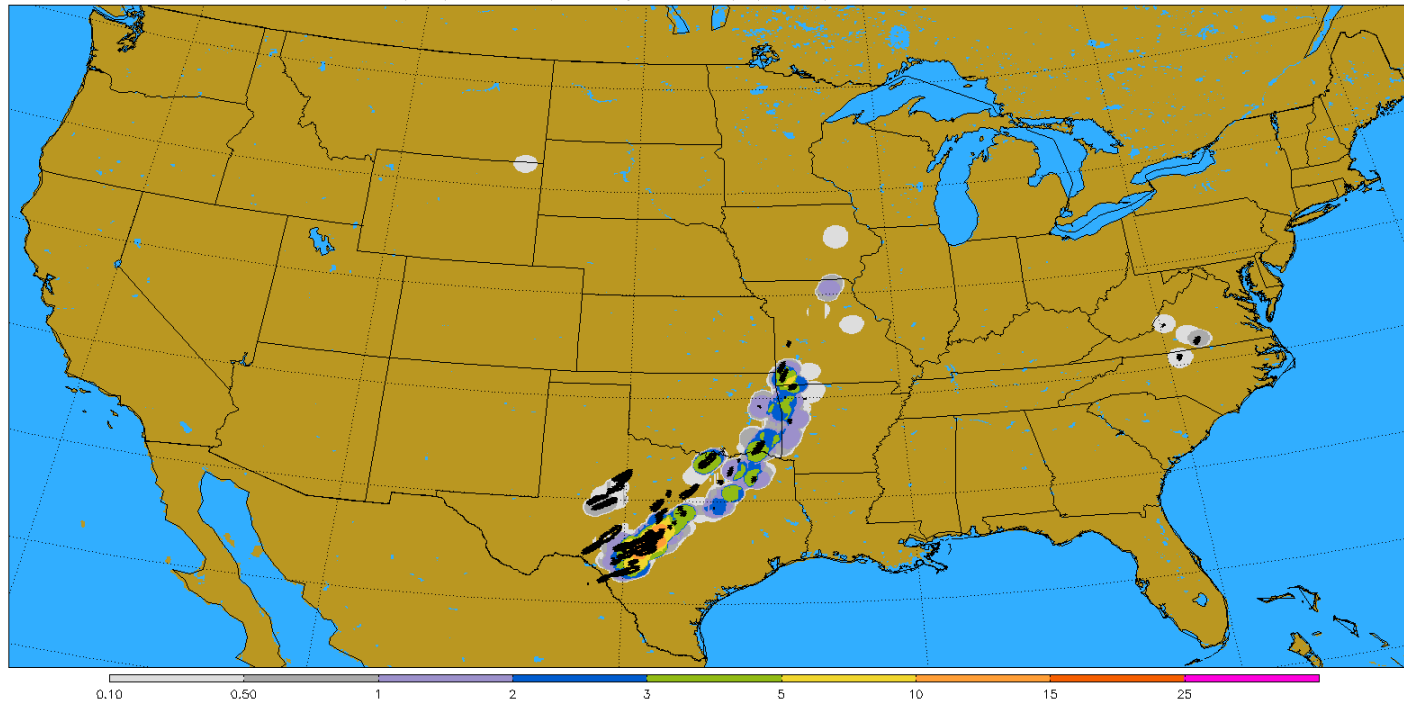


Spaghetti Charts



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Tornado prob w/in 20 NM and Updraft Helicity from all mbrs (bick) > 50 m2/s2 valid: 025 hrs at: 2012032001



Overlays of algorithm-based phenomena probabilities with individual member spaghetti of variables at thresholds of significance.

For instance here, the probability of tornado with the individual member updraft helicity greater than 50 m2/s2 (i.e. a supercell in the model) plotted on top. Allows the user to see if the supercells will be brief (OK/AR/MO) or long-lived (TX).

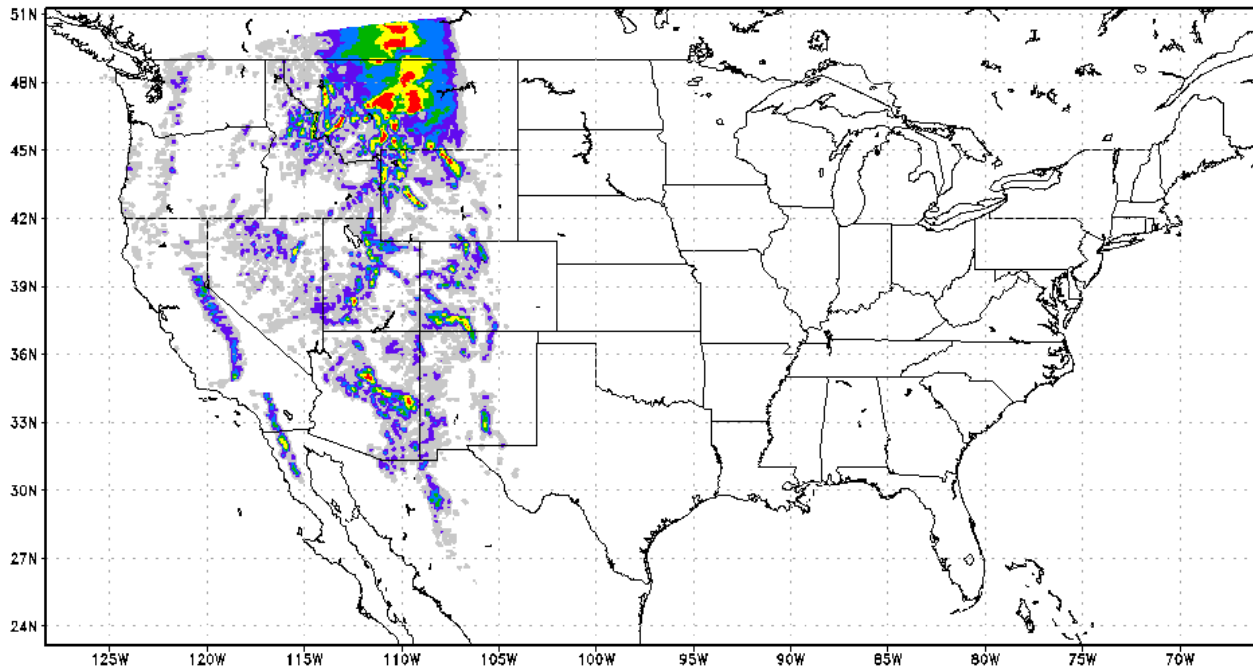


Precipitation Accumulation

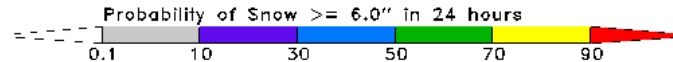


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Valid: Tuesday 20 MAR 12, 00Z



024hr Forecast
Valid: Tuesday 20 MAR 12, 00Z
Model Cycle: 19 MAR 12, 00Z



Probabilities of precipitation for different amounts and time periods.

Standard warning criteria (like 2 inches of rain or snow in 12 hours) plus many others like this one (6 inches of snow in 24 hours).



Point Ensemble Probabilities

Hourly to 60 hours



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WARNING: Check Cycle Time! 4km may not be current
To change location, enter new ICAO in the URL before
the .html (must be within 4 km domain!)

HUNTSVILLE 34.6500 lat -86.7833 lon 191 meters elevation
MODEL BOX INFO 34.6566 lat -86.8018 lon 186 meters elevation

4 km MEPS APR 27/06Z

WED 27 THR 28

	12Z	13Z	14Z	15Z	16Z	17Z	18Z	19Z	20Z	21Z	22Z	23Z	00Z	01Z	02Z	03Z	04Z	05Z	06Z	07Z	08Z	09Z	10Z	11Z	12Z	13Z	14Z	15Z	16Z	17Z	18Z	19Z	20Z	21Z	22Z	23Z	00Z	01Z	02Z	03Z	04Z	05Z	06Z			
Surface winds	76	81	90	97	91	71	89	74	90	73	83	83	83	94	95	92	80	47	43	60	17	3	29	6	1	12	8	3	0	0	14	14	19	48	19	23	9	1	0	0	0	0	0			
Winds GT 25 KT	37	31	63	68	36	36	77	63	73	64	68	45	53	69	55	58	44	4	14	4	1	0	2	1	0	1	1	0	0	2	2	1	3	1	2	0	0	0	0	0	0					
Winds GT 35 KT	1	7	5	5	7	10	16	11	32	37	25	19	20	28	13	10	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Winds GT 50 KT	0	1	0	0	0	2	3	2	5	6	5	6	8	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Winds GT 65 KT																																														
Precipitation	12	12	12	2	26	36	52	62	63	71	80	90	96	96	95	92	92	83	82	64	42	20	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Precip GT 0.10 IN in 6 hr	-99	-99	-99	-99	-99	-99	11	22	26	28	28	42	43	53	66	66	59	55	47	21	17	16	16	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Precip GT 2 IN in 12 hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
FRZR GT 0.01 IN in 3 hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
SN GT 0.1 IN in 6 hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
SN GT 2 IN in 12 hr	-99	-99	-99	-99	-99	-99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
SN GT 6 IN in 24 hr	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99			
Thunderstorms	12	13	14	15	16	17	18	19	20	21	22	23	00Z	01Z	02Z	03Z	04Z	05Z	06Z	07Z	08Z	09Z	10Z	11Z	12Z	13Z	14Z	15Z	16Z	17Z	18Z	19Z	20Z	21Z	22Z	23Z	00Z	01Z	02Z	03Z	04Z	05Z	06Z			
Lightning within 20 NM	1	7	1	15	30	38	49	66	92	80	84	89	95	85	61	33	19	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1.00 in hail within 20 NM	0	0	0	0	0	2	17	14	34	22	35	43	47	45	31	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2.00 in hail within 20 NM	0	0	0	0	0	0	1	0	3	4	2	6	7	12	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Tornado within 20 NM	0	0	0	0	5	10	8	8	7	5	19	33	26	23	16	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Visibility	10	7	5	5	24	26	50	43	32	13	17	28	29	32	18	4	5	8	11	15	14	20	14	18	12	8	3	2	1	1	1	1	0	0	0	0	0	0	1	2	4	5	8	10	13	
Visibility lt 5 miles	3	2	1	1	18	20	43	32	23	5	8	14	14	20	10	1	2	3	5	7	6	10	6	8	5	3	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	3	4	6	
Visibility lt 3 miles	1	0	0	0	2	5	9	11	6	0	0	8	7	1	1	0	0	0	1	2	1	2	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
Visibility lt 1 mile																																														
Others	69	70	71	72	71	70	69	71	73	75	73	73	73	71	68	67	64	62	60	58	57	55	54	52	52	53	55	58	60	63	65	66	67	67	66	65	62	59	57	57	55	55	54			
Mean Temperature (F)	19	21	22	22	21	18	18	16	20	19	17	17	21	19	17	16	15	14	13	11	10	11	12	10	8	10	10	10	9	9	10	11	13	14	13	12	8	7	7	7	6	5	5			
Mean wind speed (kts)																																														

A number of variables of significance are plotted for a single station, and color-coded to draw attention to the time periods of higher risk.



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Output



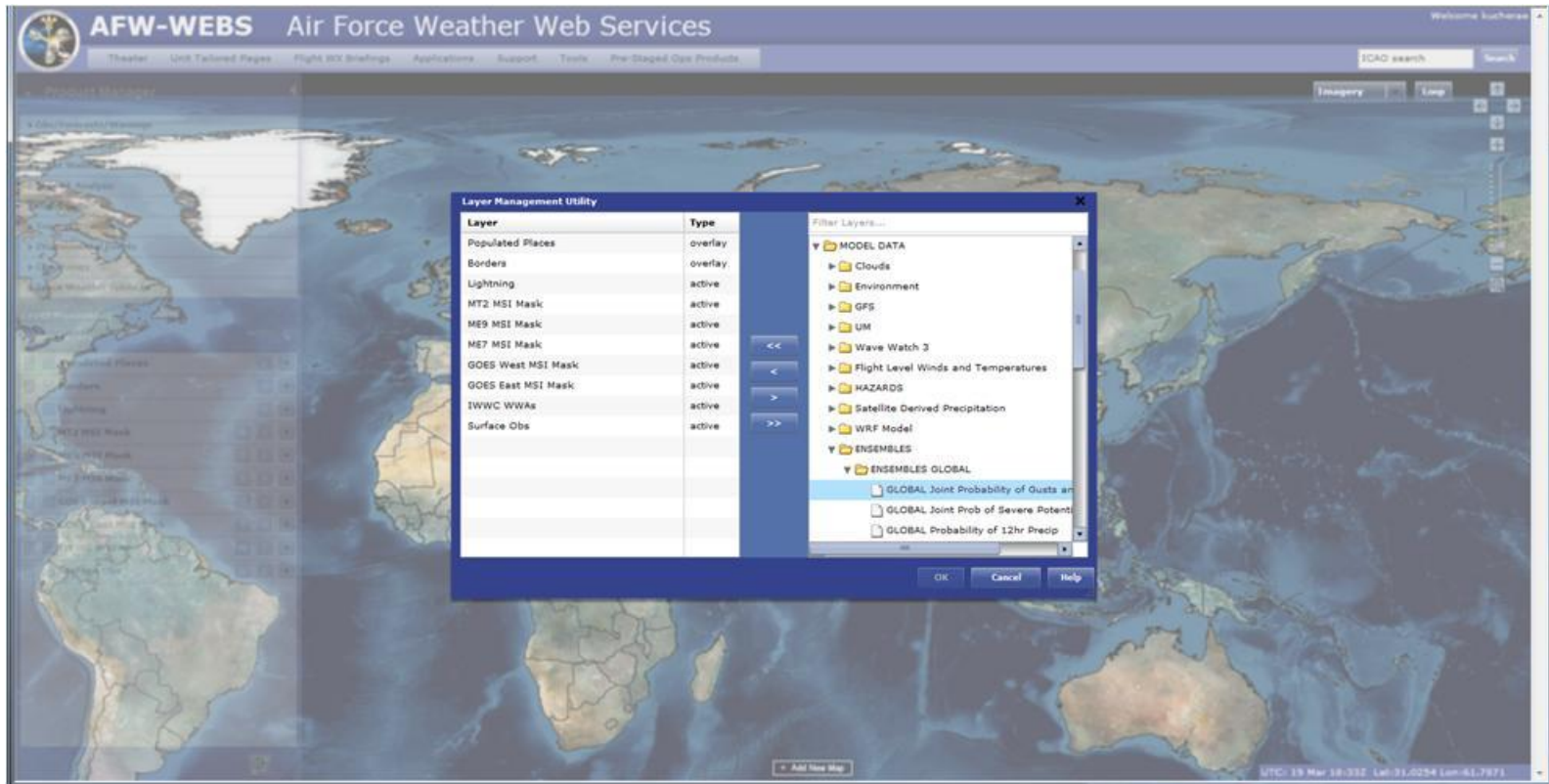
- **GEPS available now in AFW-WEBS and on JAAWIN:**
 - https://weather.af.mil/AFW_WEBS/
 - https://weather.afwa.af.mil/host_home/DNXM/JEFS/jefs_index.html
- **MEPS available on JAAWIN:**
 - https://weather.afwa.af.mil/host_home/DNXM/JEFS/afweps_MEPS_index.html



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Output

AFW-WEBS



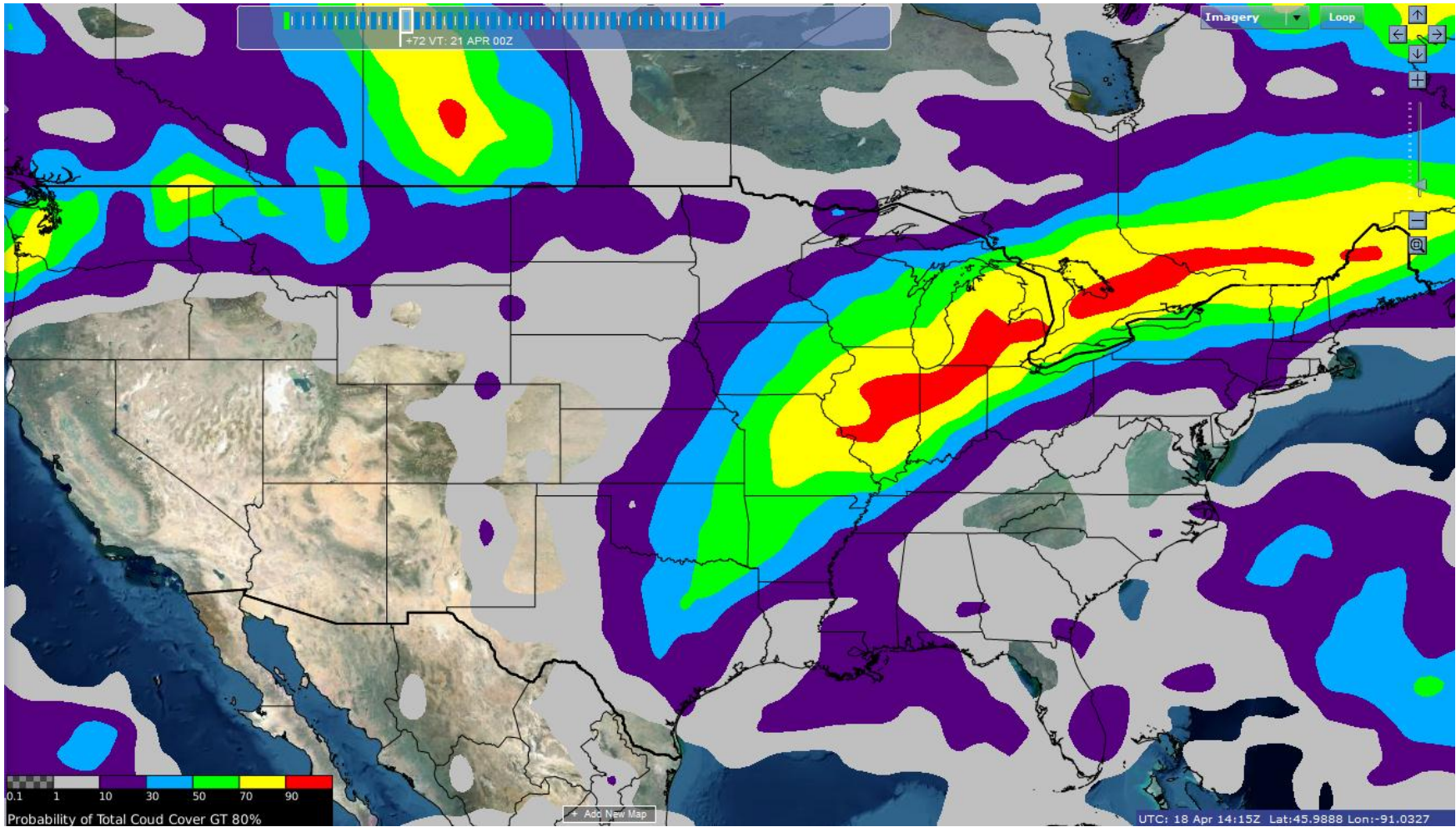
Right click on the map and select “Add Layer” and then drill down under “MODEL DATA”



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Output

AFW-WEBS—Probability of OVC cloud cover



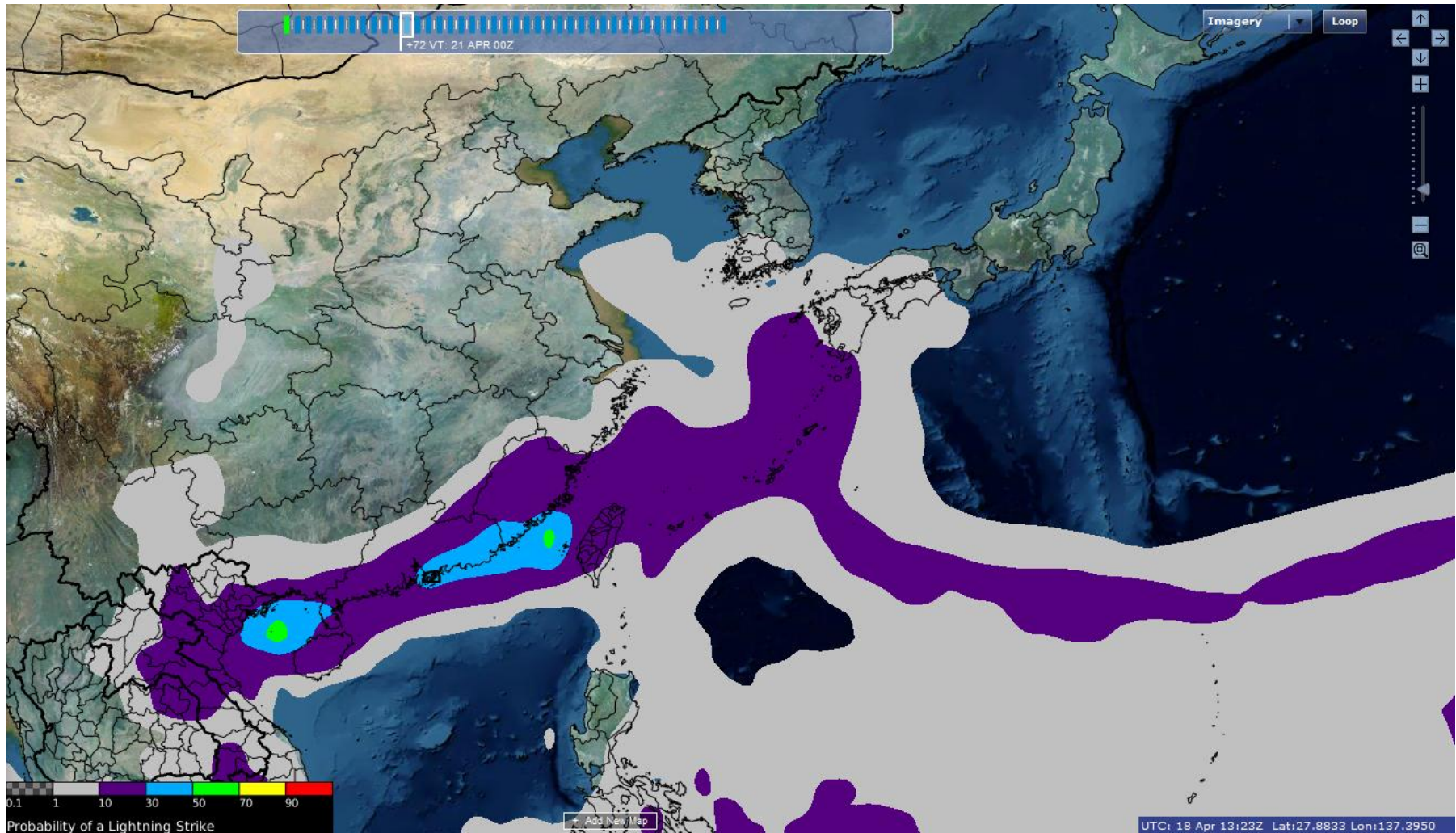
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Output

AFW-WEBS—Lightning Probability 72 hour forecast



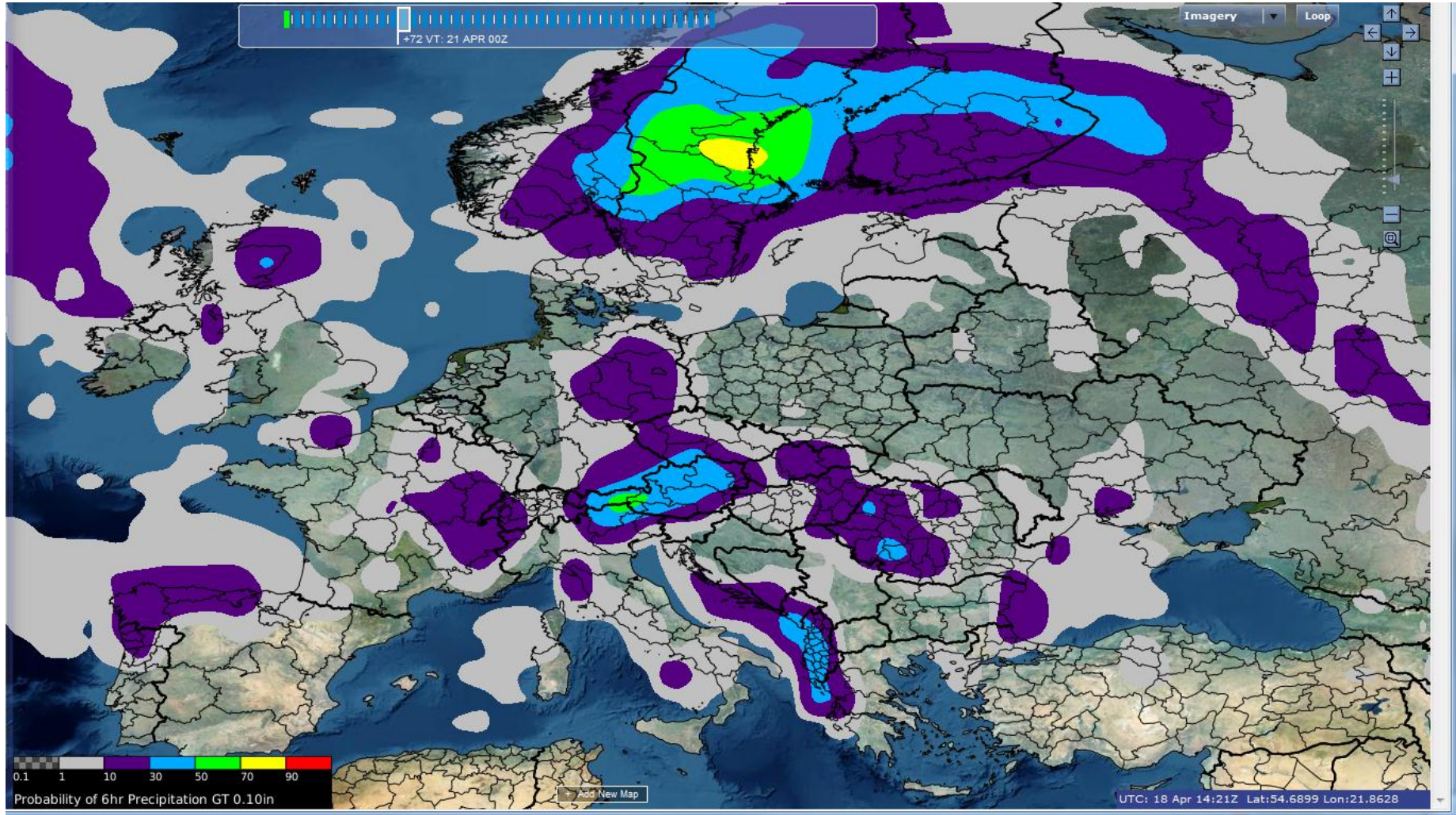
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Output

AFW-WEBS—Prob of Precip gt 0.10 inches 72 hour forecast



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Future



- **AFW-WEBS will enable users to manually select variables, thresholds, and time increments of choice**
 - **Can tailor the probabilities to specific mission needs**
 - **For instance, probability of surface winds greater than 50 knots OR visibility less than 1 mile OR ceiling less than 1000 feet OR lightning for aircraft ops**
 - **Also, probability of 2 inches of snow in 3 hours, 12 hours, 53 hours, XX hours, etc.**
- **Contingency 4 km MEPS domains**
 - **Appointed user can request to change the area of the domain from cycle to cycle to meet mission or weather needs**
- **Gridded data availability via CDC subscription**
 - **Test datasets available now by request to 16 WS/WXN**



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QUESTIONS?

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