



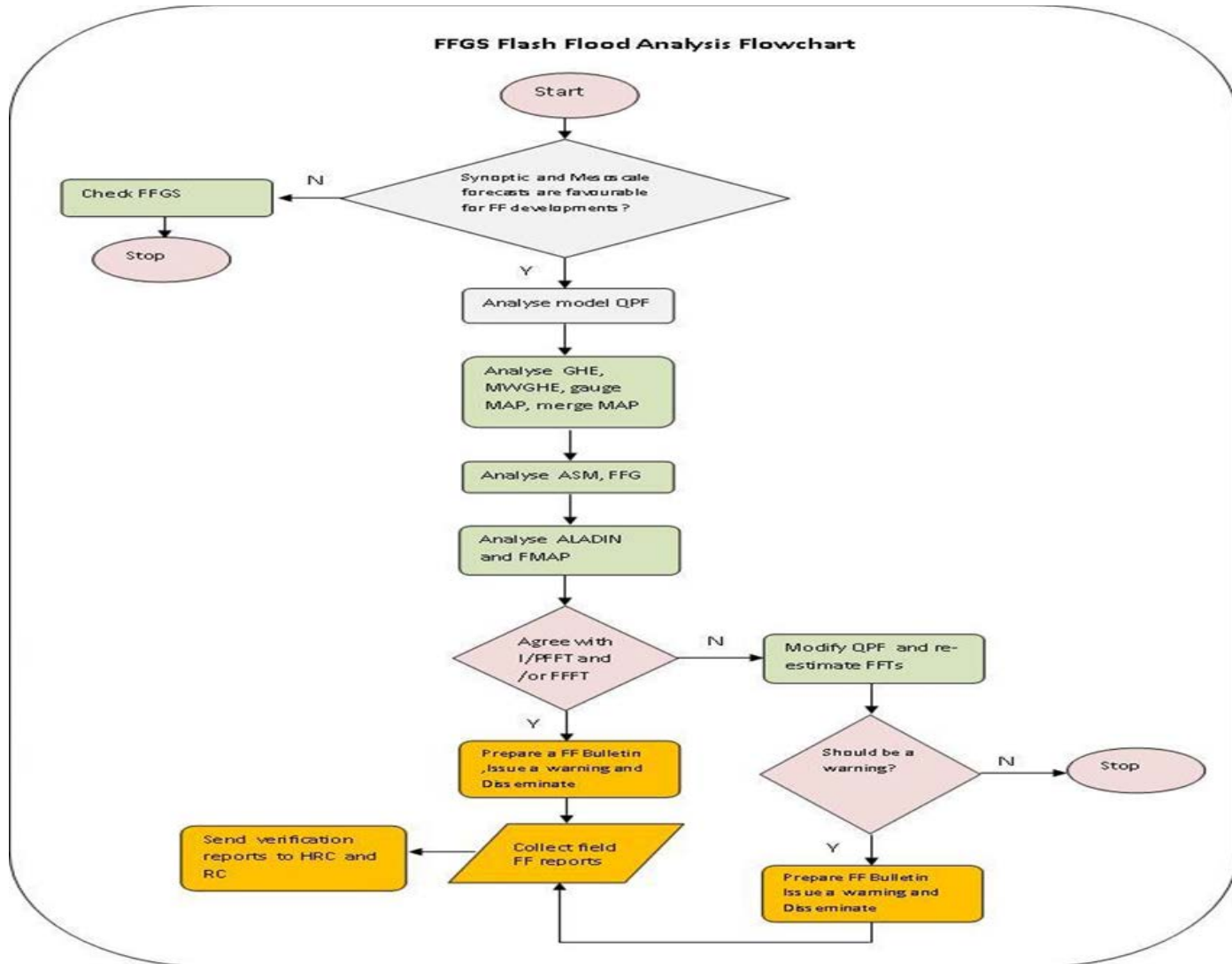
World Meteorological Organization

Weather • Climate • Water

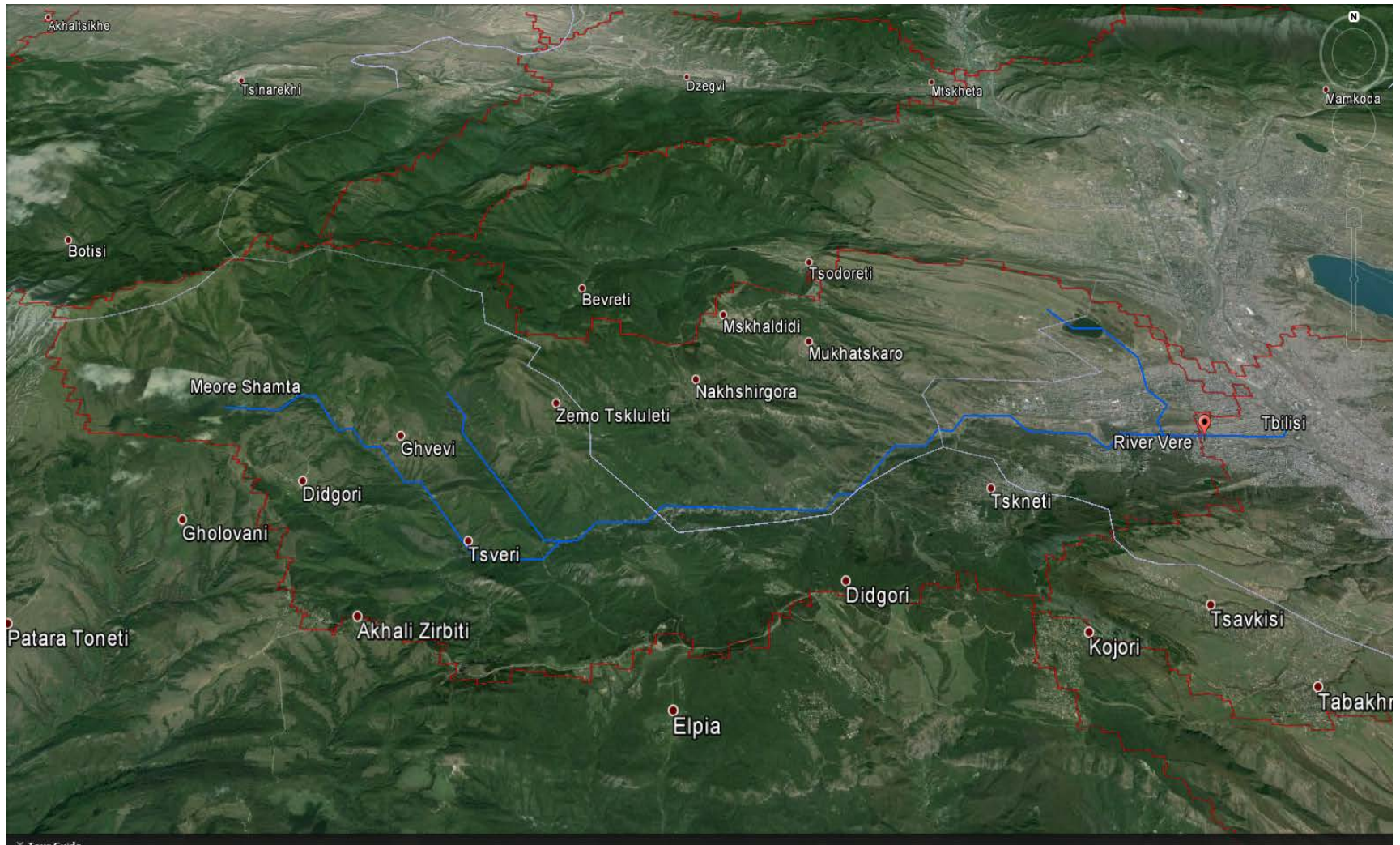
A Case Study: 12-14 June 2015 Flash Flood Event in Georgia



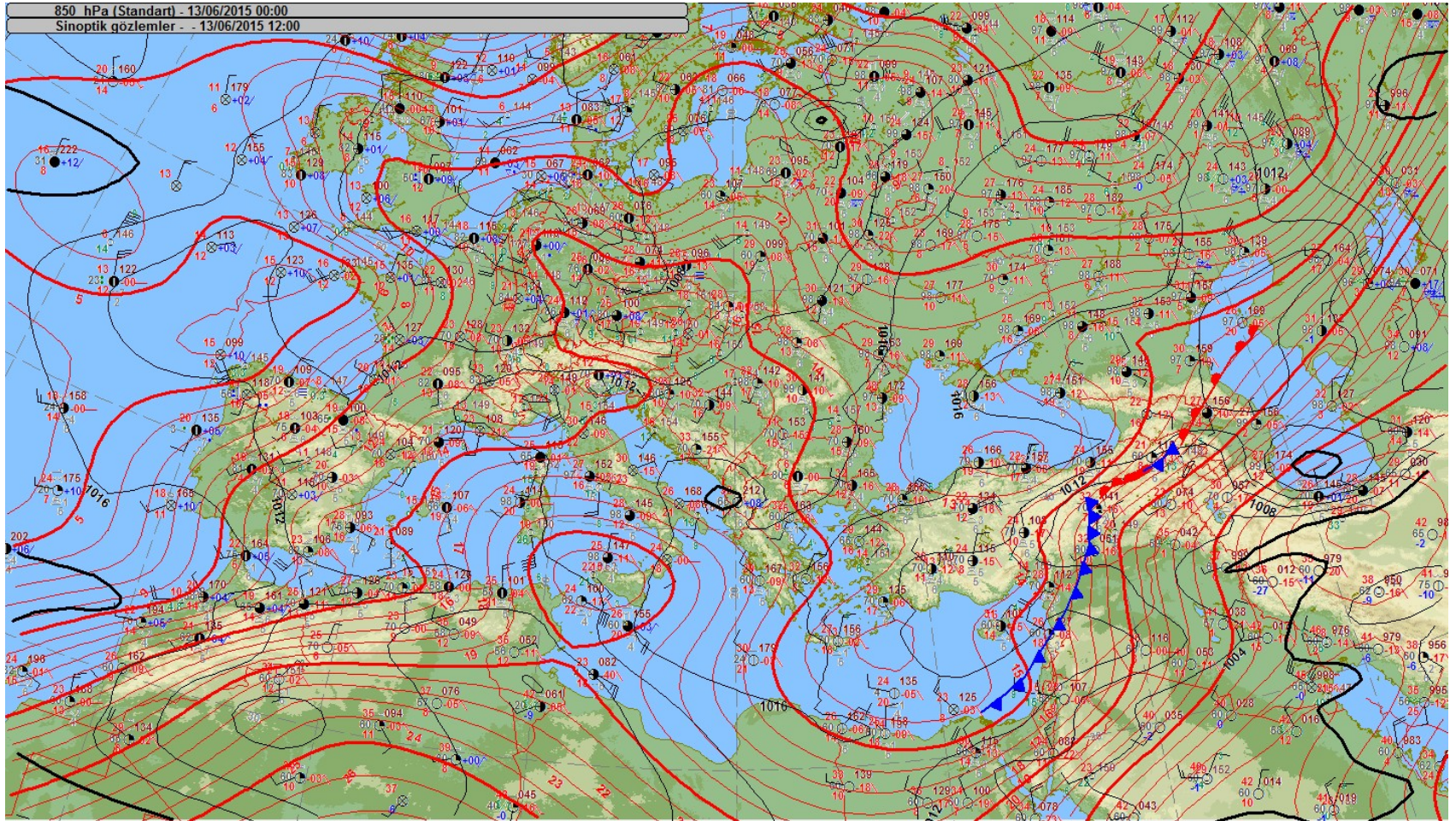
Flash Flood Warning Flow Chart



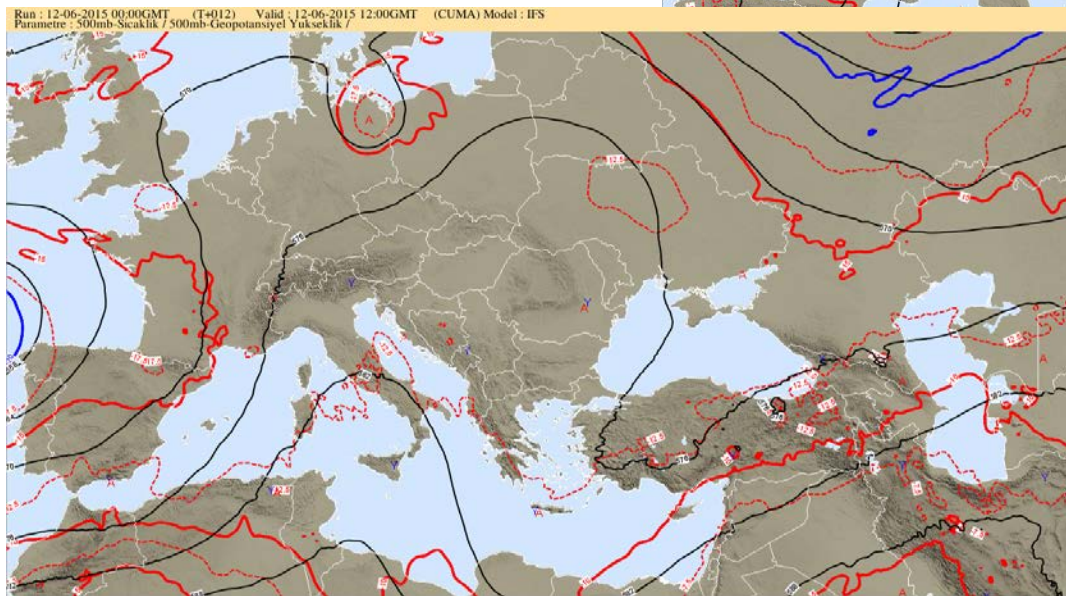
Vere River Flooding, Georgia



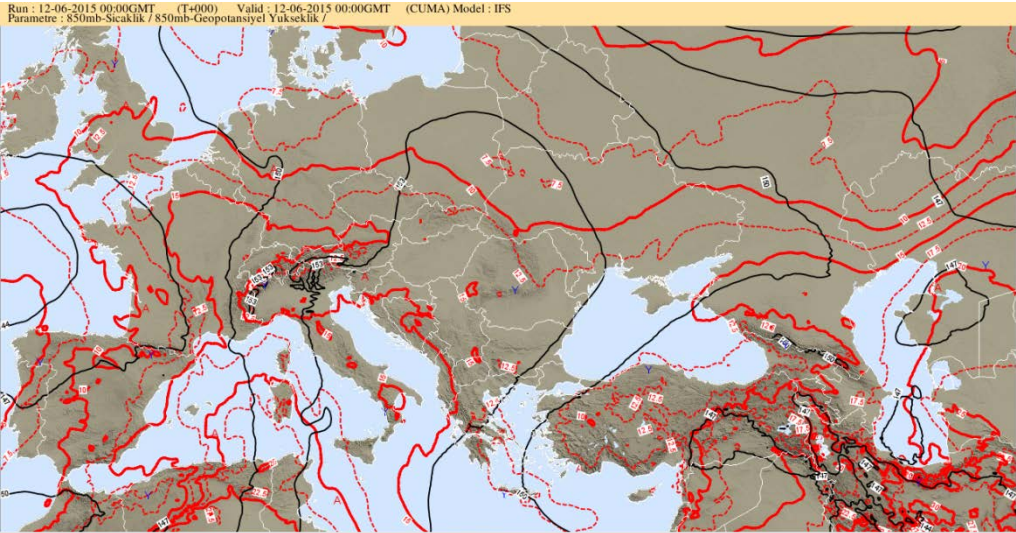
Surface Chart 13 June 2015 12 UTC



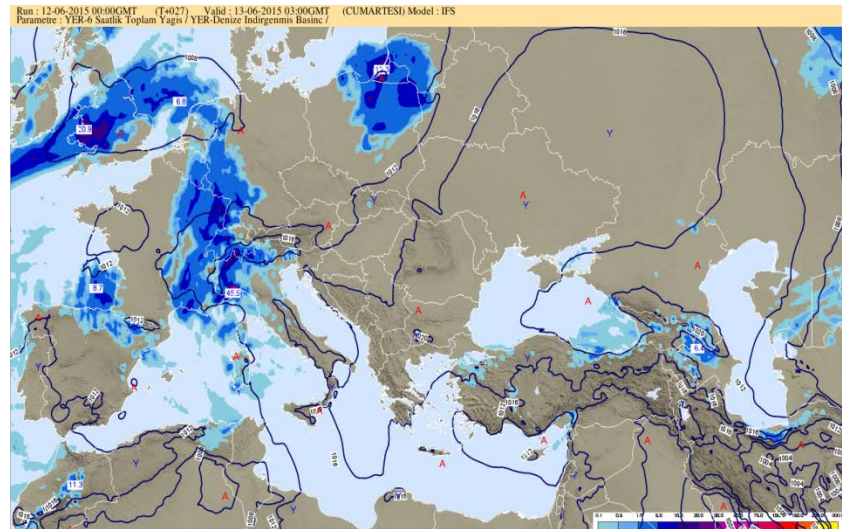
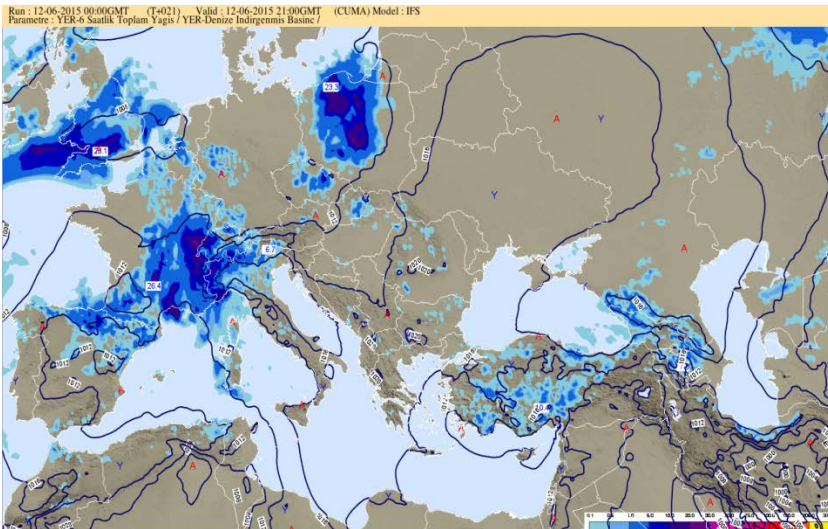
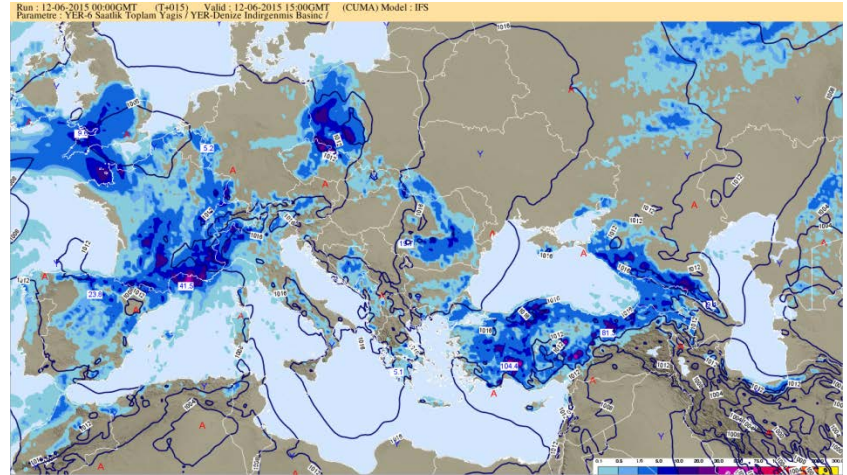
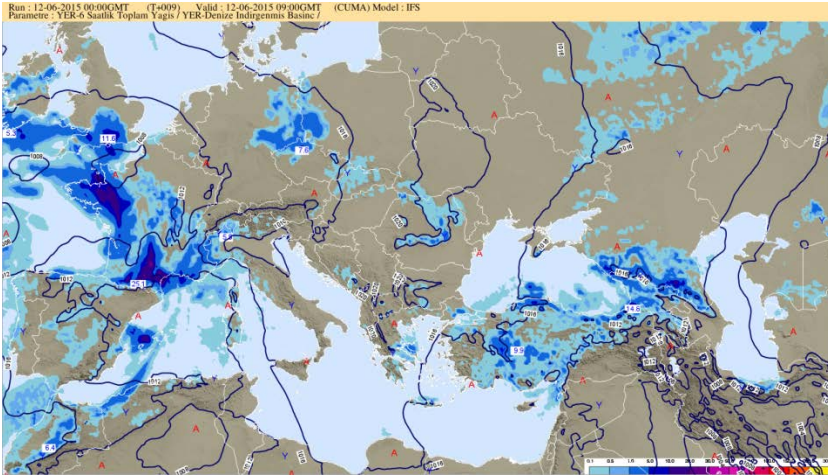
ECMWF 500 hPa 12 June 2015 00 and 12 UTC



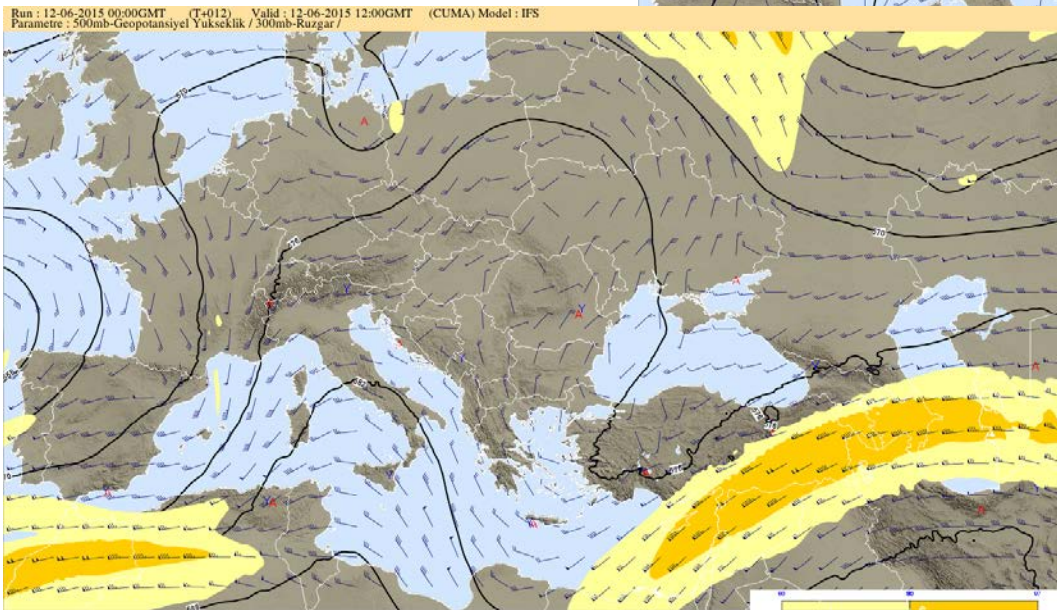
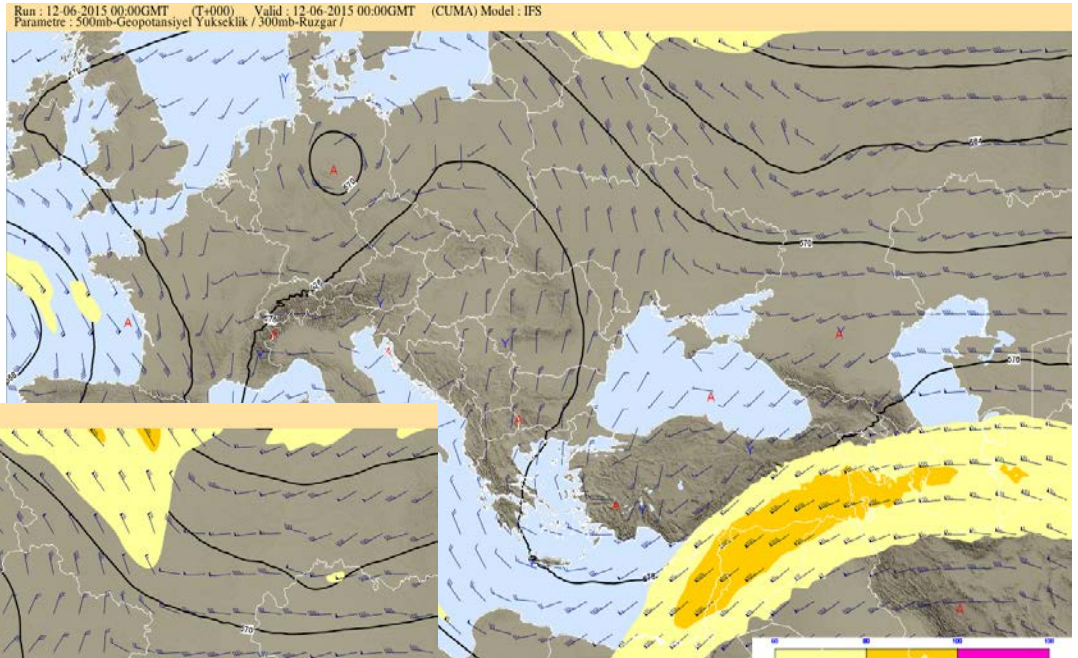
ECMWF 850 hPa Charts 12 June 2015 00 and 12 UTC



ECMWF Surface chart + 6-hr Precipitation 12 June 2015 Valid 09, 15, 21, 03/13 June UTC

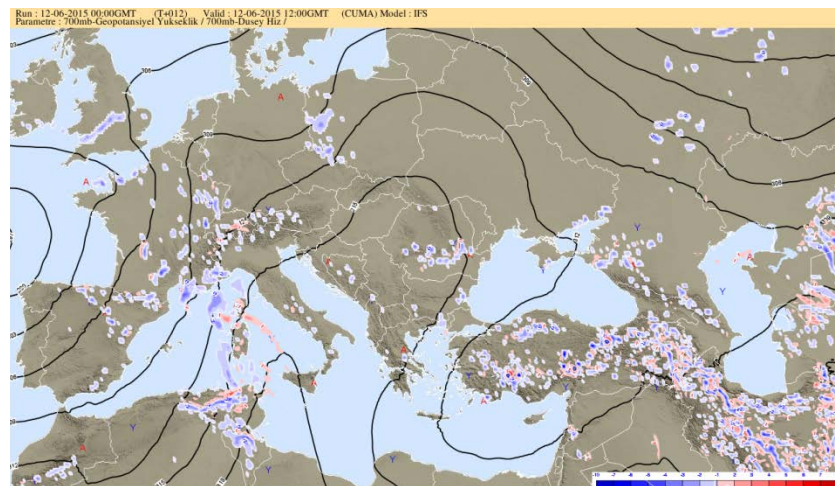
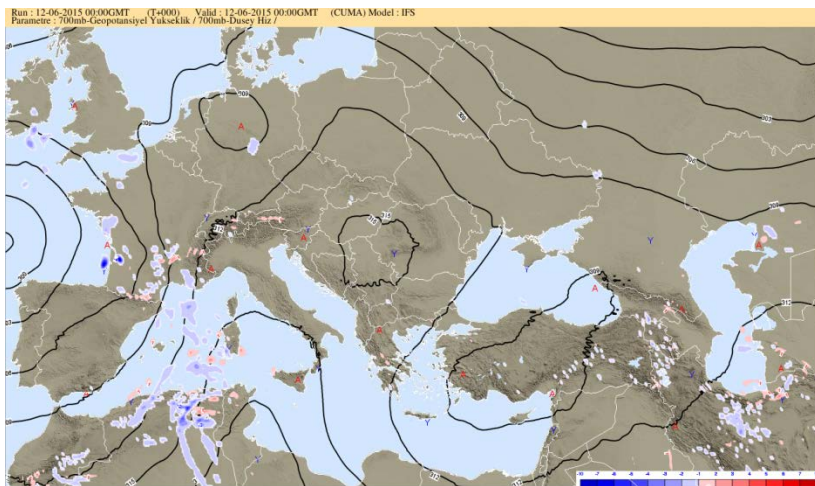
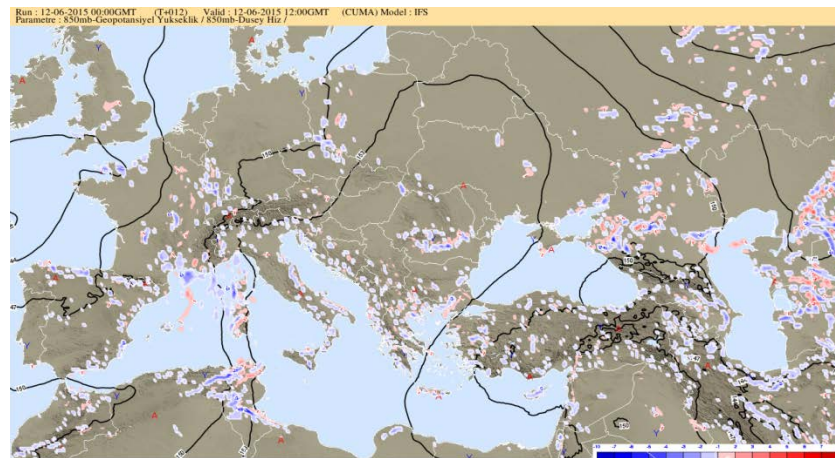
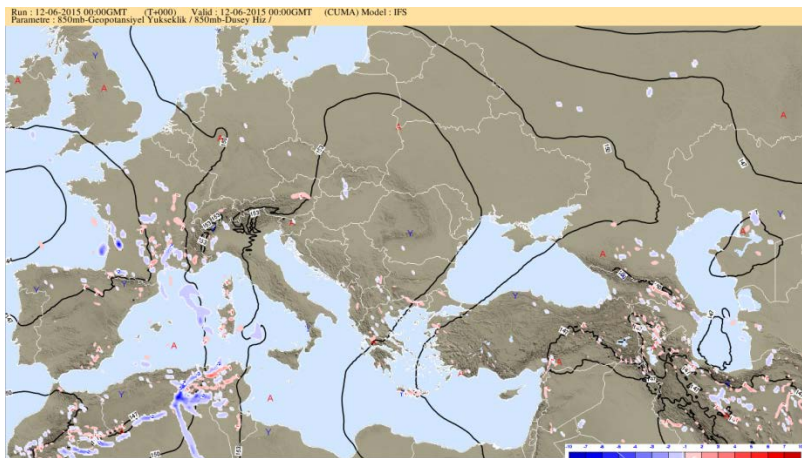


ECMWF Jet 12 June 2015 00 and 12 UTC

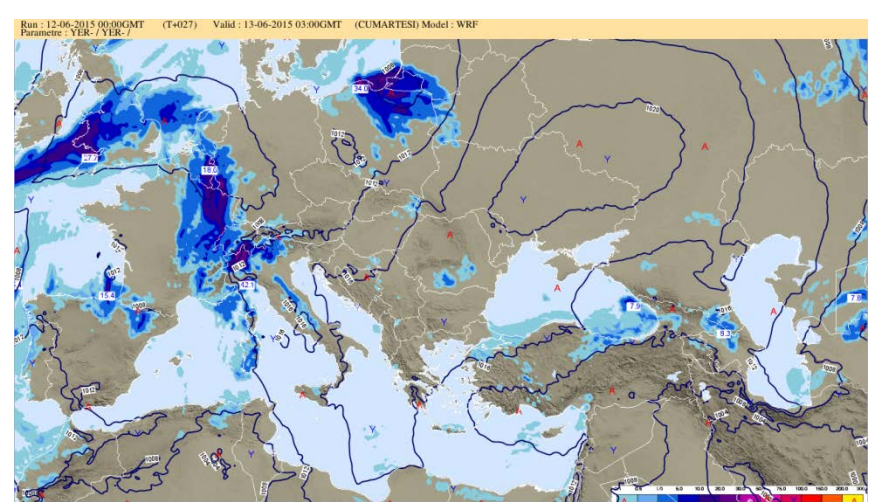
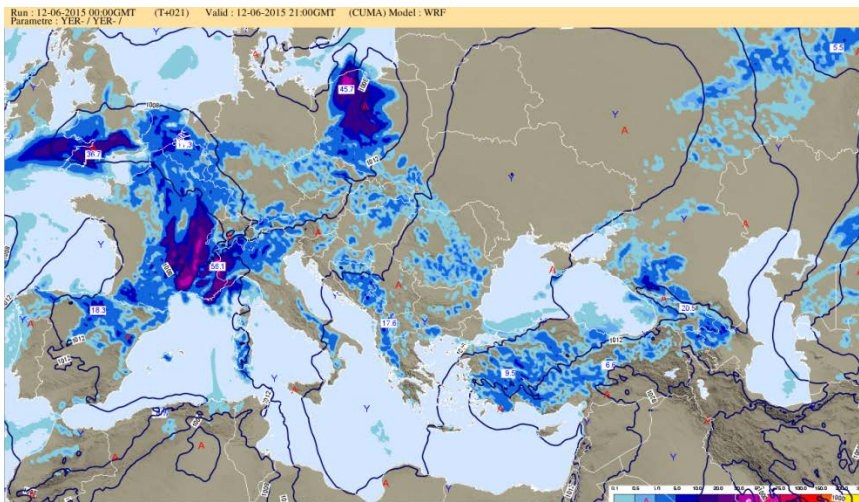
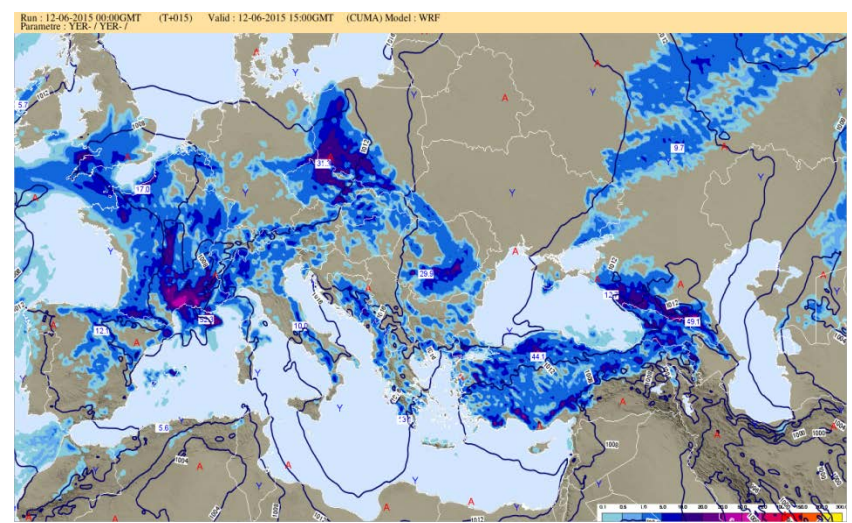
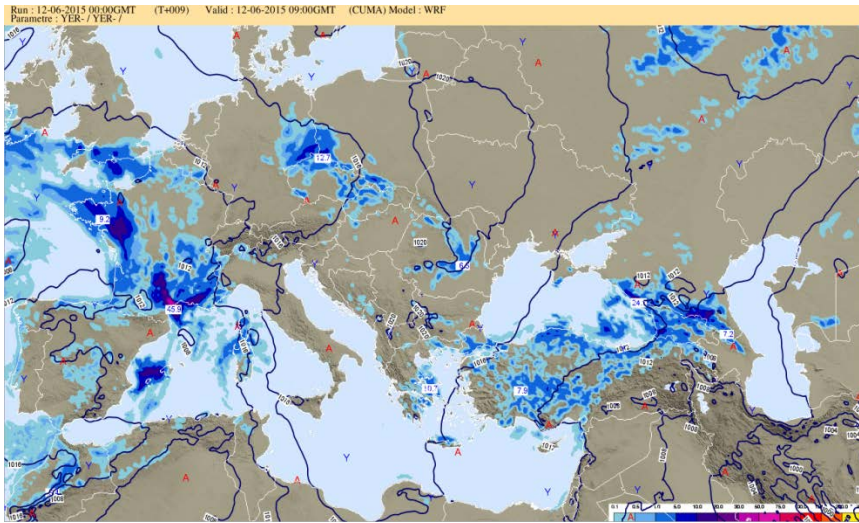


ECMWF 850 hPa and 700 hPa Vertical Motions

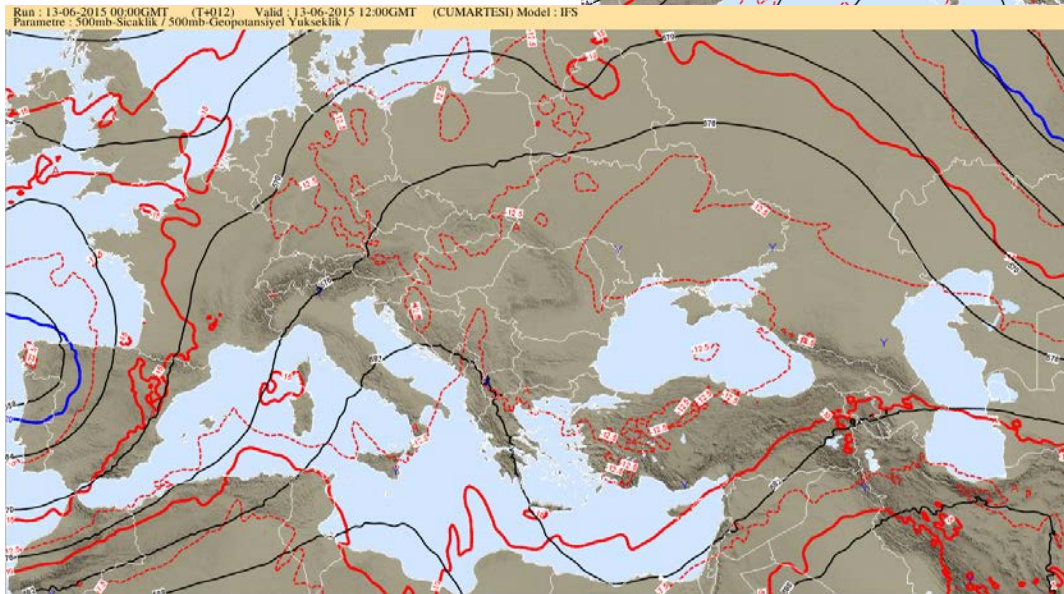
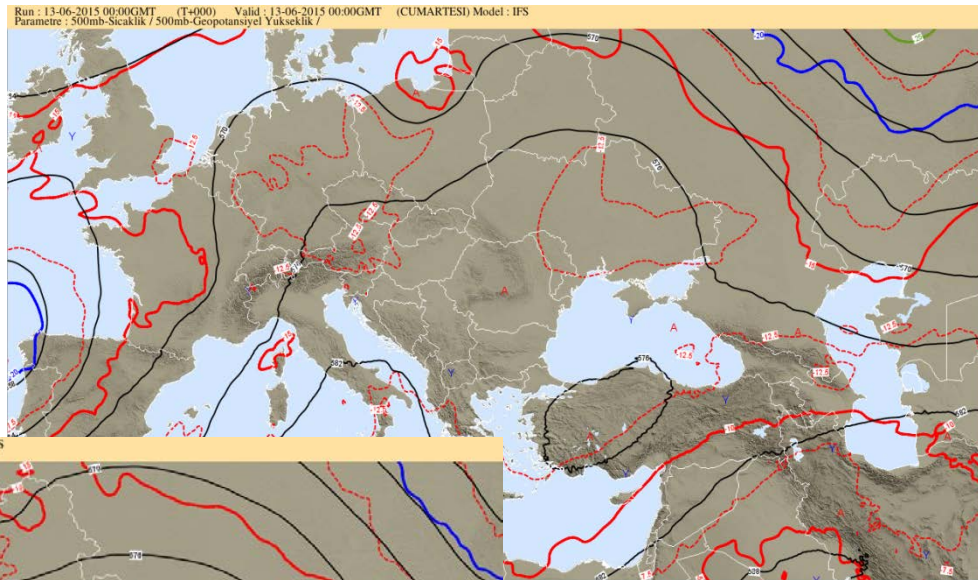
12 June 2015 at 00 and 12 UTC



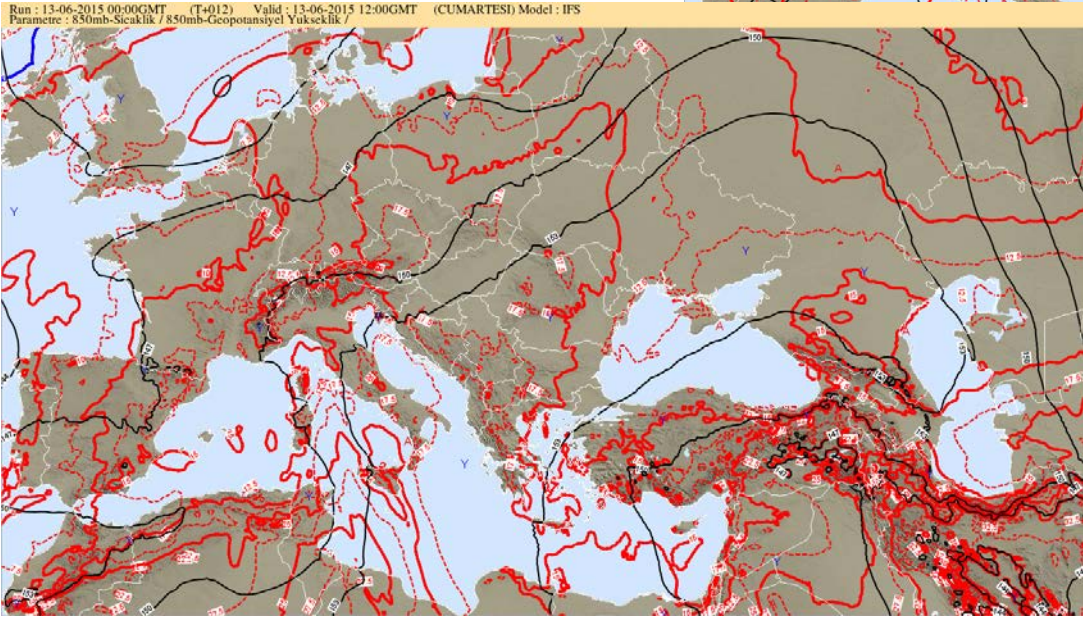
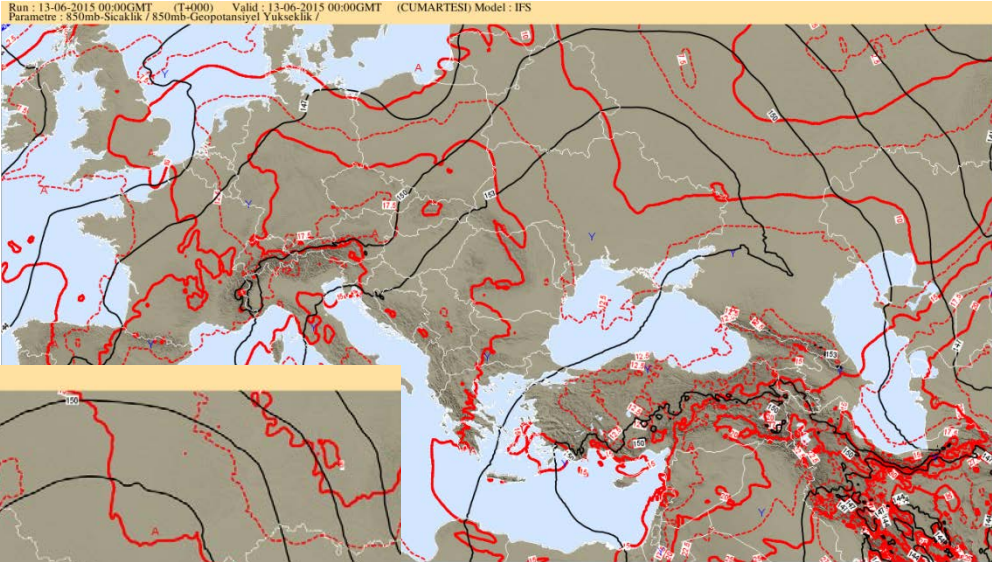
WRF Surface chart + 6-hr Precipitation 12 June 2015 Valid 09, 15, 21, 03/13 June UTC



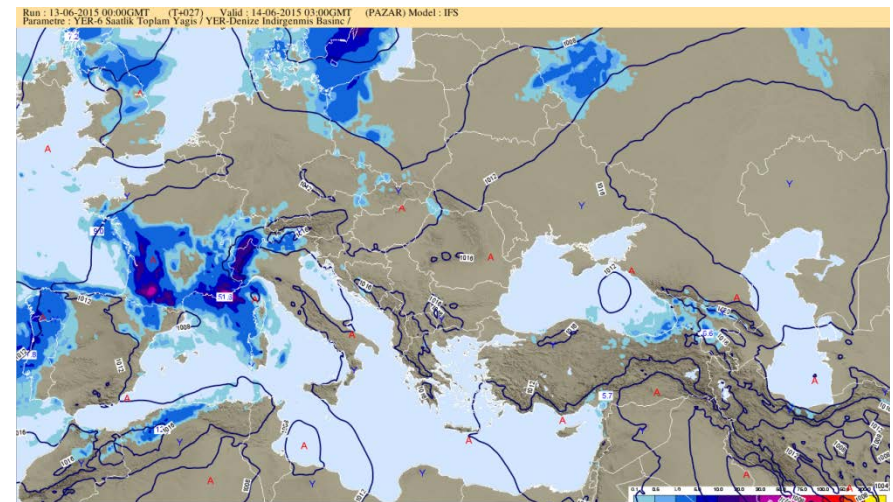
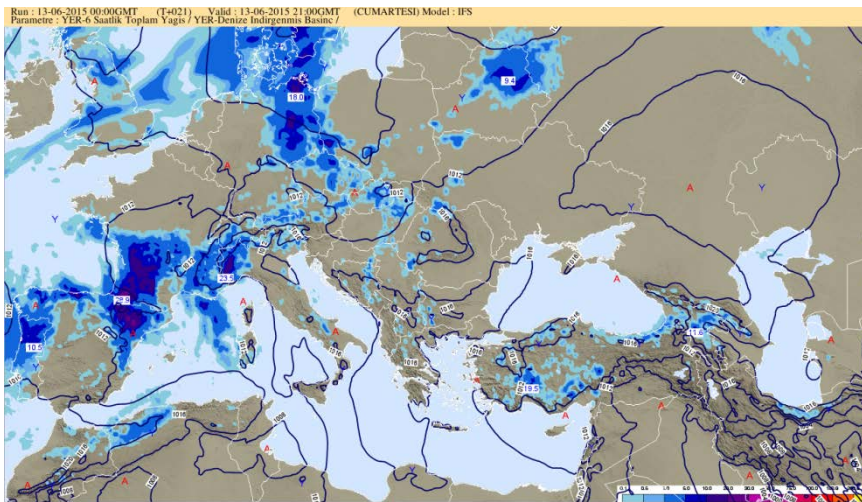
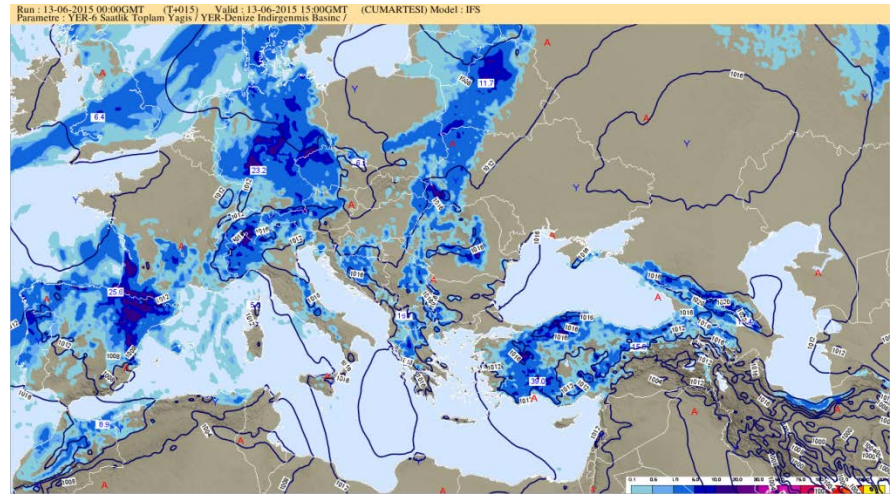
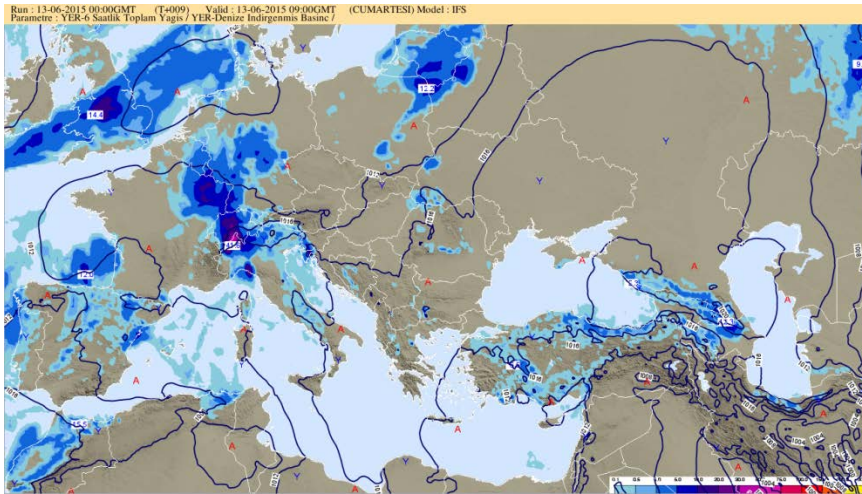
ECMWF 500 hPa 13 June 2015 00 and 12 UTC



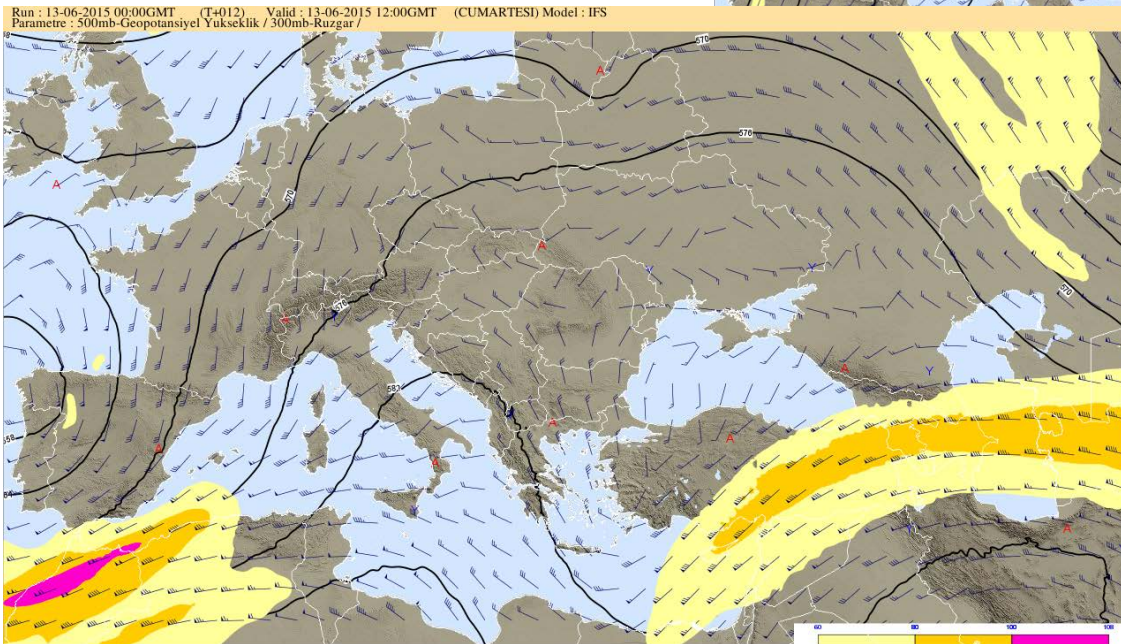
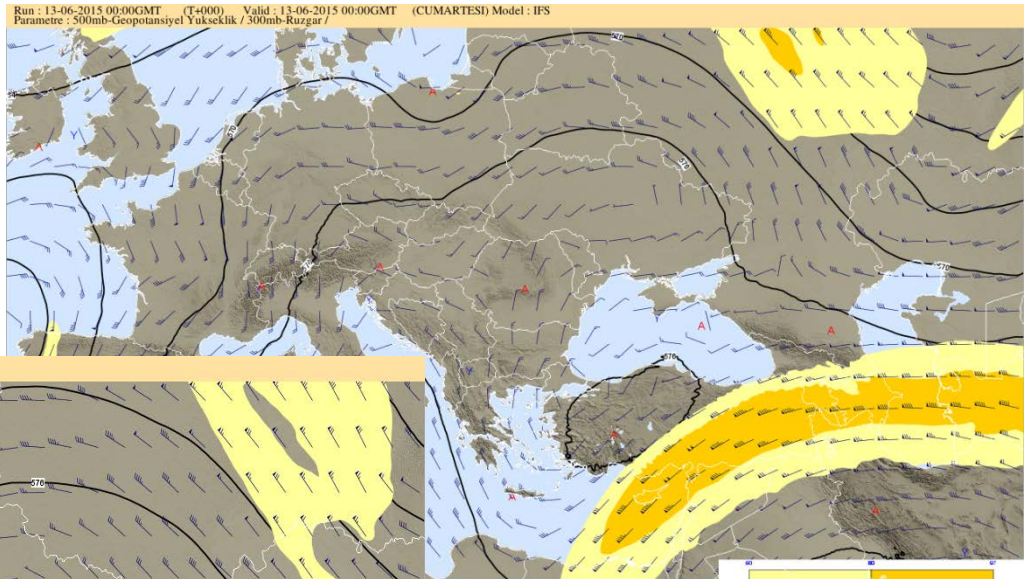
ECMWF 850 hPa Charts 13 June 2015 00 and 12 UTC



ECMWF Surface chart + 6-hr Precipitation 13 June 2015 Valid 09, 15, 21, 03/14 June UTC

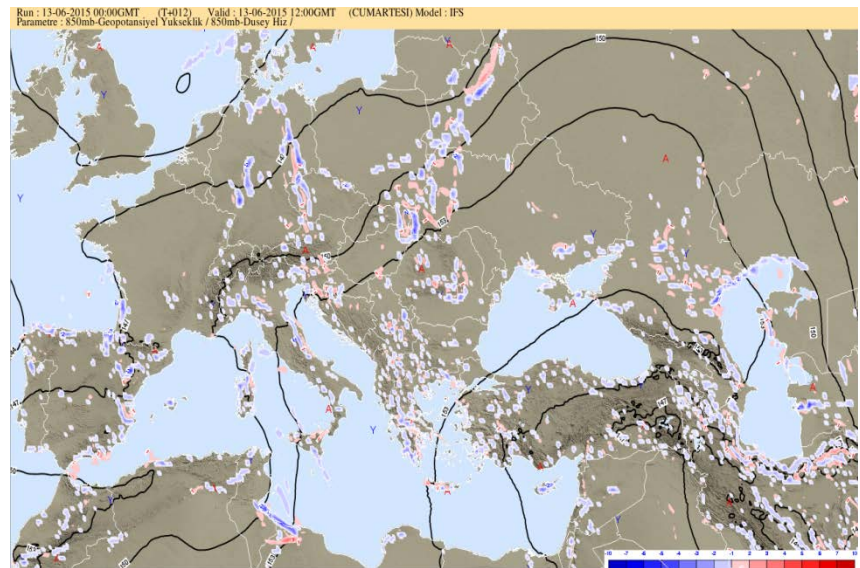
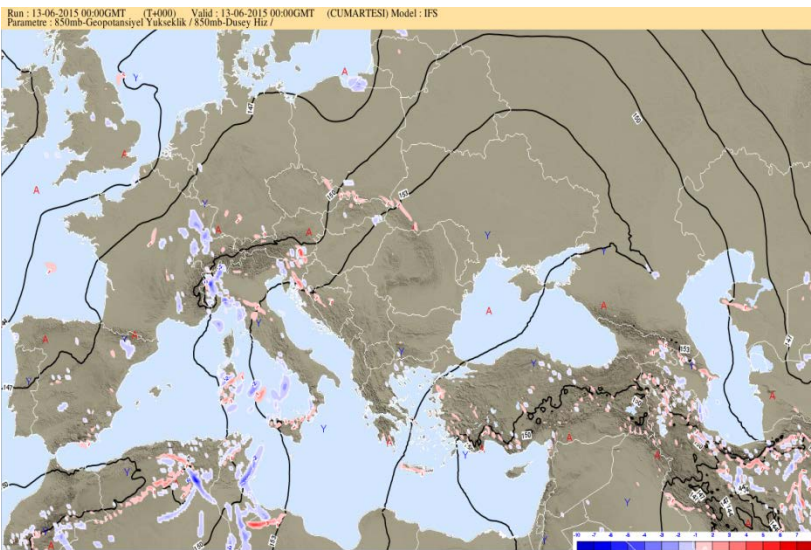
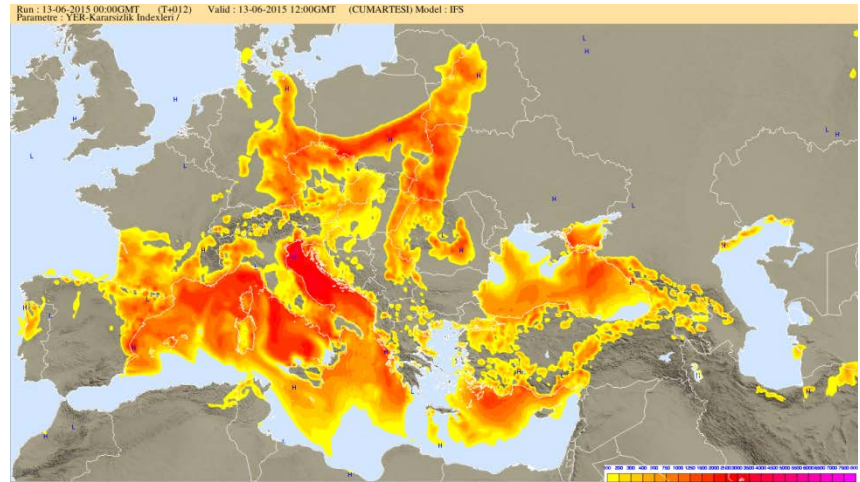
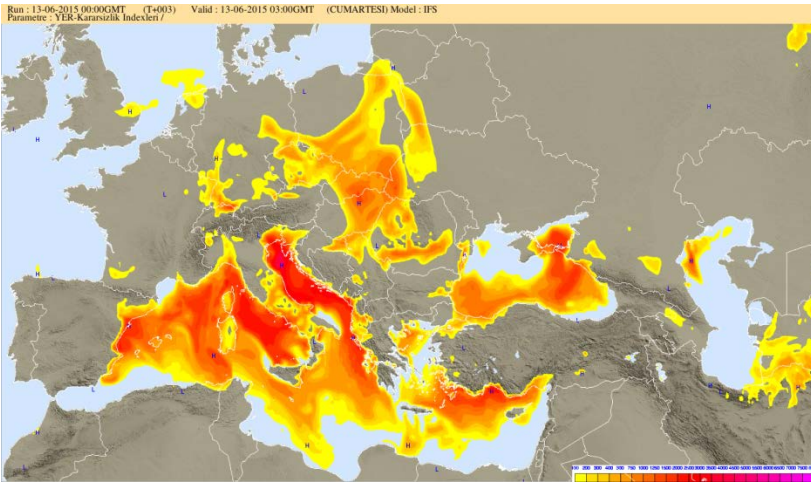


ECMWF Jet 13 June 2015 00 and 12 UTC

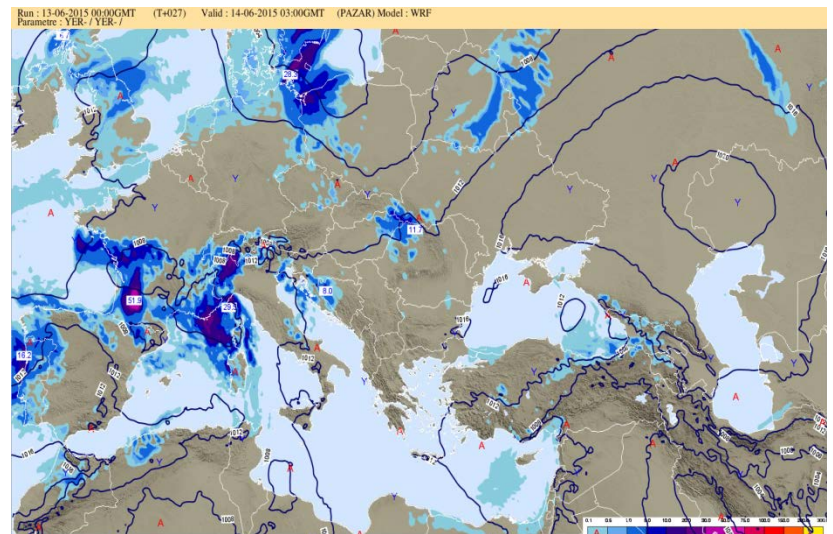
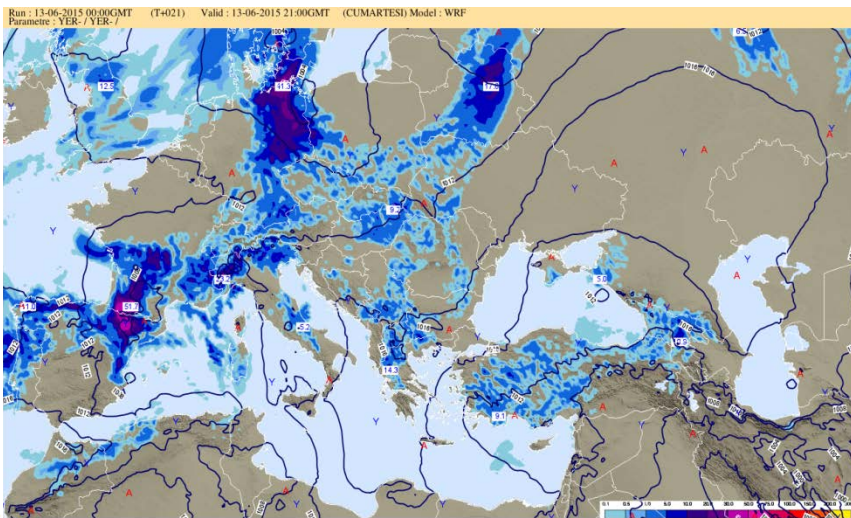
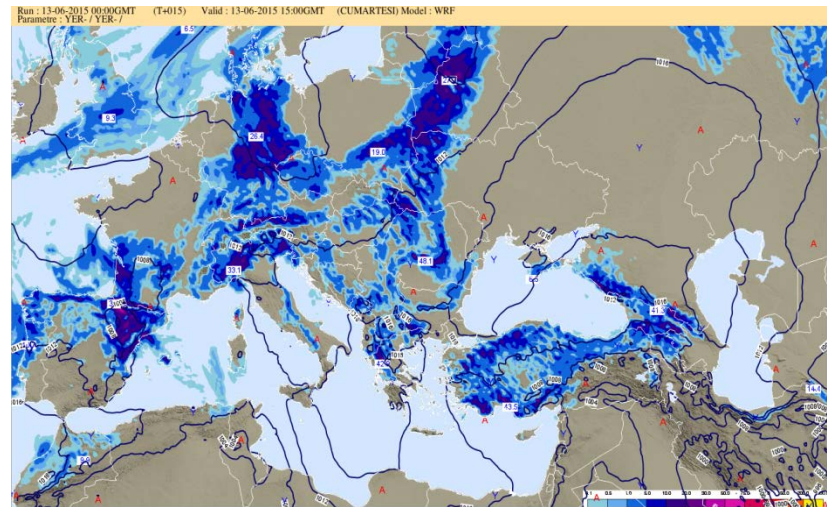
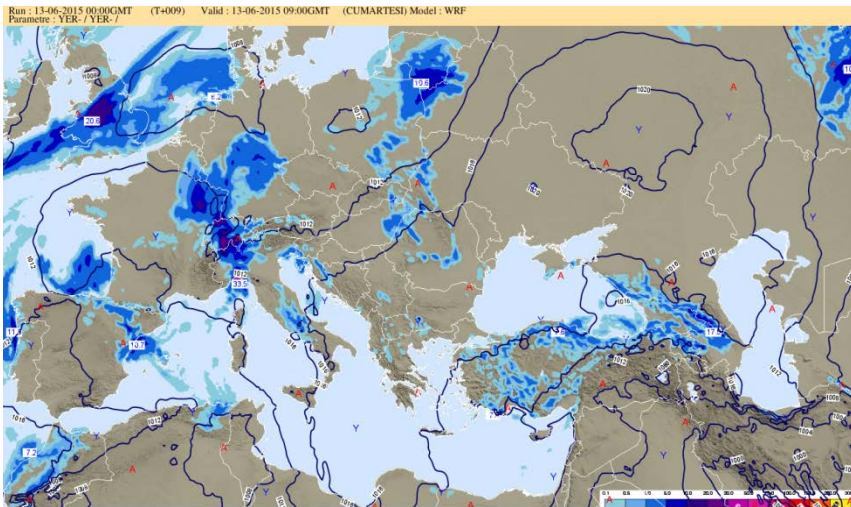


ECMWF CAPE and Vertical Motion

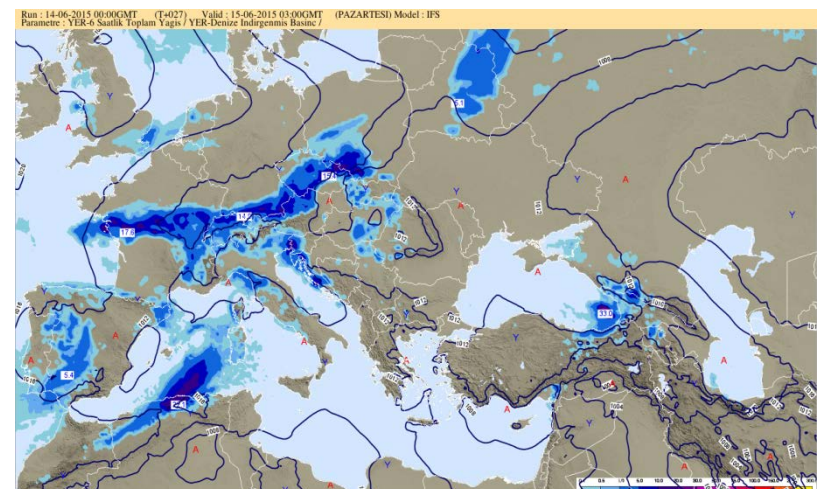
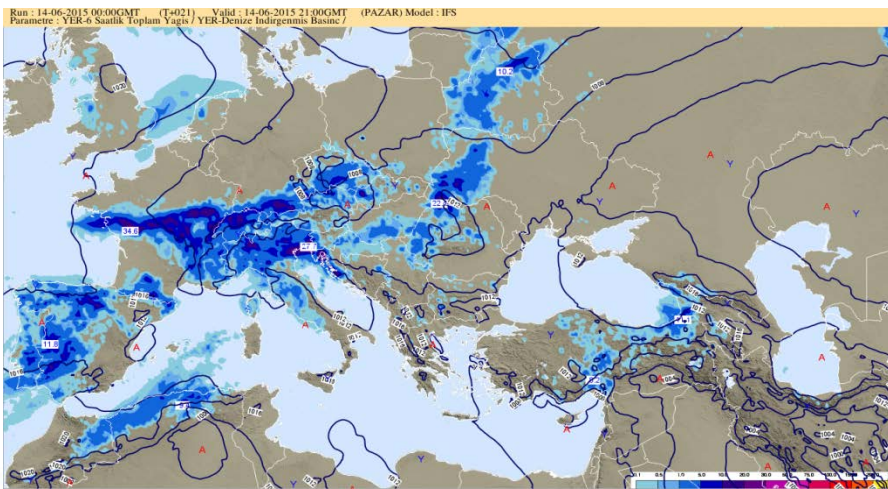
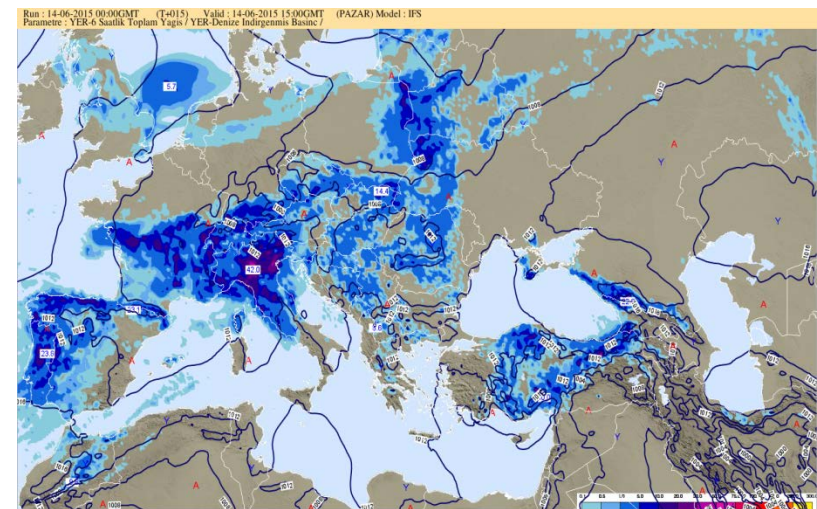
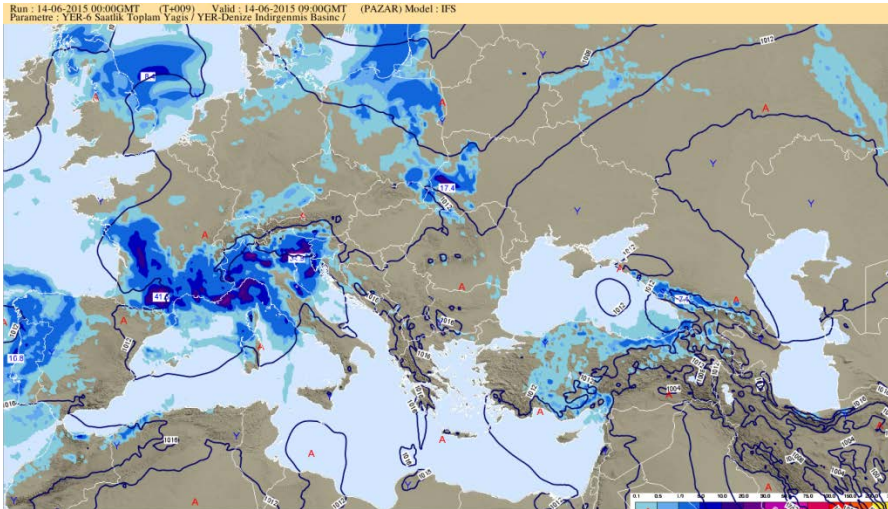
13 June 2015 00 and 12 UTC



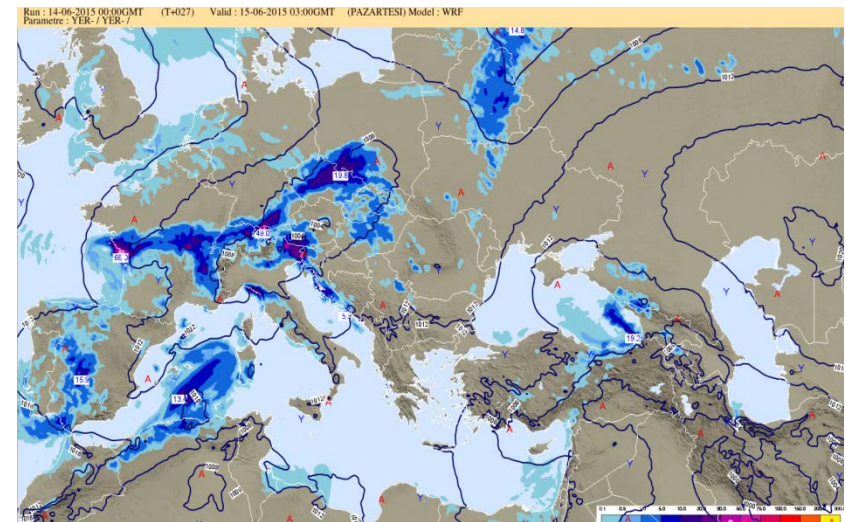
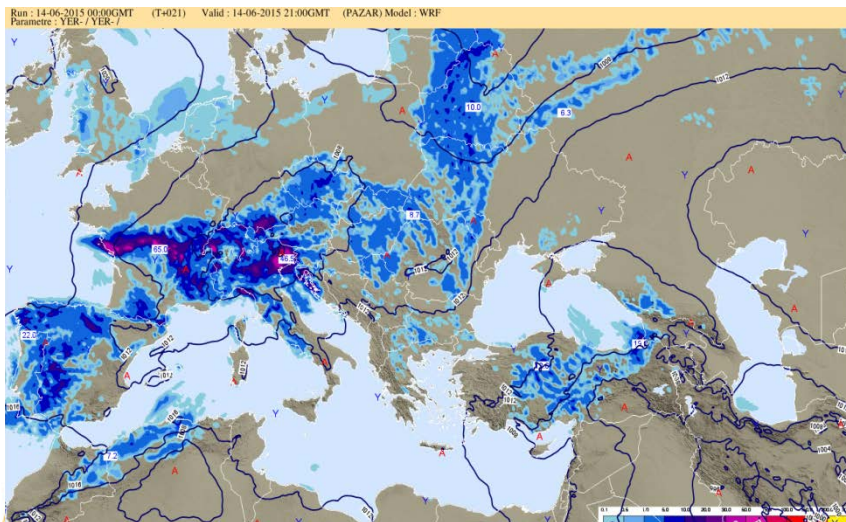
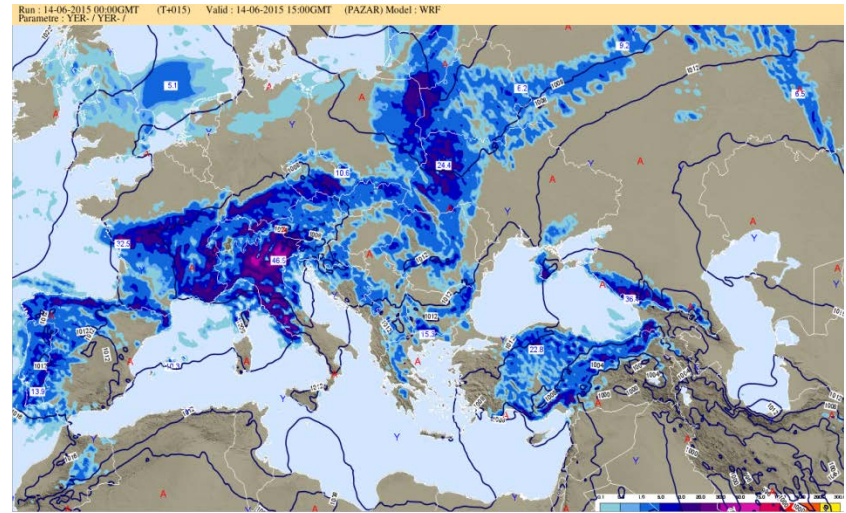
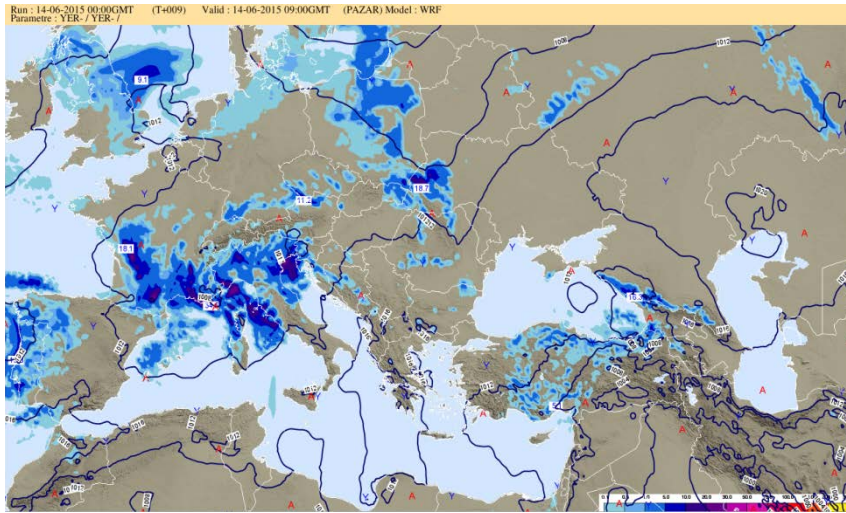
WRF Surface chart + 6-hr Precipitation 13 June 2015 Valid 09, 15, 21, 03/13 June UTC



ECMWF Surface chart + 6-hr Precipitation 14 June 2015 Valid 09, 15, 21, 03/15 June UTC



WRF Surface chart + 6-hr Precipitation 14 June 2015 Valid 09, 15, 21, 03/13 June UTC



Comparison of ECMWF and WRF Precipitation Forecasts

Date & Time 12.06.2015 03 Z +6 hr interval	ECMWF QPF (mm)	WRF QPF (mm)
09 UTC	10	20
15 UTC	20	30
21 UTC	5	10
03/13 UTC	5	5
09 UTC	10	10
15 UTC	10	40
21 UTC	10	10
03/14 UTC	5	5
09 UTC	5	10 (at the Turkish border)
15 UTC	10 (at the Turkish border)	30 (at the Turkish border)
21 UTC	10 (at the Turkish border)	10 (at the Turkish border)
03/15 UTC	-	5



Comparison of 24-hr QPF of ECMWF, WRF, and ALARO

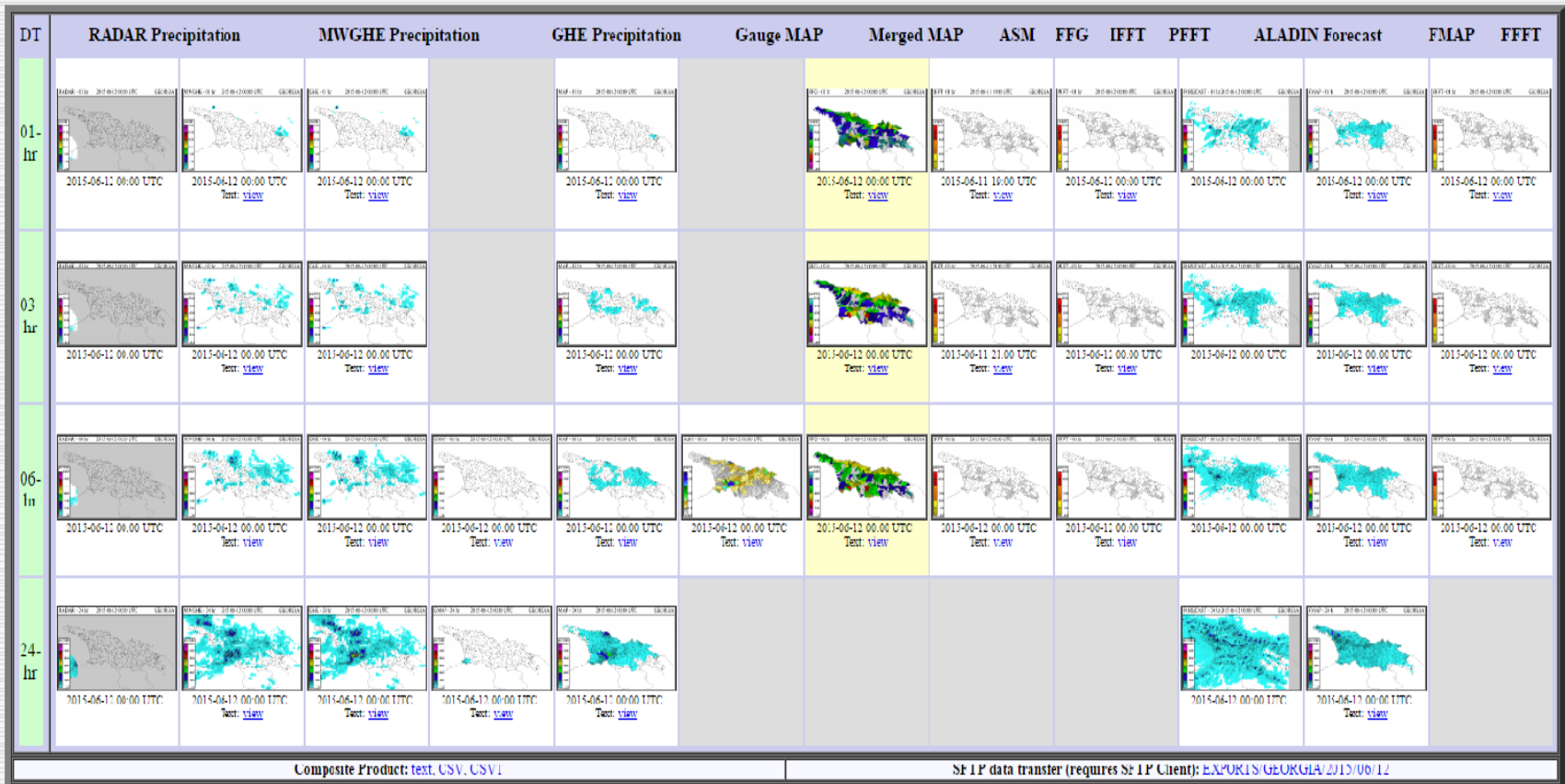
Date & Time	IFS QPF (mm)	WRF QPF (mm)	ALARO (mm)
11.06.2015 00			
12.06.2015 00 UTC	50	70	70
13.06.2015 00 UTC	30	70	50
14.06.2015 00 UTC	20	30	30



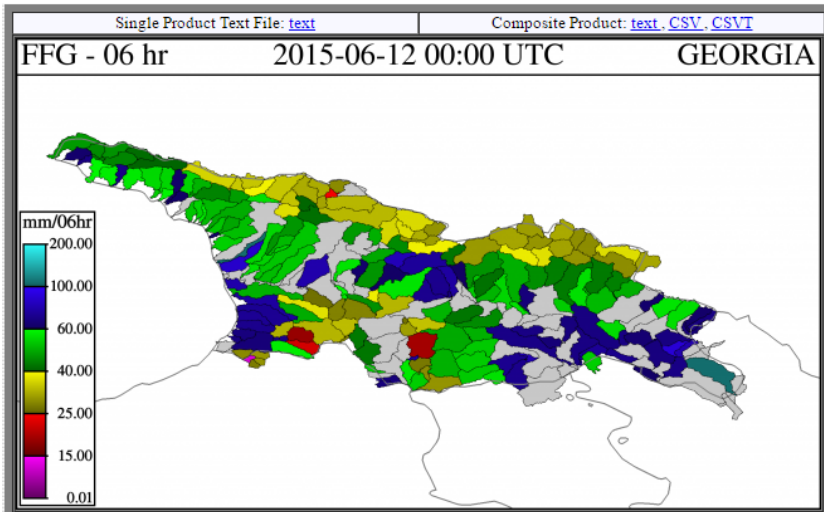
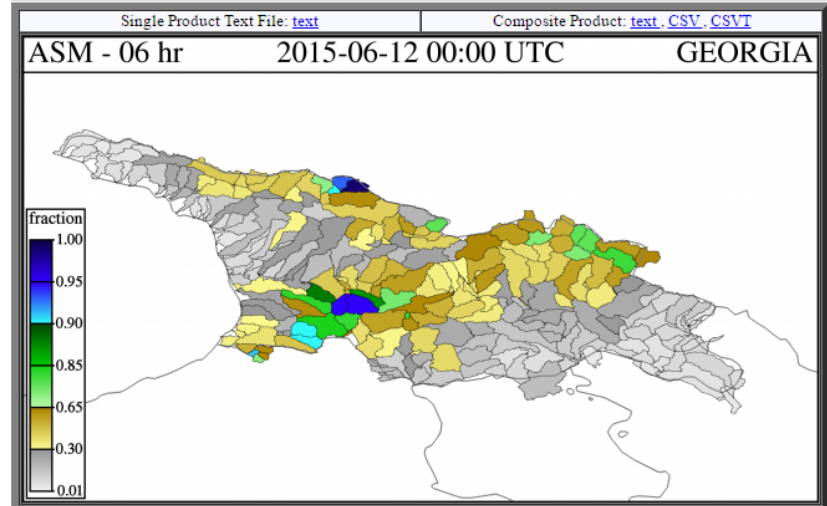
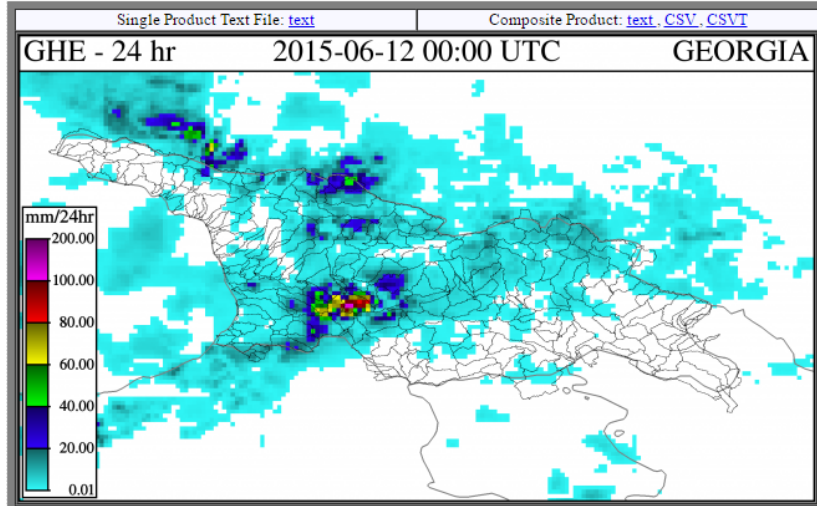
BSMEFFG Products 12062015 00 UTC

BSMEFFG - Black Sea Middle East Flash Flood Guidance System

Current Date: 2016-06-23 08:46 UTC Nav Date: 2015-06-12 00:00 UTC
 Year: 2016 Month: 06 Day: 12 Hour: 00 REGION: GEORGIA Submit
 -1 Month -1 Day -8 Hours -1 Hour +1 Hour +8 Hours +1 Day +1 Month
 Prev 6-hr Interval (18 UTC) Reset to Current Next 6-hr Interval (06 UTC)



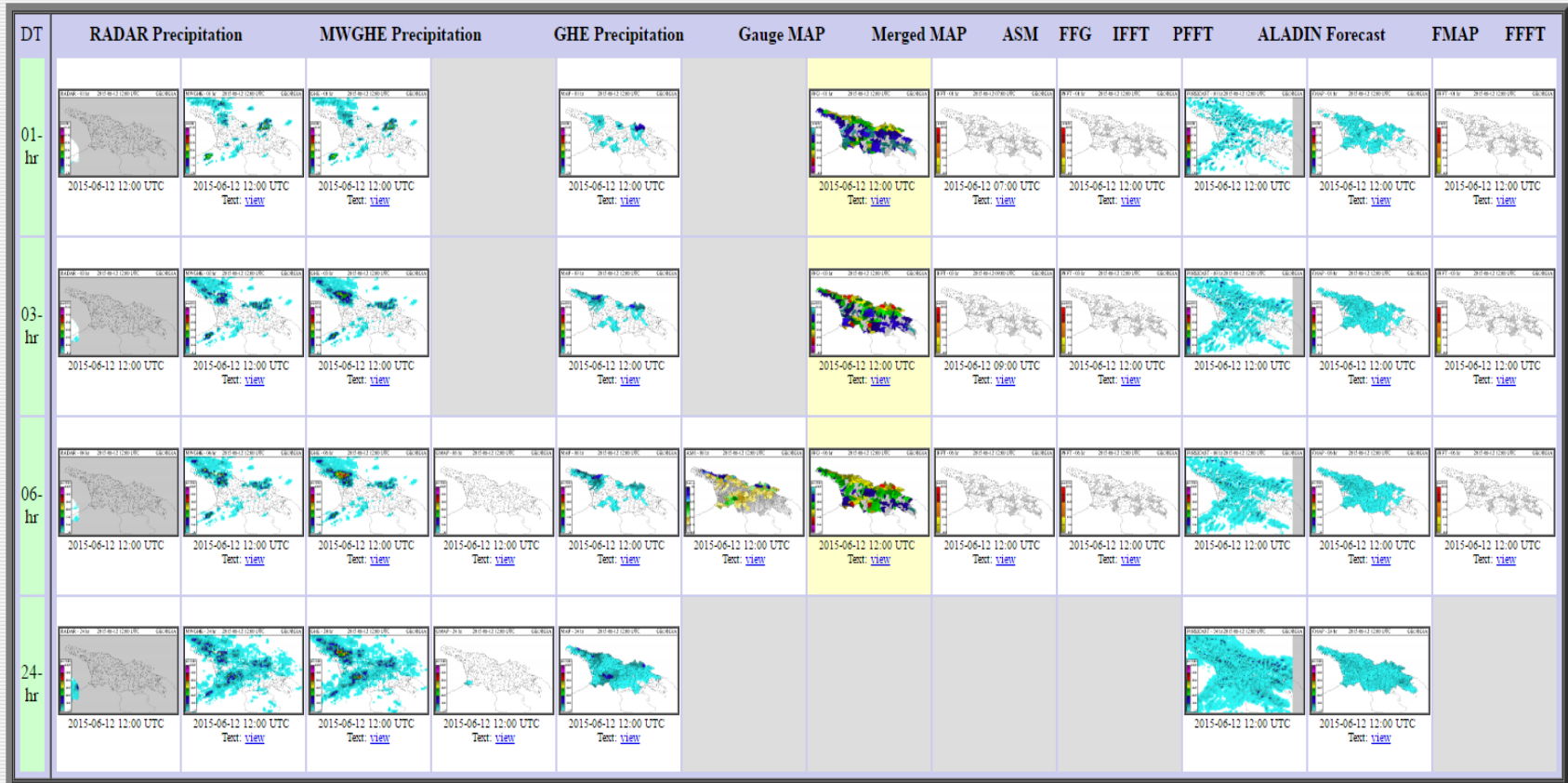
GHE, ASM, FFG



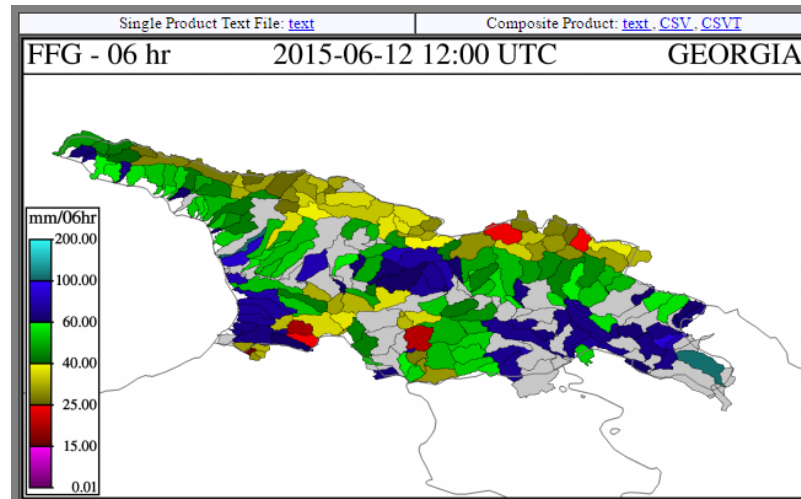
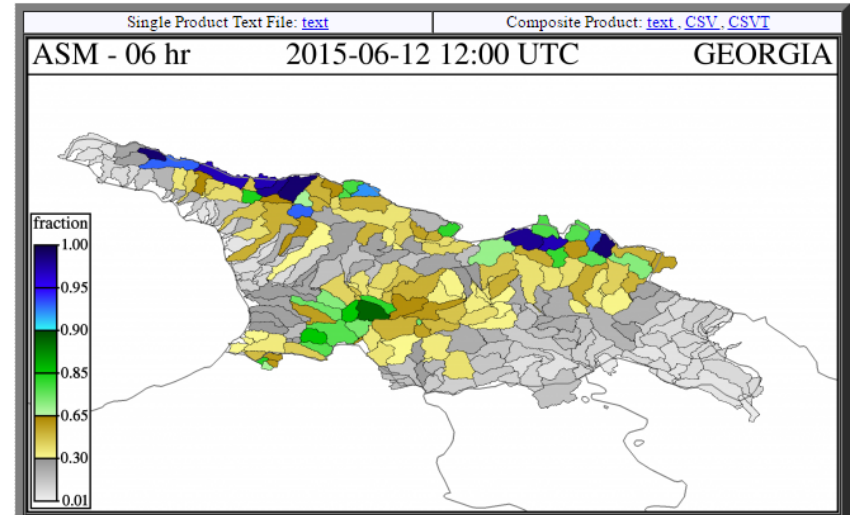
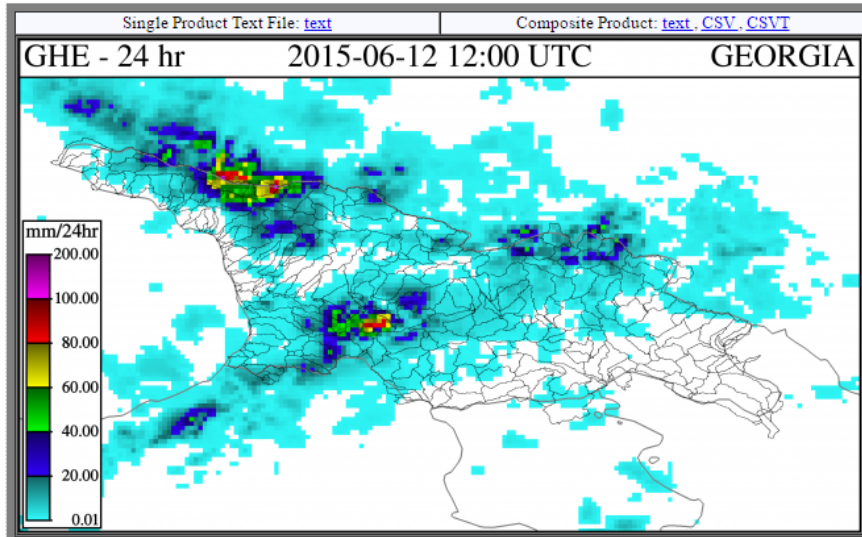
BSMEFFG Products 12062015 12 UTC

BSMEFFG - Black Sea Middle East Flash Flood Guidance System

Current Date: 2016-06-23 09:09 UTC Nav Date: 2015-06-12 12:00 UTC
 Year: 2015 Month: 06 Day: 12 Hour: 12 REGION: GEORGIA Submit
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 Prev 6-hr Interval (06 UTC) Reset to Current Next 6-hr Interval (18 UTC)



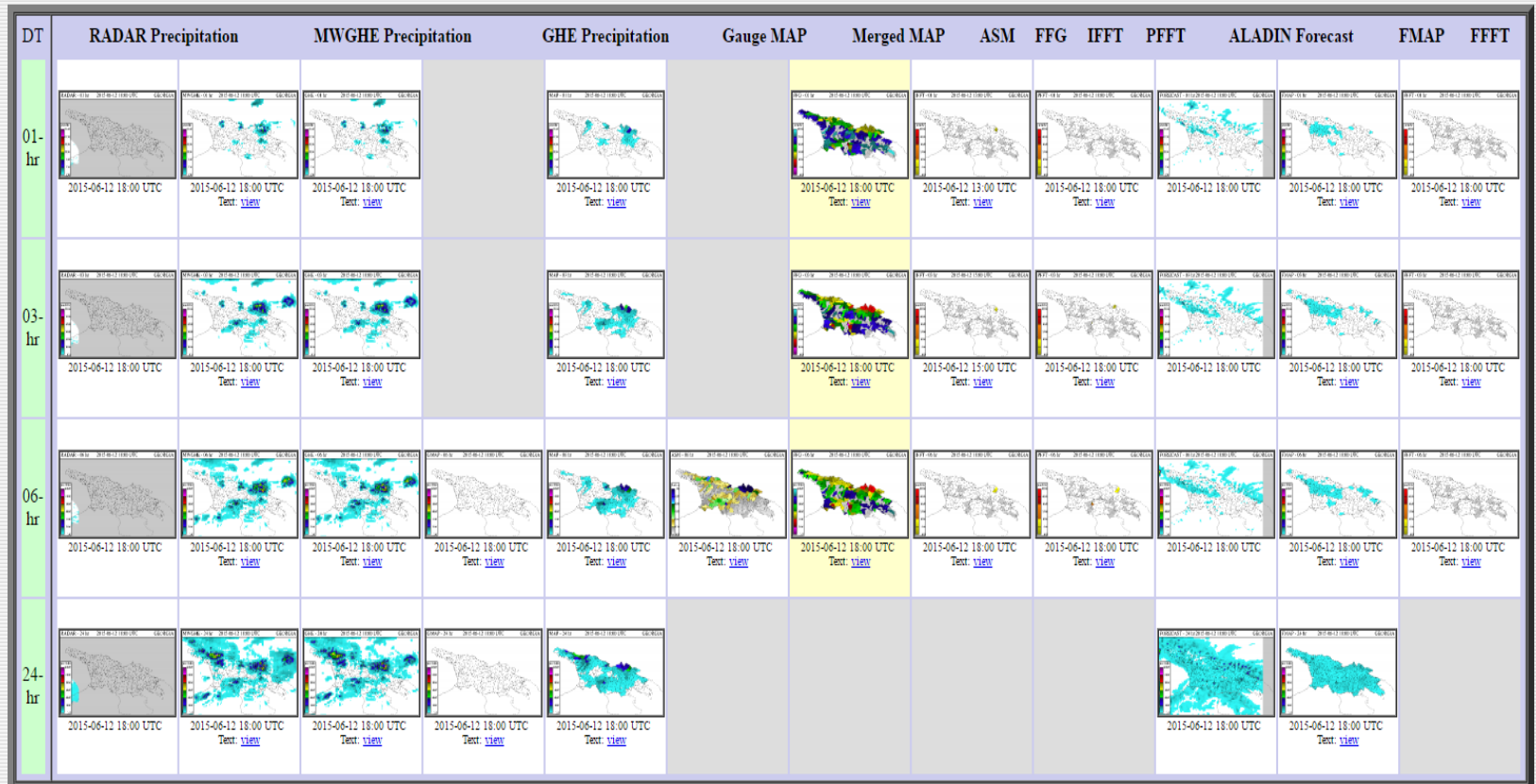
GHE, ASM, FFG



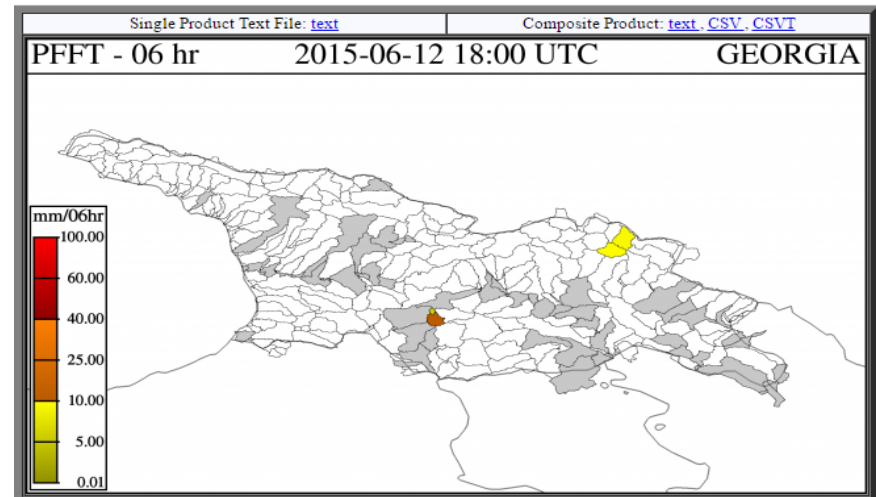
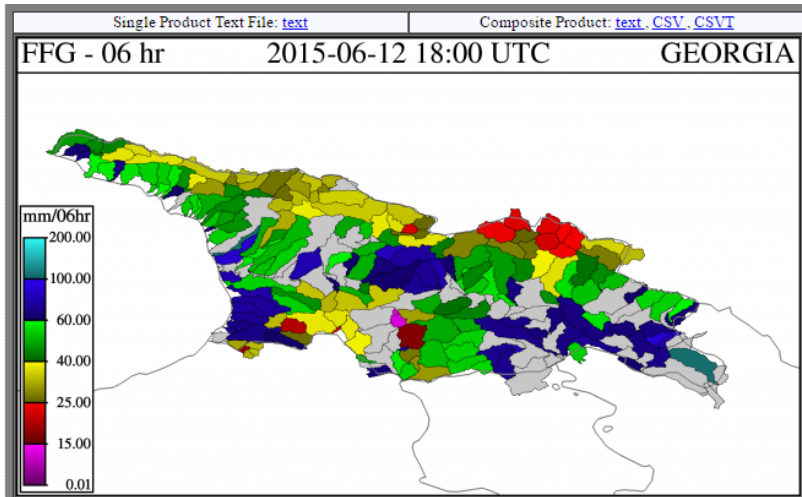
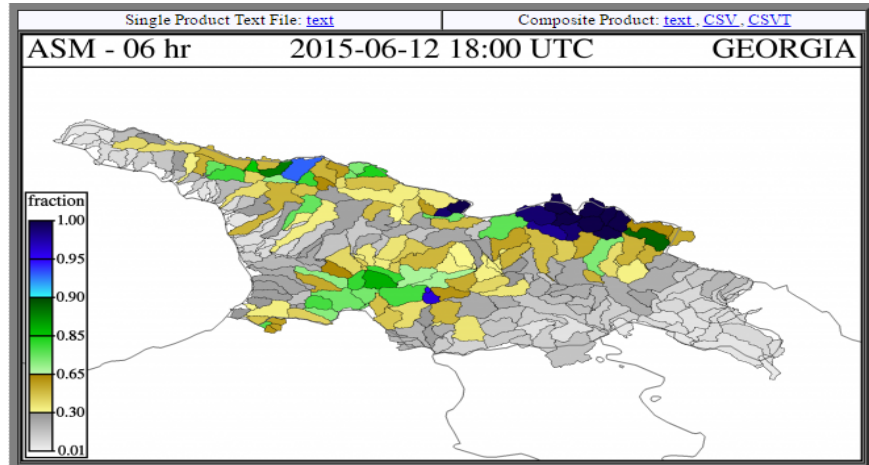
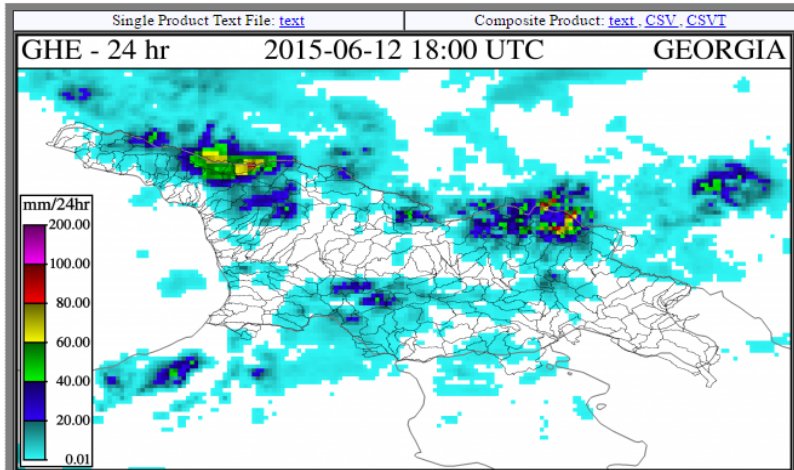
BSMEFFG Products 12062015 18 UTC

BSMEFFG - Black Sea Middle East Flash Flood Guidance System

Current Date: 2016-06-23 09:25 UTC Nav Date: 2015-06-12 18:00 UTC
 Year: 2015 Month: 06 Day: 12 Hour: 18 REGION: GEORGIA Submit
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 Prev 6-hr Interval (12 UTC) Reset to Current Next 6-hr Interval (00 UTC)



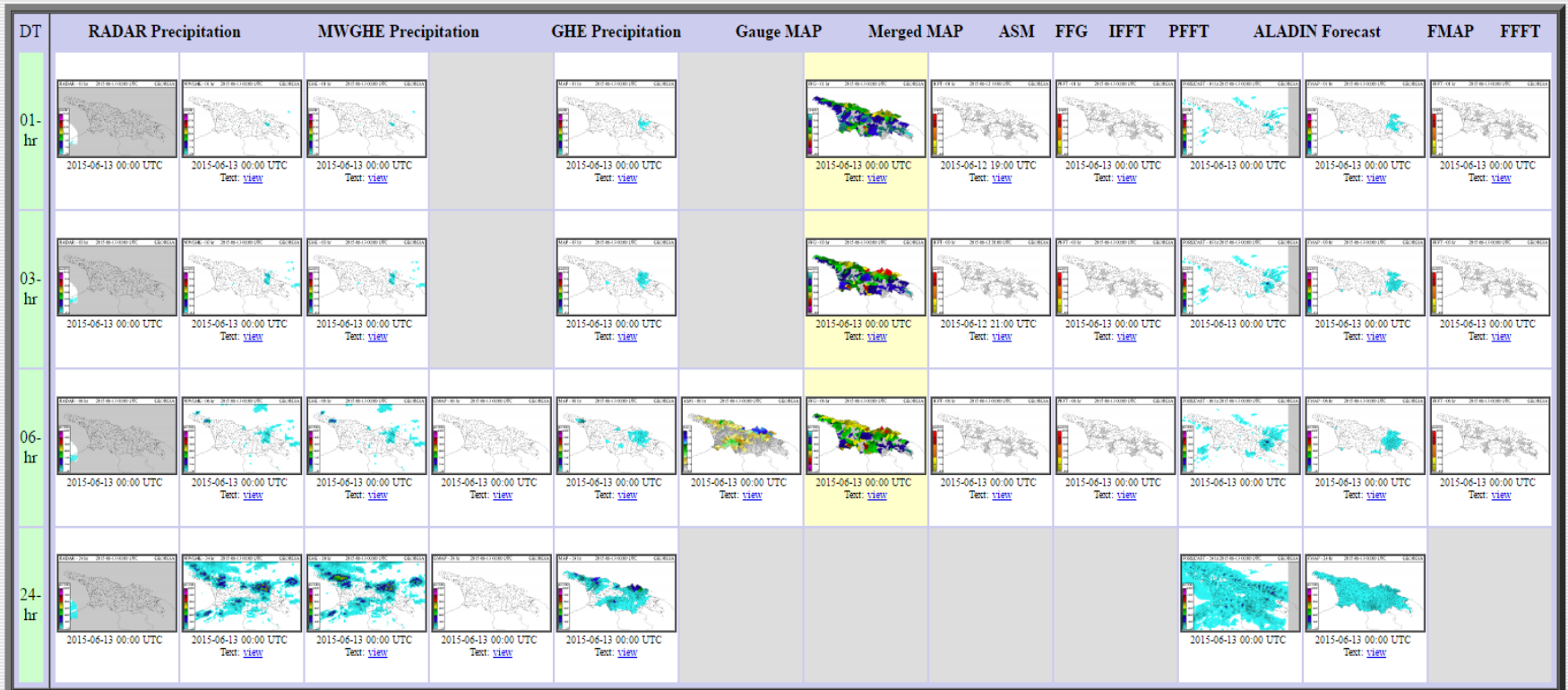
GHE, ASM, FFG, PFFT



BSMEFFG Products 13062015 00 UTC

BSMEFFG - Black Sea Middle East Flash Flood Guidance System

Current Date: 2016-06-23 13:19 UTC Nav Date: 2015-06-13 00:00 UTC
 Year: 2015 Month: 06 Day: 13 Hour: 00 REGION: GEORGIA Submit
 -1 Month -1 Day -6 Hours -1 Hour +1 Hour +6 Hours +1 Day +1 Month
 Prev 6-hr Interval (18 UTC) Reset to Current Next 6-hr Interval (06 UTC)



Tbilisi AWS Station Reports: What is next step?

37545: Tbilisi (Georgia)

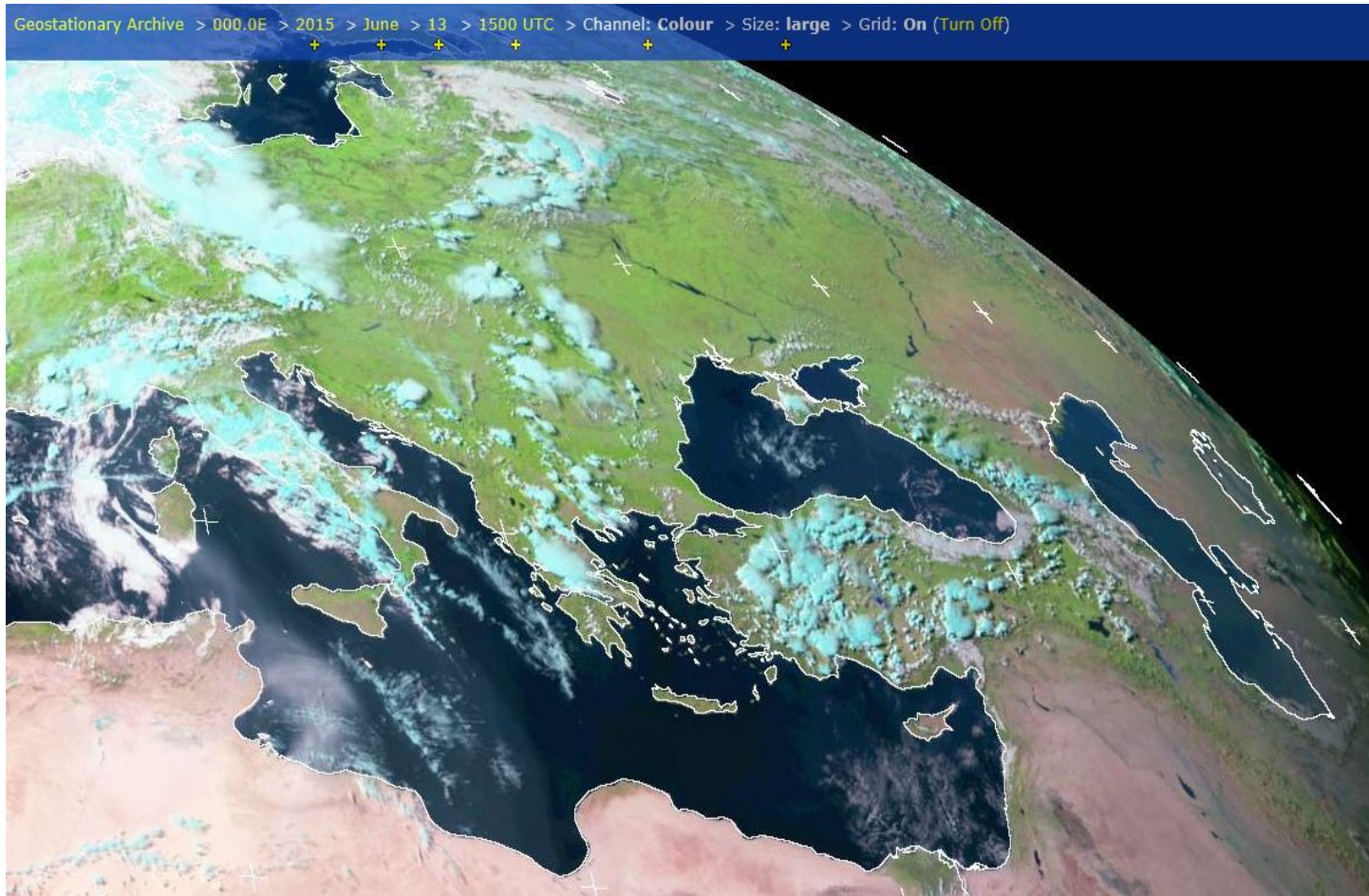
Latitude: 41-45-00N Longitude: 044-46-10E Altitude: 428 m.

Daily summary at 06:00 UTC. (08:59 mean solar time)
Time interval: 30 days before 2015/06/15

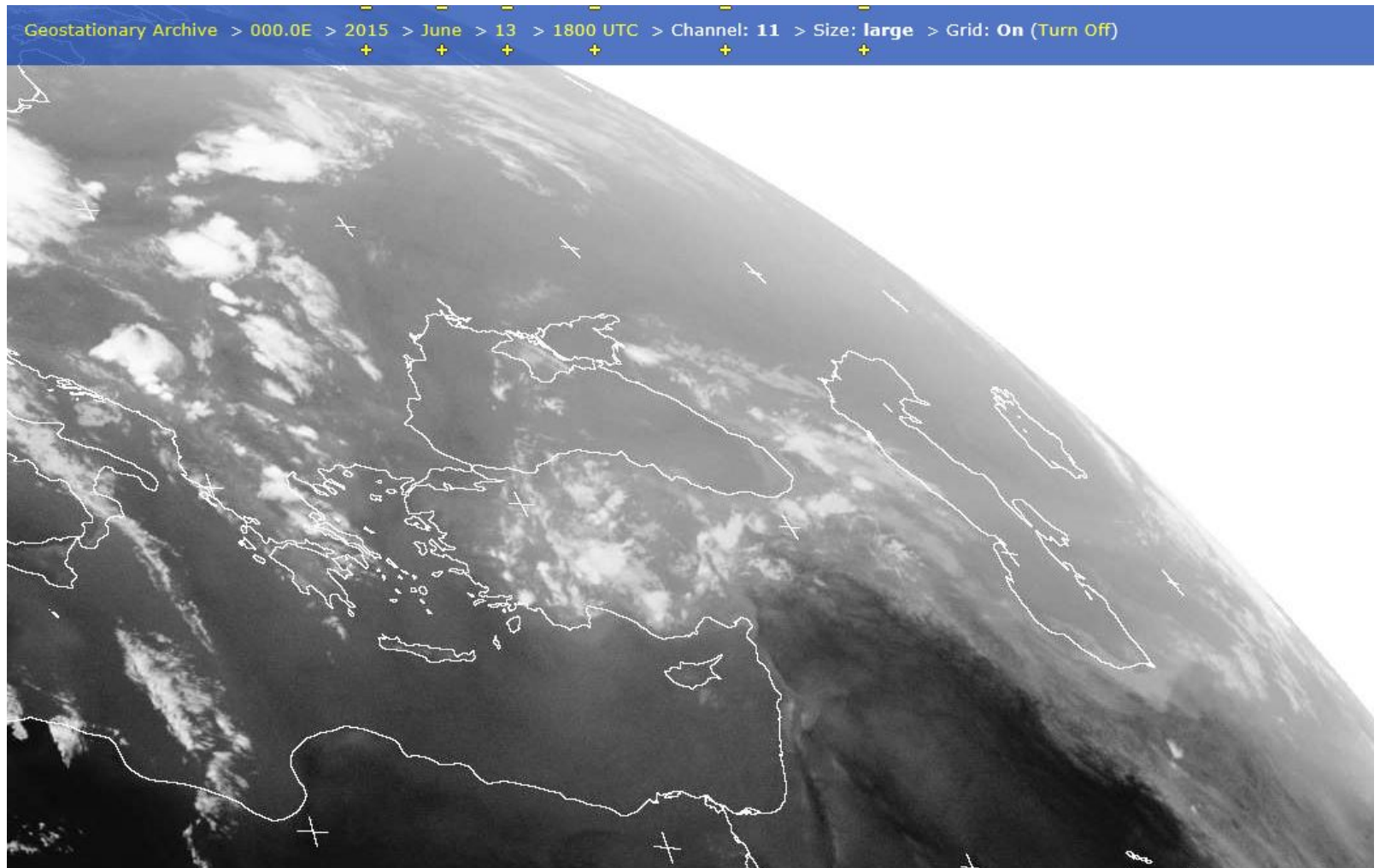
Date	Temperature (C)			Td Avg (C)	Hr. Avg (%)	Wind (km/h)			Pres. s.leve (Hp)	Prec. (mm)	Tot Cl Oct	low Cl Oct	Vis Km	Daily weather summary
	Max	Min	Avg			Dir.	Int.	Gust						
06/15	27.4	15.5	21.3	12.9	61.4	SSE	7.2	----	1013.4	0.0	4.2	3.2	50.0	
06/14	28.5	16.4	22.1	16.8	73.3	SE	22.1	----	1014.8	0.0	6.7	6.6	50.0	
06/13	30.2	17.9	23.1	16.5	66.5	N	21.2	32.4	1012.3	----	4.0	1.8	50.0	
06/12	30.8	18.5	23.5	16.7	68.2	N	15.3	14.4	1008.6	0.0	5.5	3.6	50.0	
06/11	31.4	17.3	22.4	16.1	69.9	NNW	13.5	----	1009.0	----	5.9	4.8	40.4	
06/10	27.8	16.2	22.2	14.8	63.9	SE	15.3	10.8	1012.7	0.0	3.2	3.2	50.0	
06/09	23.1	17.4	20.0	14.3	70.1	SE	9.9	21.6	1020.8	0.0	5.0	3.4	40.0	
06/08	30.1	16.9	23.0	16.0	67.3	NNE	14.0	14.4	1019.7	16.8	5.8	3.0	50.0	
06/07	29.4	15.7	23.1	16.9	69.4	NNW	14.9	18.0	1013.4	3.0	6.0	3.5	50.0	
06/06	31.2	17.8	22.3	16.2	69.9	NNW	20.7	----	1012.9	4.0	6.6	5.5	50.0	
06/05	30.6	17.8	24.2	18.4	70.4	NNW	14.4	18.0	1011.0	0.0	1.8	1.5	50.0	
06/04	27.8	17.7	22.2	18.3	80.1	NNW	14.4	14.4	1013.3	53.0	7.1	6.2	50.0	
06/03	29.0	18.9	22.7	18.5	78.5	S	7.7	----	1017.1	----	6.1	6.1	50.0	
06/02	31.6	14.4	23.2	17.8	74.7	E	22.1	25.2	1016.7	25.0	6.2	3.6	50.0	
06/01	28.6	16.6	21.8	15.8	70.5	N	31.1	36.0	1014.6	0.0	1.0	1.0	50.0	
05/31	31.8	17.6	24.5	18.0	69.2	NE	14.9	25.2	1008.8	0.0	2.5	1.2	50.0	
05/30	30.4	18.1	22.7	17.4	73.9	NNW	16.7	----	1005.9	0.0	4.0	2.9	50.0	
05/29	29.1	15.1	21.2	16.2	75.8	NW	17.1	18.0	1005.2	1.2	4.8	2.7	50.0	
05/28	30.1	14.3	21.6	16.1	74.3	WNW	14.0	18.0	1007.7	----	4.2	1.9	50.0	
05/27	29.5	14.3	20.5	16.0	77.8	NNW	23.4	21.6	1009.8	2.0	3.8	3.2	50.0	
05/26	27.5	16.1	21.5	16.4	75.9	E	14.4	----	1009.5	0.0	6.0	5.4	50.0	
05/25	24.2	14.4	18.9	12.4	66.8	E	11.3	18.0	1014.4	0.0	6.8	3.1	50.0	
05/24	22.2	13.5	17.7	12.6	76.3	NE	11.3	14.4	1016.9	1.2	7.3	4.4	50.0	
05/23	25.2	17.6	21.3	14.4	65.9	SSE	23.4	14.4	1016.1	0.0	7.4	5.0	50.0	
05/22	25.5	16.5	20.5	17.4	84.1	SE	15.8	----	1015.4	0.0	6.4	5.4	50.0	
05/21	26.2	13.7	19.7	16.4	83.0	SE	16.7	14.4	1016.9	0.0	3.4	2.7	50.0	
05/20	28.9	12.1	20.0	12.6	65.1	N	12.6	14.4	1014.8	0.0	1.2	0.8	50.0	



Satellite Image: 13062015 15:00 UTC

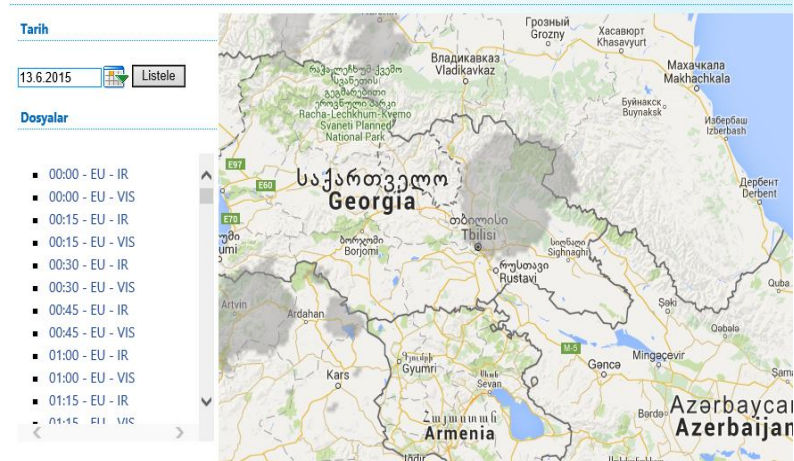


Satellite Images: 13062015 18:00 UTC

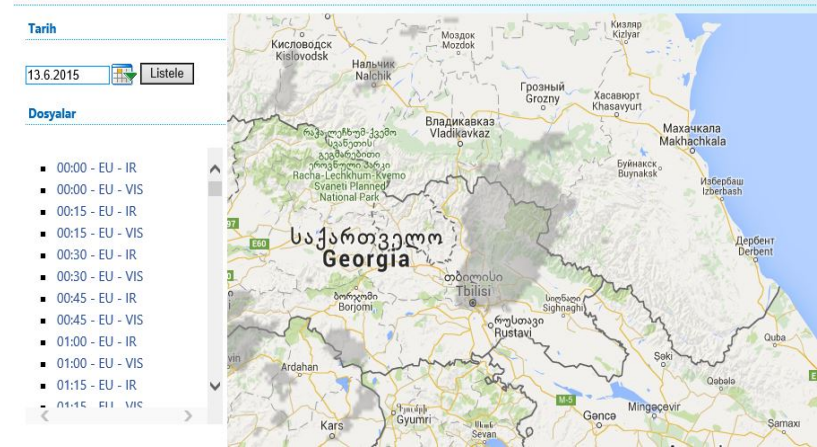


Satellite Images: 13062016

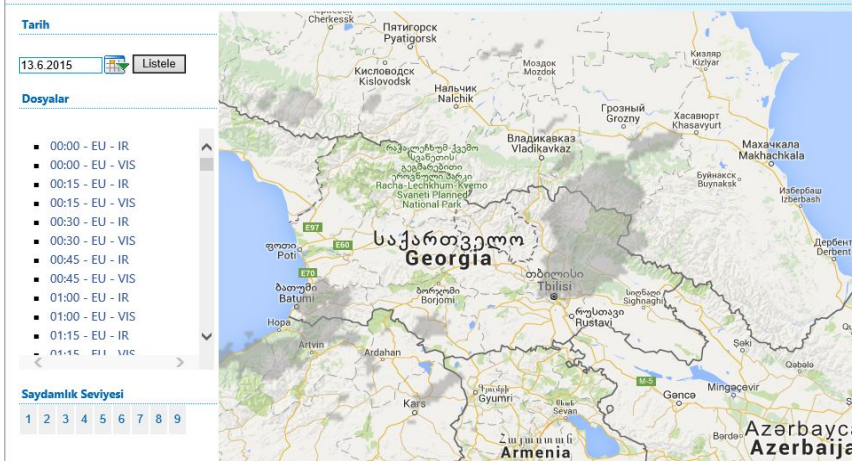
Uydu Arşiv Görüntüleri | 2015-06-13-19:30 - EU - IR



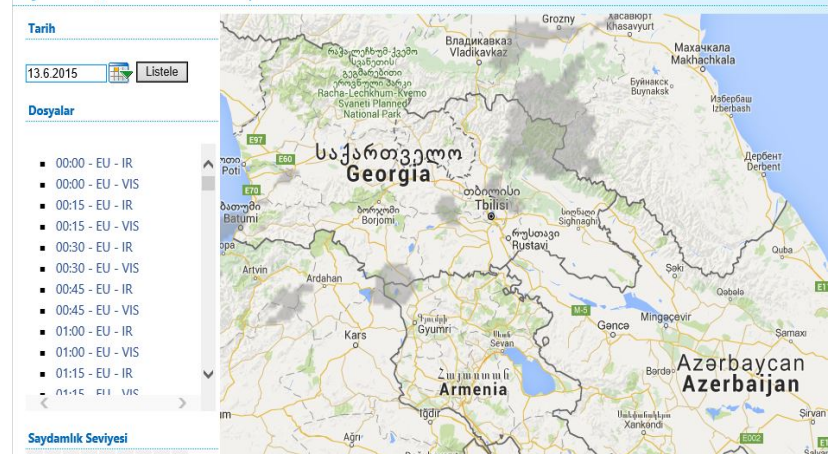
Uydu Arşiv Görüntüleri | 2015-06-13-20:30 - EU - IR



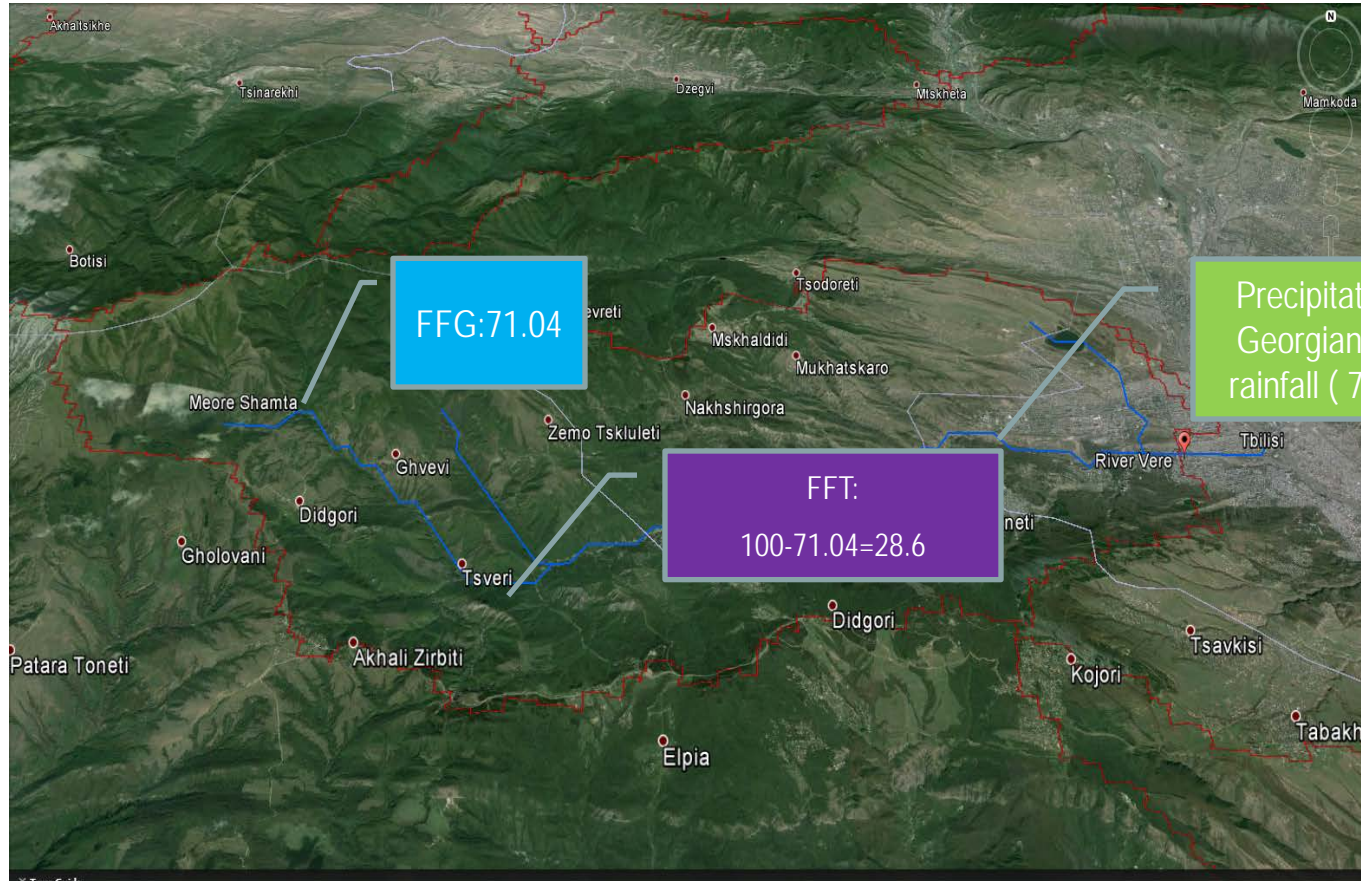
Uydu Arşiv Görüntüleri | 2015-06-13-21:00 - EU - IR



Uydu Arşiv Görüntüleri | 2015-06-13-22:30 - EU - IR



6-hr FFG/estimated 6-hr FFT: 13062015 18 UTC



Flash Flood Warning Issuance and Dissemination

Flash Flood Warnings	
Issued:	13.06. 2015 at 18 UTC
Valid	00 UTC 14.06.2015
Warning	Flash floods are expected for regions and towns and villages due to heavy rainfall associated convection

WMO Common Alert Protocol (CAP) is recommended to be implemented to disseminate warnings.



Vere River Flooding





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Thank you for your attention

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