

## World Meteorological Organization

Weather • Climate • Water

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



Weather 

· Climate 
· Water

WMO; CLW/HFWR

## **Flash Flood Warning Flow Chart**



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## **Vere River Flooding, Georgia**





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#### Surface Chart 13 June 2015 12 UTC





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#### ECMWF 500 hPa 12 June 2015 00 and 12 UTC





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#### ECMWF 850 hPa Charts 12 June 2015 00 and 12 UTC





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



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#### ECMWF Jet 12 June 2015 00 and 12 UTC





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#### ECMWF 850 hPa and 700 hPa Vertical Motions 12 June 2015 at 00 and 12 UTC









(CUMA) Model : IFS

Valid: 12-06-2015 12:00GMT



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

Run : 12-06-2015 00:00GMT (T+009) Valid : 12-06-2015 09:00GMT (CUMA) Model : V Parameter : YER, / YER, /



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#### ECMWF 500 hPa 13 June 2015 00 and 12 UTC

Run : 13-06-2015 00:00GMT (T+000) Valid : 13-06-2015 00:00GMT (CUMARTESI) Model : IFS Parametre : 500mb-Sicaklik / 500mb-Geopotansivel Yukseklik /



![](_page_10_Picture_3.jpeg)

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#### ECMWF 850 hPa Charts 13 June 2015 00 and 12 UTC

![](_page_11_Figure_1.jpeg)

![](_page_11_Picture_2.jpeg)

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

![](_page_12_Picture_1.jpeg)

![](_page_12_Picture_2.jpeg)

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#### ECMWF Jet 13 June 2015 00 and 12 UTC

![](_page_13_Picture_1.jpeg)

![](_page_13_Picture_2.jpeg)

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#### ECMWF CAPE and Vertical Motion 13 June 2015 00 and 12 UTC

Run: 13-06-2015/00:00GMT (T+003) Valid: 13-06-2015/03:00GMT (CUMARTESI) Model: IFS

![](_page_14_Picture_2.jpeg)

Run: 13-06-2015 00:00GMT (T+0)2) Valid: 13-06-2015 12:00GMT (CUMARTESI) Model: IFS

![](_page_14_Picture_4.jpeg)

Run : 13-06-2015 00:00GMT (T+012) Valid : 13-06-2015 12:00GMT (CUMARTESI) Model :

![](_page_14_Picture_6.jpeg)

![](_page_14_Picture_7.jpeg)

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

![](_page_15_Picture_1.jpeg)

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

![](_page_16_Figure_1.jpeg)

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

![](_page_17_Figure_1.jpeg)

![](_page_17_Picture_3.jpeg)

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## 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

![](_page_18_Picture_2.jpeg)

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

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

![](_page_19_Picture_2.jpeg)

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#### **BSMEFFG Products 12062015 00 UTC**

![](_page_20_Figure_1.jpeg)

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## **GHE, ASM, FFG**

![](_page_21_Figure_1.jpeg)

![](_page_21_Figure_2.jpeg)

![](_page_21_Figure_3.jpeg)

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### **BSMEFFG Products 12062015 12 UTC**

![](_page_22_Figure_1.jpeg)

![](_page_22_Picture_2.jpeg)

BSMEFFG First Steering committee Meeting (Step 4 Training), Tbilisi, Georgia, 28-30 June 2016 23 Weather • Climate • Water

## **GHE, ASM, FFG**

![](_page_23_Figure_1.jpeg)

![](_page_23_Figure_2.jpeg)

![](_page_23_Picture_3.jpeg)

BSMEFFG First Steering committee Meeting (Step 4 Training), Tbilisi, Georgia, 28-30 June 2016 24 Weather • Climate • Water

## **BSMEFFG Products 12062015 18 UTC**

![](_page_24_Figure_1.jpeg)

![](_page_24_Picture_2.jpeg)

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## GHE, ASM, FFG, PFFT

![](_page_25_Figure_1.jpeg)

![](_page_25_Figure_2.jpeg)

![](_page_25_Figure_3.jpeg)

![](_page_25_Picture_4.jpeg)

BSMEFFG First Steering committee Meeting (Step 4 Training), Tbilisi, Georgia, 28-30 June 2016 26 Weather • Climate • Water

## **BSMEFFG Products 13062015 00 UTC**

![](_page_26_Figure_1.jpeg)

![](_page_26_Picture_2.jpeg)

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#### **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)

	Tomporative T4 Un Wind Date T4 In																				
Date	- Cill	(C)			Ava	(km/h)		s lev	Prec.	CL	CL	Vis	Daily								
Dute	Max	Min	Ava	(C)	(%)	Dir	Int	Gust	(Hp)	(mm) Oct		Oct Oct		weather summary							
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	× .	<b>*</b> *	*	<b>65</b>	8	6		
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	കക	<u>کا 😵</u>	R	63	0	6		
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	× 📖	<b>(1) (1)</b>	*	1	1			
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	<b>9</b> , 9,	<u>کا 🕺</u>		63	0	6		
06/11	31.4	17.3	22.4	16.1	69.9	NNW	13.5		1009.0		5.9	4.8	40.4	കക	2	*	ų	3	6		
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	<b>4</b> . <b>4</b> .	<b>(1) (</b>	*	<	*			
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	× @	(iii) #10	X	63	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	× @	an Is	133	60	60			
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	کا	<b>68</b> 🔨	R	**	*			
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	60	R	<b>65</b>	Ľ	8	6		
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	<b>63 🔆</b>	* 🔨	*	¢	*			
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	88	کا 🕮	R	×	R	*		
06/03	29.0	18.9	22.7	18.5	78.5	S	7.7		1017.1		6.1	6.1	50.0	8	<b>777</b> 🛤	C	<i>65</i> 0	63	6		
06/02	31.6	14.4	23.2	17.8	74.7	Е	22.1	25.2	1016.7	25.0	6.2	3.6	50.0	7.00	88 K	R	<i>6</i> 54	3			
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	🐺 🔆	<u>Ж</u> €	C	€	*			
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	⊠ 👯	* 2	Ľ	Ľ	<b>9</b>			
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	<b>7</b>	<b>88</b> ~	<b>64</b>	Ľ	8	4		
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	🕺 🔐	<u> (18</u>	<b>#</b>	€	*			
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	🌠 🃖	<u>())</u> #10	X	•	*			
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	👯 📖	<b>88</b>	•	€	*			
05/26	27.5	16.1	21.5	16.4	75.9	Е	14.4		1009.5	0.0	6.0	5.4	50.0	6262	<b>8</b> 7	Ľ	¢	8	63		
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	ک	<b>60 40</b>	<i>6</i> 50	Ľ	*			
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	<b>6</b>	(iii) #1	<b>#50</b>	<i>6</i> 50	8			
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	🎋 🕮	(iii) <b>6</b> 84		65k	60	63		
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	8	<b>88</b> ~	Ľ	<b>#</b>	8	0		
05/21	26.2	13.7	19.7	16.4	83.0	SE	16.7	14.4	1016.9	0.0	3.4		50.0	XX	👫 🤇	•	Ľ	<b>*</b>			
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	<b>9</b> 7 - <b>9</b> 7	🔀 🤇	•	C	*			

![](_page_27_Picture_5.jpeg)

## Satellite Image: 13062015 15:00 UTC

![](_page_28_Picture_1.jpeg)

![](_page_28_Picture_2.jpeg)

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## Satellite Images: 13062015 18:00 UTC

![](_page_29_Picture_1.jpeg)

![](_page_29_Picture_2.jpeg)

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## Satellite Images: 13062016

![](_page_30_Figure_1.jpeg)

![](_page_30_Picture_2.jpeg)

Tarih Кисповолск Нальчи Nalchil Listele 13.6.2015 Грозный Grozny Khasavvurt Dosyala Владикавказ Vladikavkaz Махачкала Makhachkala • 00:00 - EU - IR Буйнакск Buynaksk • 00:00 - EU - VIS • 00:15 - EU - IR საქართველო Georgia 00:15 - EU - VIS 00:30 - EU - IR 00:30 - EU - VIS 00:45 - EU - IR 00:45 - EU - VIS 01:00 - EU - IR 01:00 - EU - VIS • 01:15 - EU - IR 01.15 FU V/IC Mingeçev Ganca

![](_page_30_Figure_4.jpeg)

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

![](_page_31_Picture_0.jpeg)

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

![](_page_31_Picture_2.jpeg)

![](_page_31_Picture_3.jpeg)

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## 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.

![](_page_32_Picture_4.jpeg)

## **Vere River Flooding**

![](_page_33_Picture_1.jpeg)

![](_page_33_Picture_2.jpeg)

![](_page_33_Picture_3.jpeg)

BSMEFFG First Steering committee Meeting (Step 4 Training), Tbilisi, Georgia, 28-30 June 2016

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![](_page_34_Picture_0.jpeg)

Meteorological Organization

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# Thank you for your attention

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