

CEDIM Forensic Disaster Analysis Group (FDA)
Extreme Rain Event – Short Summary

23 November 2015 – Report No. 1 – 13:00 GMT

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SUMMARY

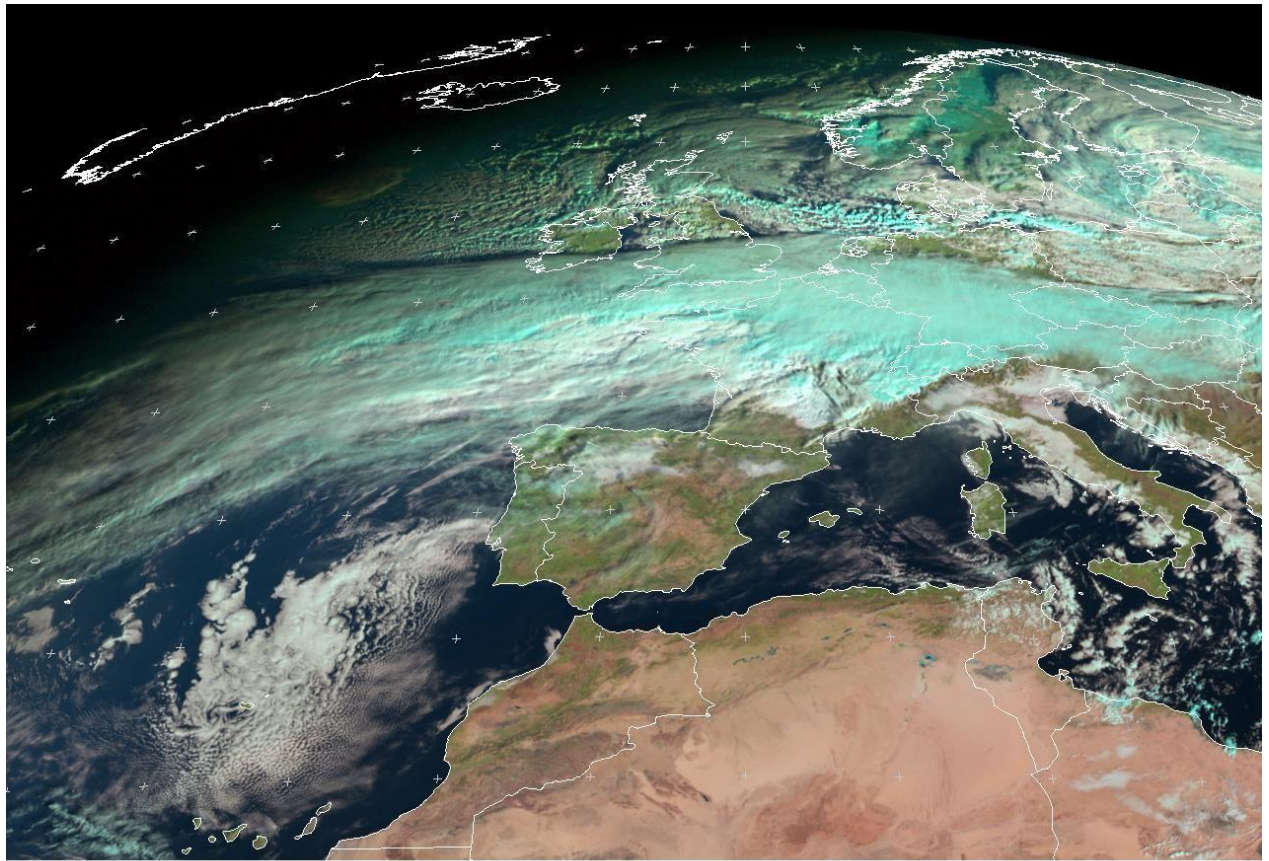
Low pressure system names	Date	Begin UTC	Local	Duration
Iwan, Kunibert, Jürgen	19/20/21-11	11 UTC	+1	~40 hours

Preferred Hazard Information:

Location	Region	Federal State	RR max 24h	RR max 48h	RR max 72h	Max wind gust
St.-Blasien-Menzenschwand (DE)	Black Forest	Baden-Württemberg	132.2 mm	185.7 mm	200.1 mm	
Grand St.-Bernard (CH)	The Alps	Wallis	108.9 mm	160.5 mm	160.5 mm	
Zugspitze (DE)	The Alps	Bavaria				158 kph
Feldberg (DE)	Black Forest	Baden-Württemberg				158 kph
Säntis (CH)	The Alps	Außerrhoden, Innerrhoden, St.Gallen				152 kph

Location Information:

Country	ISO	Provinces/Regions	Highest Impact	Economic Exposure	Urbanity	Pop. affected
Germany	DE	Rhineland-Palatinate, Hesse, Baden-Württemberg, Bavaria	Baden-Württemberg (Black Forest), Bavaria	Not applicable		
Switzerland	CH	All cantons except Graubünden and Tessin	Swiss Jura Mountains, Northern and Central Alps	Not applicable		



MET10 RGB-3-2-1 2015-11-20 09:00 UTC

EUMETSAT

Satellite image, 20 Nov 2015, 09 UTC.

Image source: EUMETSAT

http://oiswww.eumetsat.org/IPPS/html/latestImages/EUMETSAT_MSG_RGB-naturalcolor-westernEurope.jpg

Preferred Hazard Information Description:

November before 19th

- Extreme high temperatures across central Europe, temperature deviation between 1 and 20 November was > 6 K throughout Germany, with > 10 K in places.
- There was little or no rain in southern Germany, especially in Baden-Württemberg and Bavaria.
- Drought that began in February 2015 continued in southern parts of Germany. Some locations got as little as 60% of usual rain amount in 2015 until mid of November (e.g. Stuttgart)

On 19 November

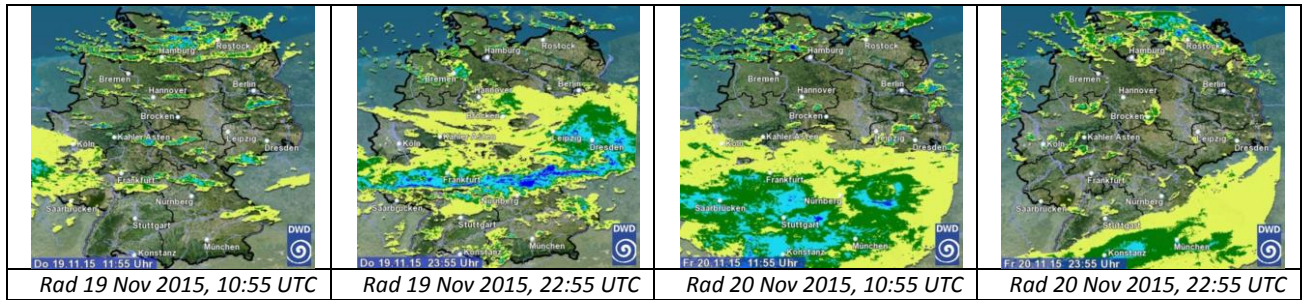
- The intense low pressure system “Iwan” moved with its center from southwestern Norway to the Baltic states within 24 hours. From “Iwan” a frontal system stretched along central Germany, France all the way to the central North Atlantic Ocean. The frontal system was embedded in the planetary frontal zone with strong gradients of temperature and pressure.
- The frontal system separated cold and dry airmasses from subtropical moist and warm airmasses to the south, central and southern parts of Germany were influenced by moist and warm airmasses. With strong surface winds from westerly to southwesterly directions an effective moisture transport has been established.
- Upper level short wave troughs provided some extra lifting and gave rise to small surface lows along the frontal system which moved rapidly from west to east. Then onset of the rain event in Germany was around 11 UTC when an extensive cloud and rain area arrived from Belgium (see radar image).
- Remarkable rain amounts fell in Saarland, Rhineland-Palatinate, northern Baden-Württemberg and northern Bavaria. Intensive rain occurred widespread, amounts were between 20 and 60 mm within 24 hours (e.g. Neuhütten/Spessart, Bavaria, 60 mm).

On 20 November

- In the course of the day another small low pressure system, “Kunibert”, arrived from the west and crossed Germany. Intensity of rainfall increased and the rain area covered the southern parts of Germany, too.
- 24 hours rain amounts locally exceeded 100 mm in the Black Forest. Most of Baden-Württemberg and the southern half of Bavaria received at least 40 mm of rain.
- Early in the day, wind speeds were between 60 and 90 kph at most places in southern Germany.

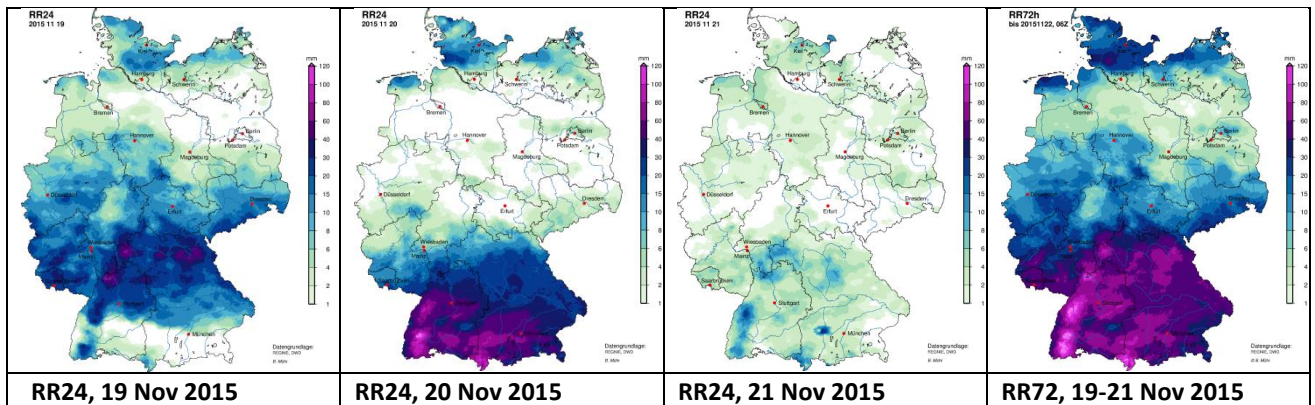
On 21 November

- During the night 20/21 November and on 21 November the frontal system finally crossed the Alps. In conjunction with the low pressure system “Jürgen”, that was located with its center over Denmark, cold and drier air could penetrate from the north and made its way across entire Germany. It replaced the subtropical airmasses and started a wintry episode.
- During the night 20/21 November and on 21 November the frontal system finally crossed the Alps. In conjunction with the low pressure system “Jürgen”, that was located with its center over Denmark, cold and drier air could penetrate from the north and made its way across entire Germany. It replaced the subtropical airmasses and started a wintry episode.
- Approaching cold air and strong pressure gradients ahead of the Alps caused strong wind gusts in the very southern parts of Germany and in Switzerland. During gusts, wind speeds frequently exceeded 100 kph, on top of the mountains even more than 150 kph (e.g. Feldberg, Zugspitze).
- During the night at higher elevations rain turned into snow, and precipitation finally ceased.
- Rain and snow amounts were between 15 and 30 mm in the Black Forest.



Radar images, 12 hourly timestep, 19 Nov 2015, 10:55 UTC – 20 Nov 2015, 22:55 UTC.

Images Source: DWD



24 hours rain amount from 19 November 2015, 06 UTC, until 22 November 2015, 06 UTC (left three maps). 72 hours accumulated rain amount (right map).

Data Set: REGNIE, DWD. Maps by wettergefahren-fruehwarnung.de

Impacts on water levels

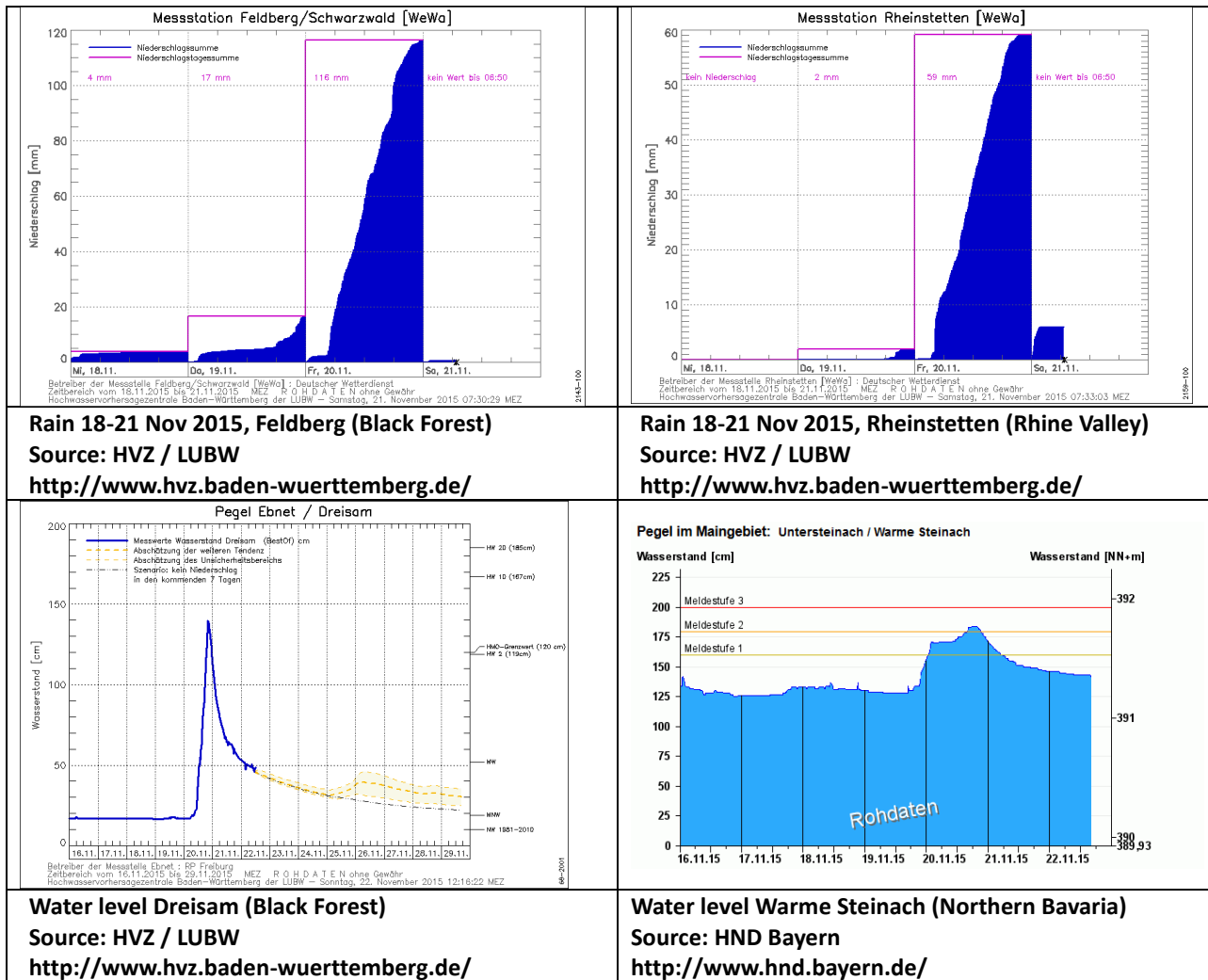
The extraordinary high rain amounts had only minor impacts:

- Before the rain event nearly all rivers in Bavaria, Baden-Württemberg and Switzerland were at low water.
- During the rain event some rivers were in flood, but flood was not dangerous, as the recurrence interval of nearly all gauges remained below 2 years.
- Wind caused only minor damage.

Classification of rain amounts

- 150-200 mm within 36-48 hours are extraordinary.
- On Feldberg, only 5 days since records began in 1941 were wetter than 20 November 2015, considering the 24 period (00 to 00 UTC), the Feldberg rain amount was a new record.
- In Rheinstetten 51.6 mm on 20 November 2015 was a new record in comparison with time series of Karlsruhe since 1876.
- At Simonswald-Obersimonswald 115 mm within 24 hours was a new daily record.

Rain amount/intensity and water levels of rivers in southern Germany



Rain event could have had serious consequences

- The extraordinary high rain amounts had only minor impacts:
- Before the rain event nearly all rivers in Bavaria, Baden-Württemberg and Switzerland were at low water, many of them close to their absolute minimum low water.
 - Very dry months in southern Germany since February.
 - No snow blanket in the Alps or Black Forest.
 - Rain event was extreme, >40 mm across a vast area that was even larger than during 2013 flood event.
 - Subtropical air masses with snow line >1500 meters.
 - Under normal circumstances, November 2015 rain event would have caused major flooding at least in Black Forest tributaries (rivers Kinzig, Murg, Nagold, Enz, Neckar).

This summary report was produced in conjunction wettergefahren-fruehwarnung.de and with information from DWD, meteoschweiz, LUBW, HND and EUMETSAT

Further reading (in German): http://www.wettergefahren-fruehwarnung.de/Ereignis/20151121_e.html