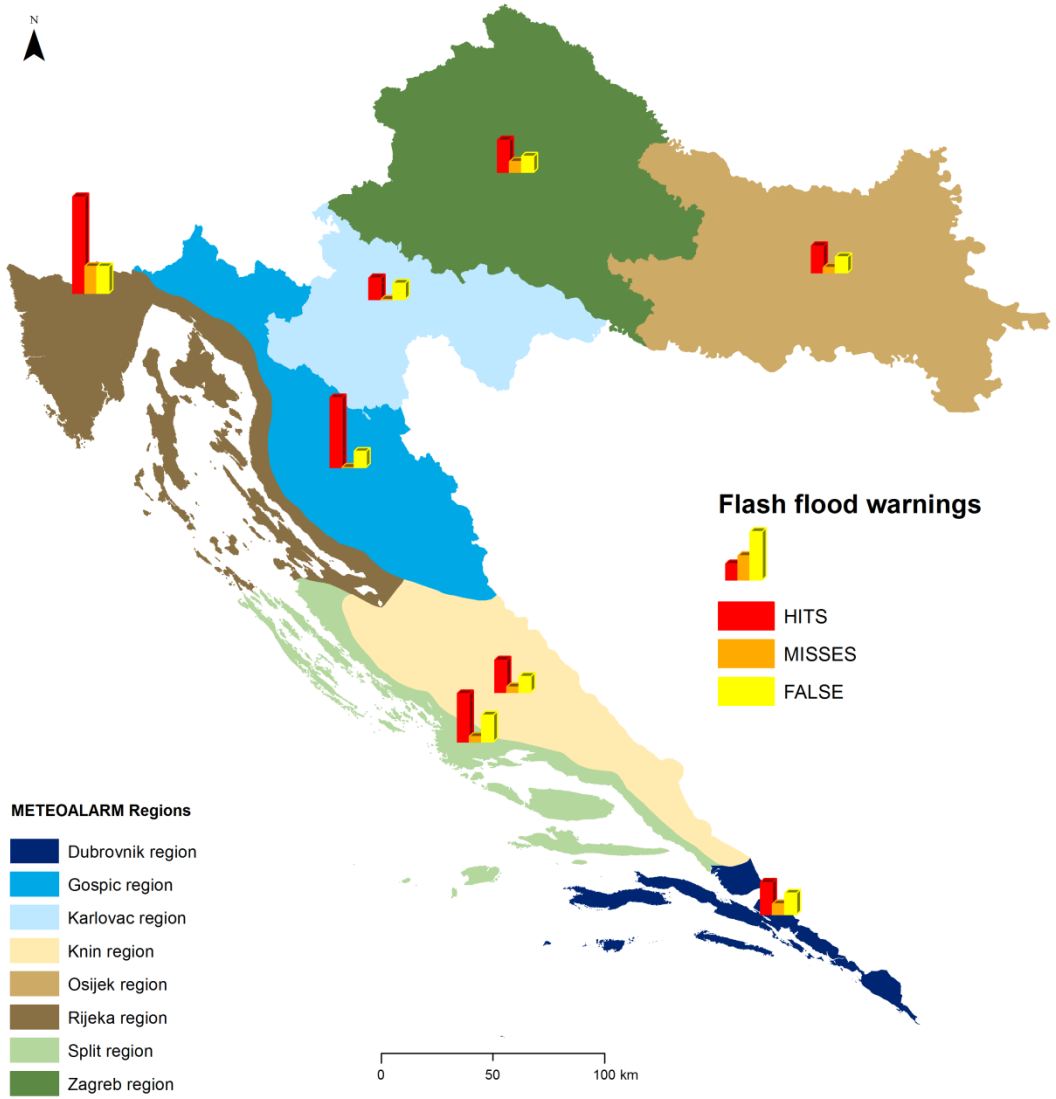
Verification of flash flood warnings

VERIFICATION OF FLASH FLOOD WARNINGS IN 2016 - REPUBLIC OF CROATIA -

REGIONAL DISTRIBUTION OF FLASH FLOOD WARNINGS IN 2016 - REPUBLIC OF CROATIA -



HTRS96/Transverse Mercator
Official map projection of the Republic of Croatia

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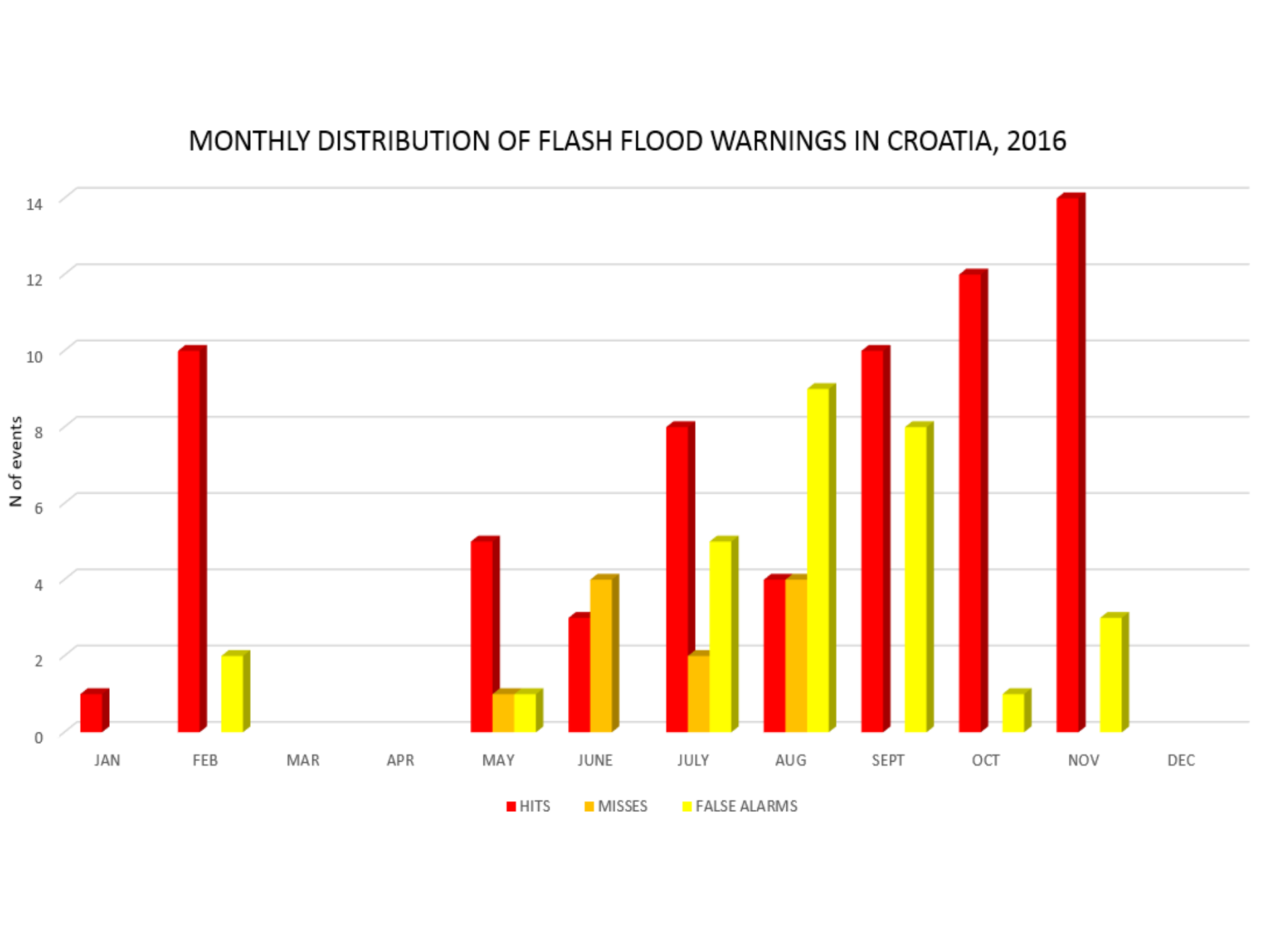
MONTHLY DISTRIBUTION OF FLASH FLOOD WARNINGS IN CROATIA, 2016
N of events
0
2
4
6
8
10
12
14
JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEPT
OCT
NOV
DEC
HITS
MISSES
FALSE ALARMS

a = Hits
b = False alarms
c = Misses
d = Correct negatives

		EVENT OBSERVED		
		Yes	No	Total
EVENT FORECASTED	Yes	67 (a)	29 (b)	96
	No	12 (c)	2528 (d)	2540
	Total	79	2557	2636

Contingency table of flash flood warnings for Croatia in 2016

Prepared by: Petra Mutic, Meteorological and Hydrological Service

Hit Rate (POD) : a/ (a + c)	**0.84**
False Alarm Ratio (FAR): b/ (a + b)	0.30
False Alarm Rate (POFD): b/ (b + d)	0.01
Threat Score: a/ (a + b + c)	**0.62**

The scores of flash flood warnings for Croatia in 2016

Prepared by: Petra Mutic, Meteorological and Hydrological Service

Verification scores

Probability of detection (PoD) (hit rate (HR)):

$$P_0D = HR = \frac{a}{a + c}$$

The hit rate (HR) has a range of 0 to 1 with 1 representing a perfect forecast. As it uses only the observed events a and c in the contingency table, it is sensitive only to missed events and not false alarms.

The HR is incomplete by itself and should be used in conjunction with either the false alarm ratio or the false alarm rate.

Verification scores

False alarm ratio (FAR):

$$FAR = \frac{b}{a + b}$$

The false alarm ratio (FAR) is the ratio of the total false alarms (b) to the total events forecast (a + b).

Its range is 0 to 1 and a perfect score is 0. It does not include c and therefore is not sensitive to missed events.

The FAR can be improved by systematically underforecasting rare events. It also is an incomplete score and should be used in connection with the HR.

Verification scores

Threat score (TS) (critical success index, CSI):

$$CSI = \frac{a}{a + b + c}$$

The threat score (TS), or critical success index (CSI), is frequently used as a standard verification measure.

It has a range of 0 to 1 with a value of 1 indicating a perfect score.

The CSI is more complete than the HR and FAR because it is sensitive to both missed events and false alarms.

Verification scores

The false alarm rate (FA):

$$FA = \frac{b}{b + d}$$

The false alarm rate (RA) is unfortunately often confused with the false alarm ratio. The false alarm rate is simply the fraction of observed non-events that are false alarms. By contrast, the false alarm ratio is referenced to the total number of forecasts; it is the fraction of forecasts that were false alarms. The best score for the FA is 0, that is, the wish is to have as few false alarms as possible. The FA is not often used by itself but rather is used in connection with the HR in a comparative sense.

Verification scores

Probability of detection (PoD) (hit rate (HR)):

$$P_0D = HR = \frac{a}{a + c}$$

The hit rate (HR) has a range of 0 to 1 with 1 representing a perfect forecast. As it uses only the observed events a and c in the contingency table, it is sensitive only to missed events and not false alarms.

The HR is incomplete by itself and should be used in conjunction with either the false alarm ratio or the false alarm rate.

a = Hits
b = False alarms
c = Misses
d = Correct negatives

		EVENT OBSERVED		
		Yes	No	Total
EVENT FORECASTED	Yes	21 (a)	7 (b)	28
	No	1 (c)	113 (d)	114
	Total	22	120	142

Contingency table of flash flood warnings for Croatia in the period from 10th of October 2015 to 29th of February 2016

Hit Rate (POD): a/(a+c)	0.75
False Alarm Ratio (FAR): b/(a+b)	0.045
False Alarm Rate (POFD): b/(b+d)	0.009
Threat Score: a/(a+b+c)	0.72