



Assessment of the prediction for the JJA 2016 Summer season for the Republic of Srpska, Bosnia and Herzegovina



1. SEECOF 15, MedCOF-6 Climate outlook for the 2016 Summer season:

Precipitation and Temperature

Over The Republika Srpska and Bosnia-Herzegovina it is expected to be *normal* to warm temperature with chance of **40%** for both conditions, what is in consistence with observed values. (figure 1).

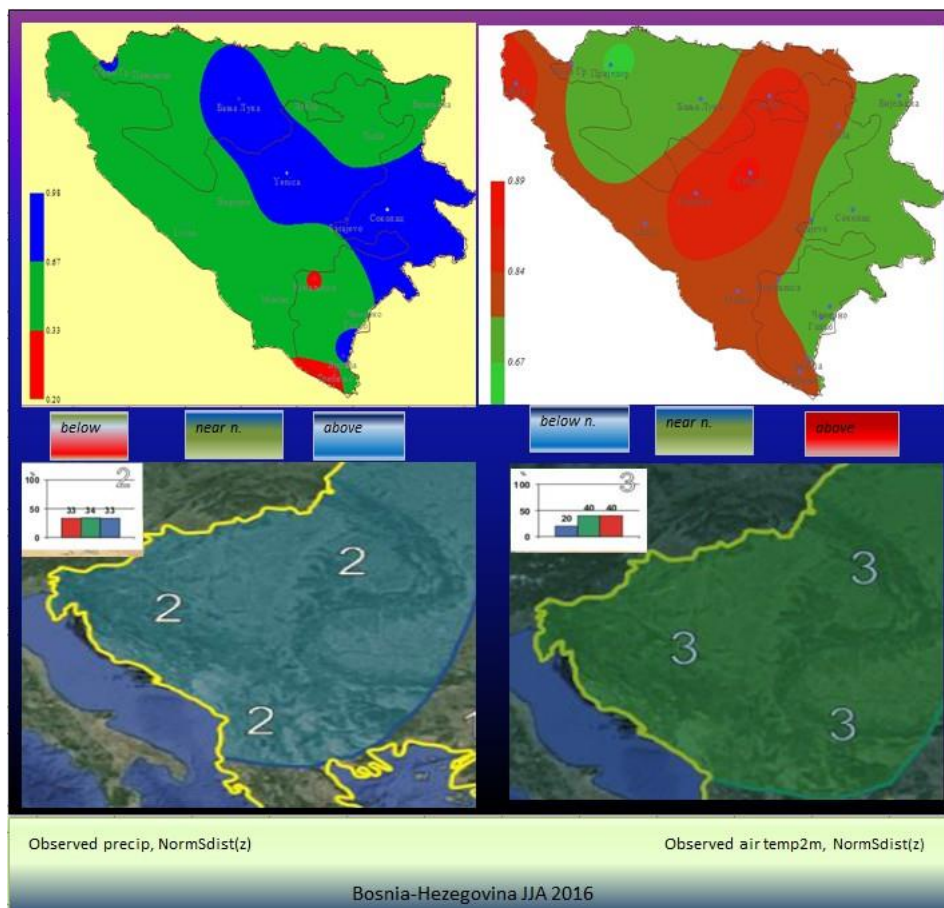


Figure 1. Graphical presentation of the 2016 summer season: a) JJA 16 temperature and outlook (top and bottom, left) b) jja16 precipitation and forecast (top and bottom, right) / normalised distribution of cumulative (ref 1981/2010)

The JJA outlook for the rain total suggested the same probabilities to all three terciles categories. Measured values was settled in *near normal* (fig 1, left green zone) to *wet* ranges (fig 1, top left, blue zone). Drought occurred in the southern areas (fig 1, top left, red zone).

2. Analysis of the 2016 Summer season:

Air temperature

Summer 2016 mean temperature for The Republic Serbska stations, in average, reached 0.7th **percentile rank** (*normal*) or 0.8th **percentile** according to standardised and after that then **normalised** values (*warm*). Deviation from normal distribution over the 1981/2010, arithmetical mean corresponds to probability different from 0.5; at many stations that is less than 0.5, but at some stations as Bana Luka, Trebine it is 0.6th. Due to statistically rough tercile methodology there are a little bit confusion about terminology like *normal*, *above normal* and colours that means extremes or range for the meaning of normal values...

Temperature, summer mean 2016 as well as long term means, anomalies regarding to 1981-2010 and other important statistics for better understanding of changes, are presented at the table 1 and Fig 2. Detailed seasonal Tmean statistics, with relevant terciles categories of anomalies, have shown at the table 1 and 2 for the RS stations (the 1981-2010 climatology).

Table 1 Temperature, summer mean temp statistics over jja 2016, R.Srpska, Bosnia-Herzegovina

| Station | jja 1981 - 2010 | STD | z (SPI) | NORMSD IST (z) | PercRank | jja016 °C | jja016 anom °C | 33,33 | 50,00 | 66,67 | tercile anom.cat |
|-------------------------|-----------------|------|---------|----------------|----------|-------------|----------------|-------|-------|-------|------------------|
| Бања Лука Banja Luka | 21.0 | 1.05 | 0.71 | 0.76 | 0.77 | 21.8 | 0.7 | 20.6 | 20.8 | 21.5 | above |
| Приједор Prijeedor | 21.2 | 1.08 | 0.35 | 0.64 | 0.64 | 21.6 | 0.4 | 20.6 | 21.1 | 21.8 | near norm |
| Нови Град Novi Grad | 19.8 | 1.13 | 0.89 | 0.81 | 0.73 | 20.8 | 1.0 | 19.2 | 20.1 | 20.5 | above |
| Добој Doboj | 20.5 | 1.00 | 1.15 | 0.87 | 0.94 | 21.7 | 1.1 | 20.0 | 20.4 | 21.0 | above |
| Бијељина Bijeljina | 21.4 | 1.17 | 0.75 | 0.77 | 0.80 | 22.3 | 0.9 | 20.9 | 21.2 | 21.8 | above |
| Соколац Sokolac | 16.3 | 1.04 | 0.51 | 0.69 | 0.62 | 16.8 | 0.5 | 15.7 | 16.3 | 16.9 | near norm |
| Билећа Bileća | 21.3 | 1.14 | 0.86 | 0.80 | 0.81 | 22.3 | 1.0 | 20.6 | 21.2 | 21.6 | above |
| Гацко Gacko | 17.1 | 1.07 | 0.79 | 0.79 | 0.81 | 18.0 | 0.8 | 16.5 | 17.3 | 17.8 | above |
| Чемерно Cemetno | 14.7 | 0.92 | 0.77 | 0.78 | 0.77 | 15.4 | 0.7 | 14.4 | 14.9 | 15.2 | above |
| Требинје Trebinja | 23.5 | 1.13 | 0.87 | 0.81 | 0.86 | 24.4 | 1.0 | 23.4 | 23.0 | 23.5 | above |

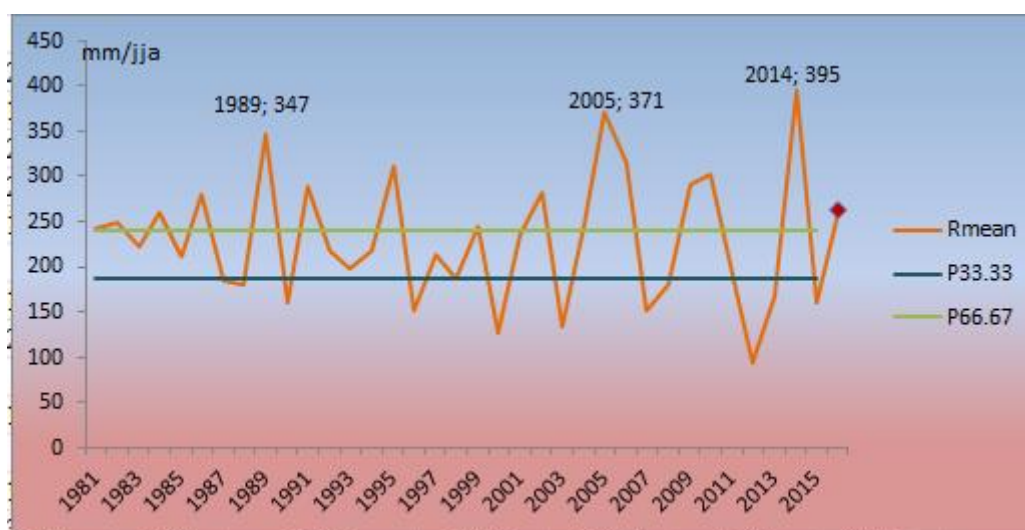


Fig 2: Summer mean rainfall total, from 1981 to 2016, Bosnia and Herzegovina

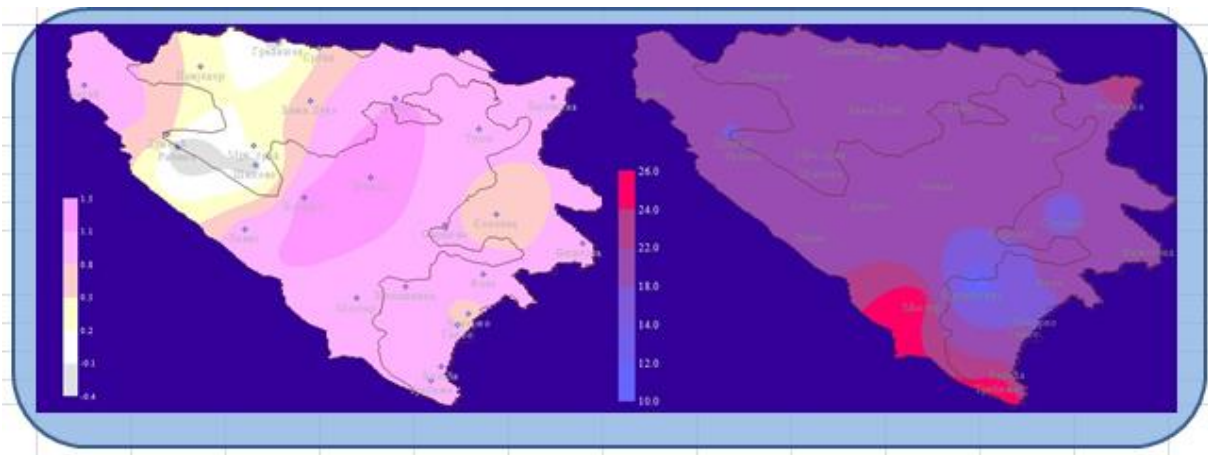


Fig 3: Spatial distribution of anomalie (left , ref 1981-2010), and Tmean (right), BH

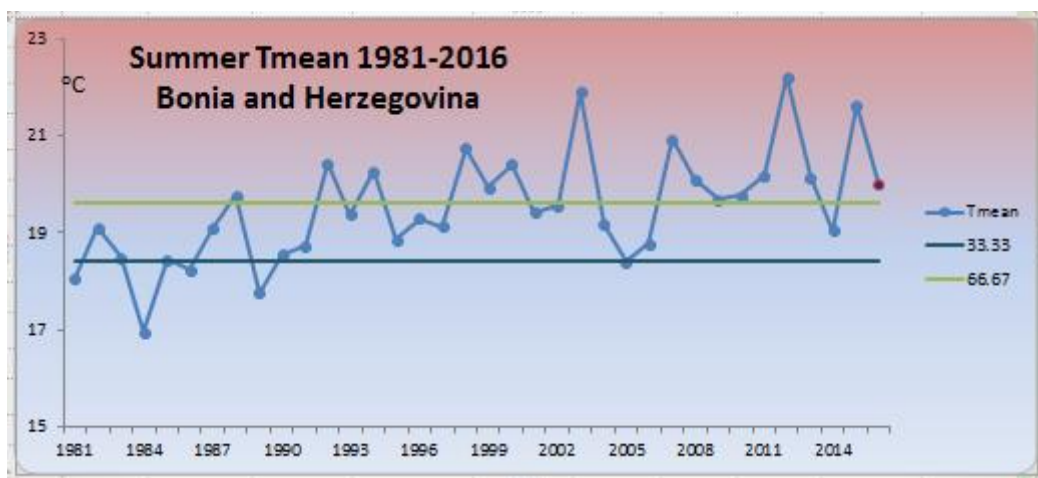


Fig 4: JJA T_{mean} from 1981 to 2016, Bosnia and Herzegovina; 2012, 2003, 2015 the hottest Years

Seasonal Rainfall

Precipitation anomalies in Summer 2016 showed higher than normal values in eastern (Han Pijesak, Foča, Kalesija, Srebrenica from 65% to 75% surplus) as well as in north (Srbac 36%) while southern Trebinje received minus 42% as a deficit.

Station Trebinje and Bileća in southern received less than ten mm as the August's Rainfall total or ~3% from the average.

Seasonal rainfall statistics, with relevant terciles categories of anomalies, have shown at the table 2 and Fig 5-7 for the RS stations (the 1981-2010 climatology).

Таб 2: 2016 Summer Rainfall , RS/ BH

| Station | jja 1981-2010 | STD | z (SPI) | NORMS DIST (z) | PercRank | jja016 mm | jja016 % | 33,33 | 66,67 | 50,00 | tercile anom.categ |
|----------------------------|---------------|--------|---------|----------------|----------|-----------|----------|-------|-------|-------|--------------------|
| Бања Лука Banja Luka | 271 | 82.60 | 0.88 | 0.81 | 0.81 | 344 | 127 | 221 | 313 | 265 | above |
| Приједор Prijedor | 243 | 76.30 | 0.09 | 0.54 | 0.56 | 250 | 103 | 198 | 271 | 219 | near norm |
| Нови Град Novi Grad | 247 | 76.38 | 0.50 | 0.69 | 0.71 | 285 | 115 | 210 | 274 | 245 | above |
| Добој Doboj | 284 | 103.63 | 0.01 | 0.50 | 0.56 | 285 | 100 | 215 | 321 | 272 | near norm |
| Бијељина Bijeljina | 243 | 77.46 | 0.37 | 0.64 | 0.58 | 272 | 112 | 216 | 278 | 255 | near norm |
| Соколац Sokolac | 238 | 65.74 | 2.24 | 0.99 | 0.98 | 385 | 162 | 206 | 260 | 241 | above |
| Билећа Bileća | 179 | 71.17 | 1.11 | 0.87 | 0.82 | 258 | 144 | 144 | 196 | 175 | above |
| Гацко Gacko | 189 | 75.97 | 0.23 | 0.59 | 0.61 | 207 | 109 | 158 | 222 | 184 | near norm |
| Чемрно Сетено Cetina | 218 | 97.61 | 0.31 | 0.62 | 0.67 | 248 | 114 | 172 | 246 | 198 | above |
| Требинје Trebinje | 181 | 95.29 | -0.83 | 0.20 | 0.27 | 102 | 56 | 133 | 229 | 161 | below |

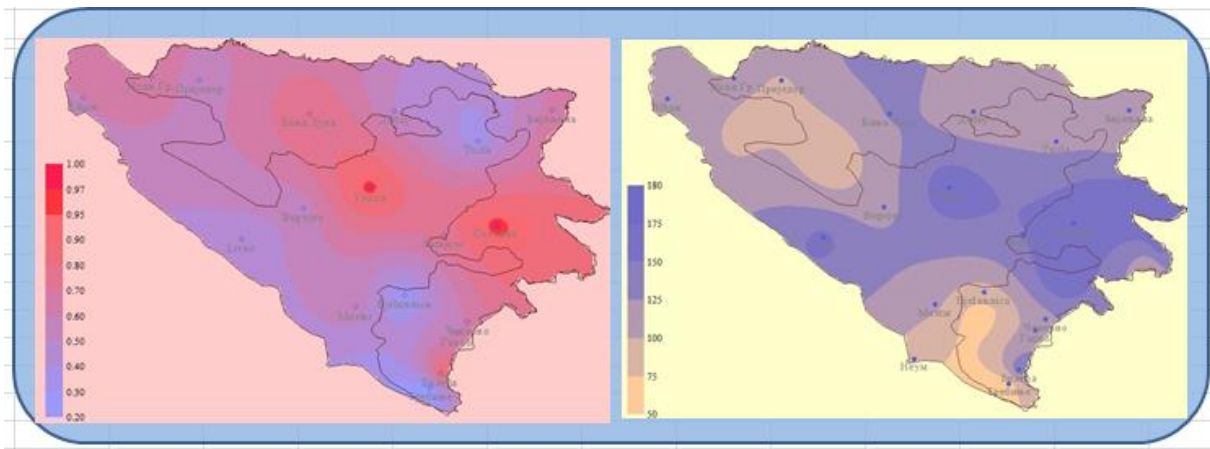
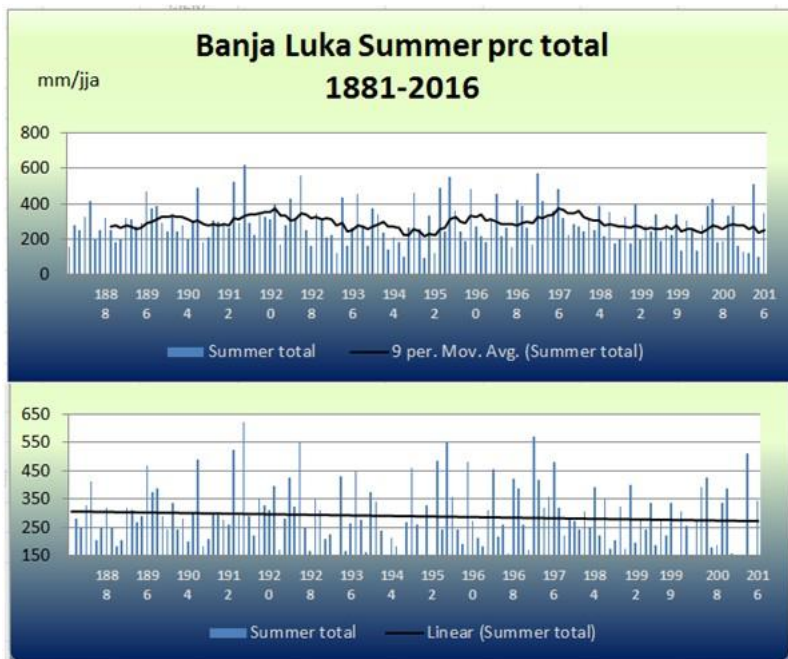


Fig 5: Spatial distribution of Percentiles and Relative anomaly of Precipitation in (%), ref 1981-2010) BH



Long term summer precip total (136Years):

Graphs at fig 5 below has shown the linear decreasing trend but there is a bigger **mean positive change**, averaged over entire period, (ref 1981-2010), than negative one. A few severe floods in the recent past have been an impact of an increased precipitation which does not follow linear trend but log normal distribution

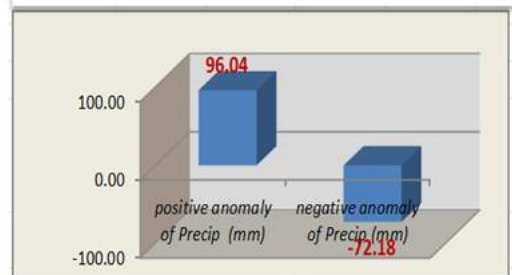


Fig 6 Precipitation, Summer total 1981/2010 Bana Luka, RS, BH

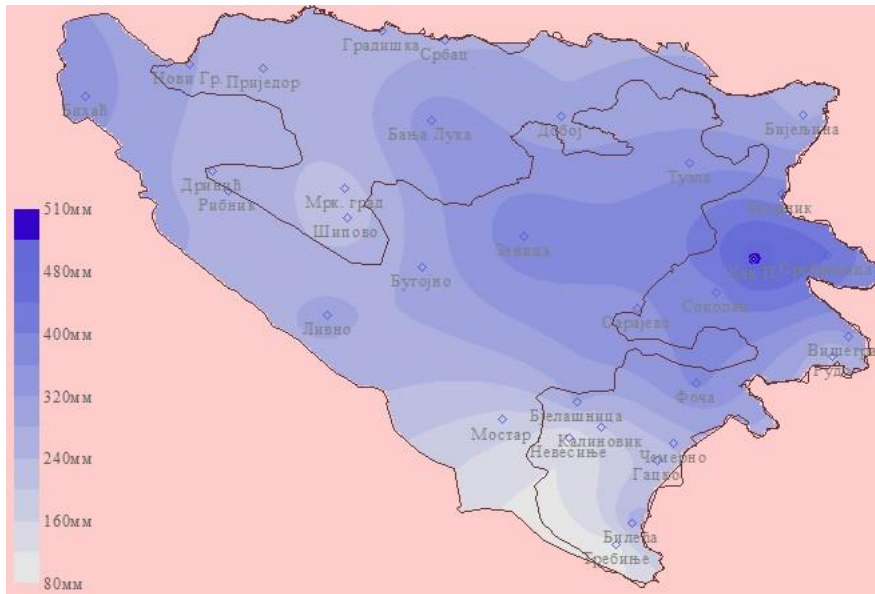


Figure 7: The JJA16 Rainfall total, Bosnia and Herzegovina

Rainfall total for the summer varied from less than 120 mm across southern parts of country (modified Mediterranean precipitation regime) to more than 400 mm in the central mountain and eastern area (~ 40% of deficit to 75% of surplus).

3. High impact events:

The month of August 2016 was extremely hot and dry, with a less than 5mm accumulated precipitation in many places in the South part, what caused the forest fires.

4. Verification of the Medcof6, Seccof15 climate outlook for the 2016 summer season

| Country | Seasonal temperature (JJA) | | Seasonal precipitation (JJA) | |
|---------|---|--|--|------------------------------------|
| | Observed | SEECOF15, MedCOF-6 climate outlook | Observed | SEECOF15, MedCOF-6 climate outlook |
| RS, BH | above ~ +0.8°C(0.7P) (r1981-010) | 40, 40, 20 <i>Normal to warm</i> | Normal to wet (~ +14% surplus, ref 1981-2010) | 33,34,33 |