MINISTRY OF EMERGENCY SITUATIONS OF ARMENIA

SERVICE OF THE HYDROMETEOROLOGY AND ACTIVE INFLUENCE ON ATMOSPHERIC PHENOMENA

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Black Sea Middle East Flash Flood Guidance (BSMEFFG) System

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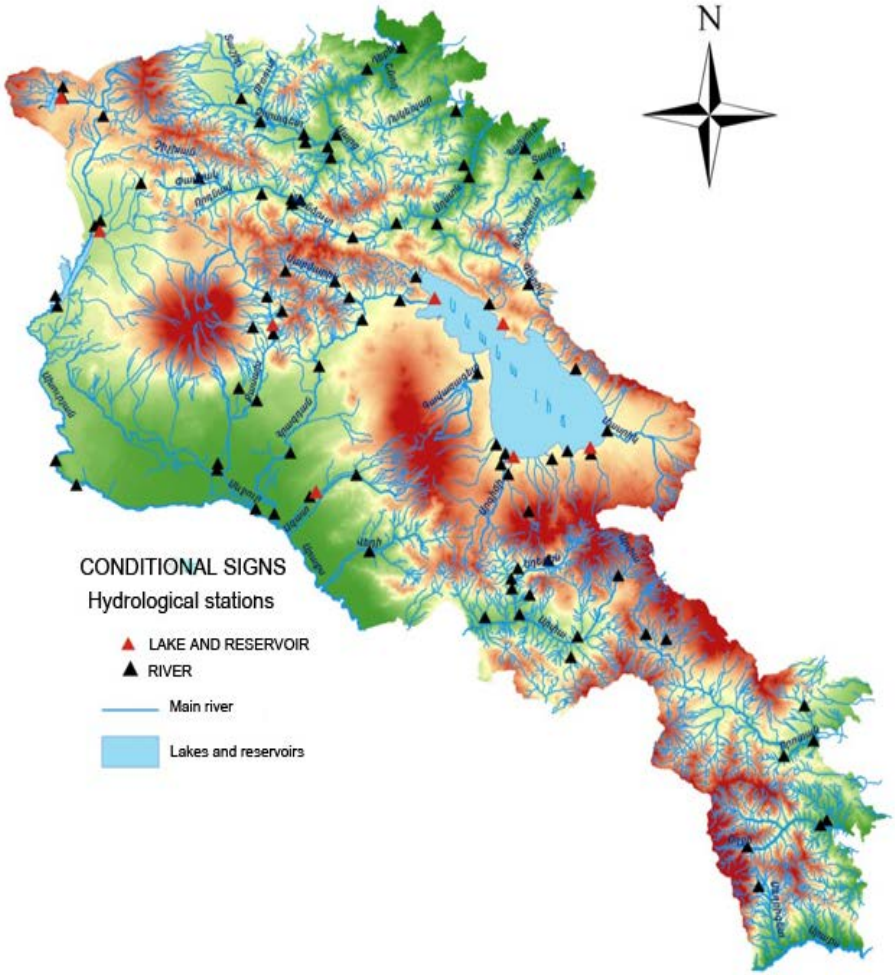
HYDROMETEOROLOGICAL NETWORK



The Armenian Hydromet service's observation system includes

- **47 meteorological stations**
- **95 hydrological stations, out of which:**
  - ✓ **86 river stations**
  - ✓ **4 lake sites (Lake Sevan)**
  - ✓ **5 reservoir sites**

HYDROLOGICAL MONITORING

At hydrological stations are observed and measured:

- ✓ Water level (gauge/or recorder)
- ✓ Water temperature
- ✓ Ice phenomena, types
- ✓ Water evaporation at 11 stations
- ✓ Water discharge.

Water discharge (measurements are made 25-35 times per year).

For Armenia floods are very typical, as it is mountainous country. Flash floods are formed basically during spring flood period, and not very often during summer-autumn water shortage stages.

The floods formed during spring flood period are more hazardous, because this time rains and melted snow waters are combined and as a result formed maximum discharge.

Flash floods can be formed as well as during summer-autumn period.

There are known many cases, when due to heavy rains, there were formed such kind of discharges, which were exceeded the spring floods peak.

For floods forecasting we are using mathematical statistics regression method. For each individual river are developed multifactorial correlation links between flood predicted value and flood developing factors. The links between predicted value and its developing factors have this general appearance:

$$Y = C_0 + C_1X_1 + \ldots + C_nX_n,$$

Where: Y – predicted value, C_0,.....C_n, - regressive coefficients, X_1,.... X_n - developing factors values.

In multifactorial correlation links are used the sum of the previous days precipitation (for different period), amount of flow before flooding.

As a flow loss indirect indicator is used average daily air temperature data, and as a basin moisture indicator is used several indirect characteristics, which are typically based on the amount of the previous precipitation data.

✓ **From 2014 in Armstatehydromet have been implmented BSMEFFG system, for increasing the flash flood forecast accuracy.**

✓ **BSMEFFG forecasters training took place in Armenia in May, 2014. During the three-day training were described of BSMEFFG products, case studies. The training was very useful for forecasters to help better understand the BSMEFFG system and it use in real-time.**

And now work is underway for analyzing and assessment of practical importance of this system results.

Therefore, in this period Hydromet Service have begun collecting examples of flash flood cases and comparison and analysis of BSMEFFG system results.

BSMEFFG products now we are using for making flash flood forecasts but as we have not long-time experiences we not use it for warnings.

In Armenia in different years and in different basins observed several flash flood events, which caused greate damages to the surrounding residential areas, sown area and etc..

Are known.

1946y.- May, Getar river flood

2004y.- March, Araqs, Hrazdan, Kasakh river basins

2007y.- Aghstev, Gavaraget river basins

2011y.-May, Arpa, Azat river basins

2012y.-May Voghji river basin.

River Hrazdan 2004 on March

EARLY WARNING

For population warning about expected unfavorable and dangerouse events, as well as for reducing the economical damages, there are need to improve flood forecasting methods and technics.

To improve the hydrological forecast system and increase forecast accuracy there is a need to:

- **Implement modern forecast models.**

- **Improvement of the snow cover observation system through introduction of modern technologies to assist in application of modern remote techniques for accurate monitoring of the snow cover in main river basins and timely processing of the observation data to assess snow depth, snowmelt and water equivalent in snowpack.**

THANK YOU
FOR ATTENTION