



Implementation stages, results and recommendations of the PEER-5 Project on the Transboundary Pyanj River Basin

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What is the urgency of the problem and what is the reason for the study of climatic conditions, the state of water resources and glaciation of the Pyanj river basin?

I. Transboundarity

After the stabilization of the political situation in Afghanistan, the problem of revising the distribution of water resources in Central Asia will become urgent

To ensure transparency and equitable distribution, it is necessary to establish the exact value of the volume of water generated on the territory of each country

Country	River Basin		Aral Sea Basin	
	Syrdarya	Amudarya	km ³ /year	%
1	2	3	4	5
Kazakhstan	2.426	-	2.426	2.1
Kyrgyzstan	27.605	1.604	29.209	25.1
Tajikistan	1.005	49.578	50.583	43.4
Turkmenistan	-	1.549	1.549	1.2
Uzbekistan	6.167	5.056	11.223	9.6
Afghanistan and Iran	-	21.593	21.593	18.6
Total in Aral Sea Basin	37.203	79.280	116.483	100

II. Demography and Food Safety



	1990	2015
Area irrigated land, ha	710,000	594,000
Population, Mln. person	5.36	8.20
	0.13 ha/per	0.07 ha/per
	0.26 ha/pers. - Global	

Therefore, the main strategy of the Republic of Tajikistan is the development of hydropower

№	Name	Parameters			
		Capacity, MWt	Output, TWt·h/years	Head, m	Useful volume of reservoir, km ³
1	Namangutskaya*	2.5	0.018	36	0
2	Barsharskaya	300	1.6	100	1.25
3	Anderobskaya	650	3.3	185	0.1
4	Pishskaya	320	1.7	90	0.03
5	Khorogskaya	250	1.3	70	0.01
6	Rushanskaya	3000	14.8	395	4.1
7	Yazgulemskaya	850	4.2	95	0.02
8	Granites gate	2100	10.5	215	0.03
9	Shirgovatskaya	1900	9.7	185	0.04
10	Khostovskaya	1200	6.1	115	0.04
11	Dastidzumskaya	4000	15.6	300	10.2
12	Dzumarskaya	2000	8.2	155	1.3
13	Moscowskaya	800	3.4	55	0.04
14	Kokchinskaya	350	1.5	20	0.2
15	Nijni-Pyanjskaya	600	3.0		
Total		18322.5	84.918		17.36

Only economically effective hydropotential of the Amu Darya River makes 37.5 Bln. kWt from which 33 Bln kWt to fit to Pyanj Rivers Basin

III. Emergencies related to meteorological and water factors

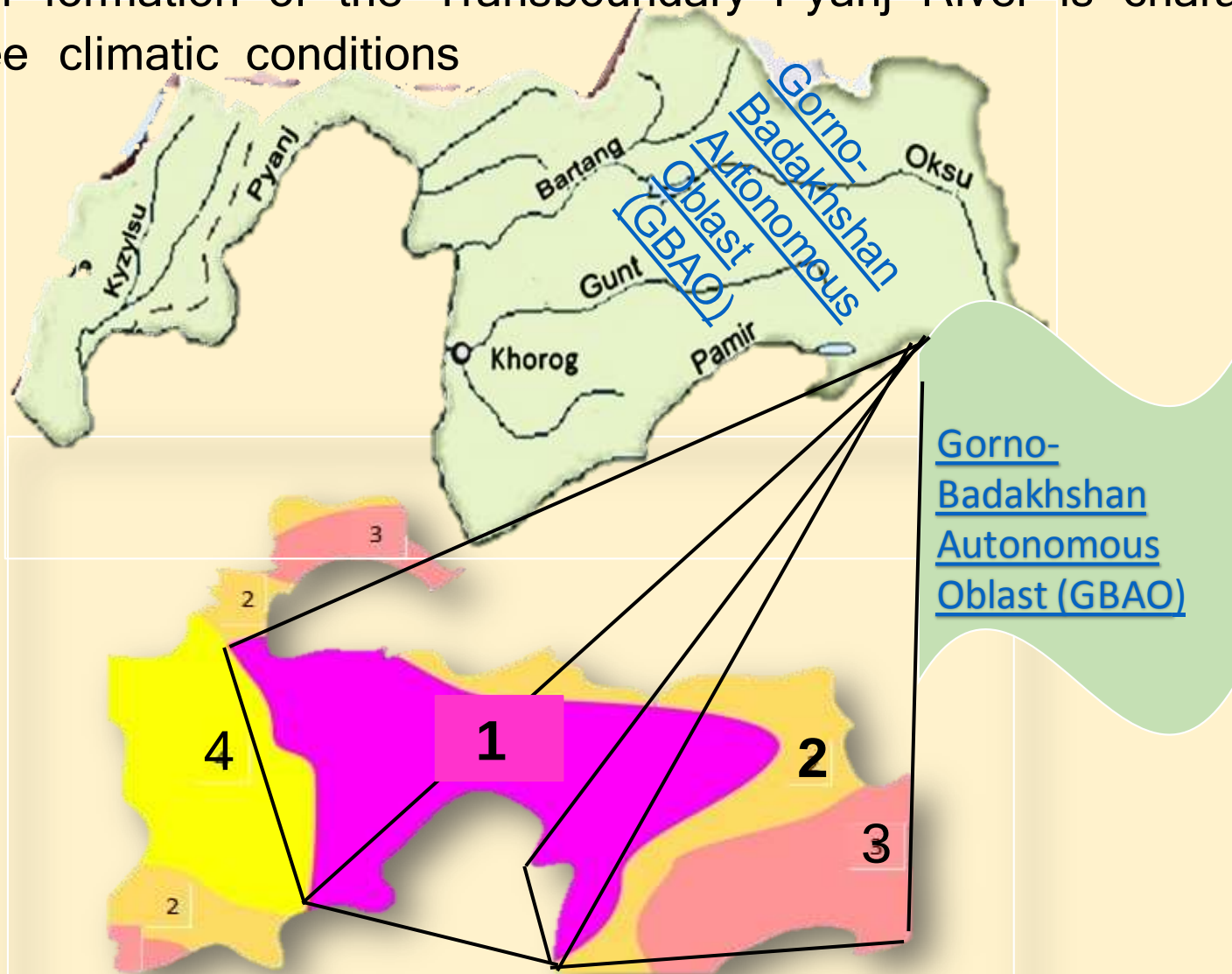


Meteorological features climate zones of the Transboundary Pyanj river basin

The diversity of climatic conditions in Central Asia, the finding of the patterns of changes in meteorological processes depending on the geographic and geoecological features of the region led to the need for climatic zoning

The main zone of formation of the Pyanj river water flow is located in the Pamir is considered as an area where there is a change of moist, cold Mediterranean precipitation to dry Central Asian

The territory of the Republic of Tajikistan is characterized by four climatic zones. In turn, the Gorno-Badakhshan Autonomous Region (GBAO) that covers almost the entire mountain Pamir and is a zone of formation of the Transboundary Pyanj River is characterized by three climatic conditions



The territory of the two main tributaries the **Pyanj and Vakhsh rivers** of the **Transboundary Amudarya** river is divided to the following zones depending on weather conditions and orography:

The Southern zone and the Pamir-Alay

Western Pamir

Central Pamir

Eastern Pamir

The study of meteorological features of the climatic zones of the Pamir, the hydrological parameters of river systems and the composition of the snow cover were carried out according to the data of meteorological and hydrological stations in the corresponding climatic zones.

The results on the influence of orography and the altitudinal location of the mountainous terrain on climatic parameters, the depth distribution of the snow cover and the isotope composition of thawed glacial waters are obtained.

Vanch River

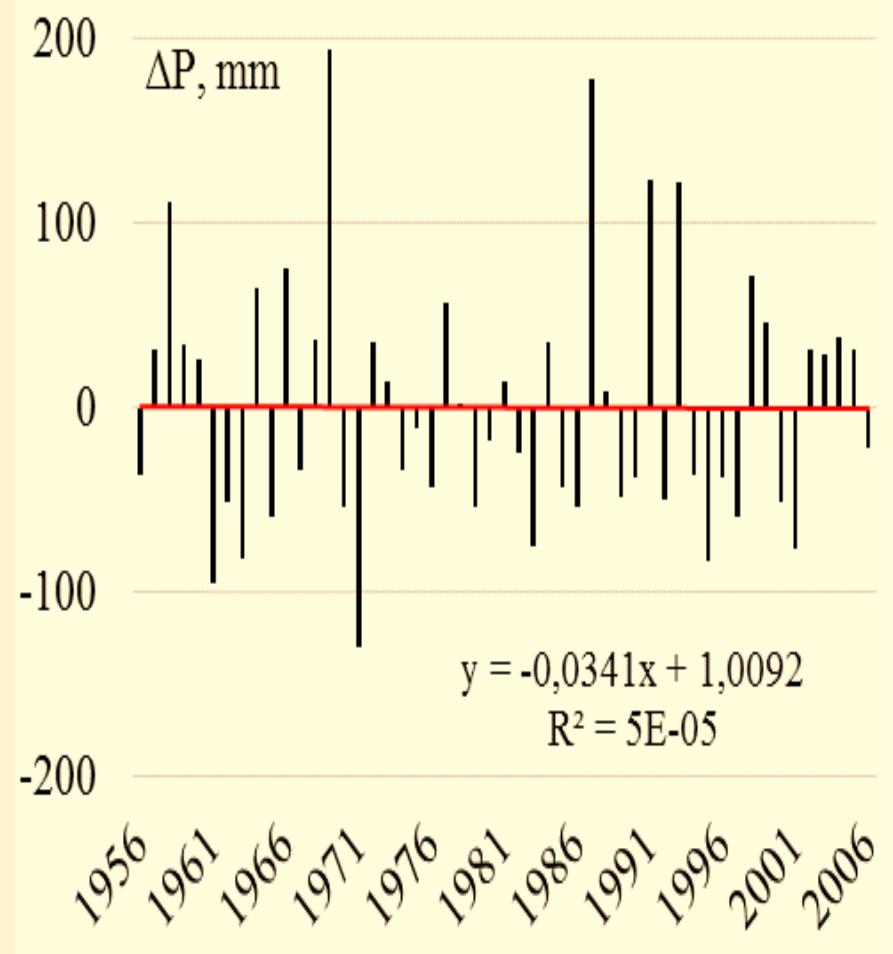
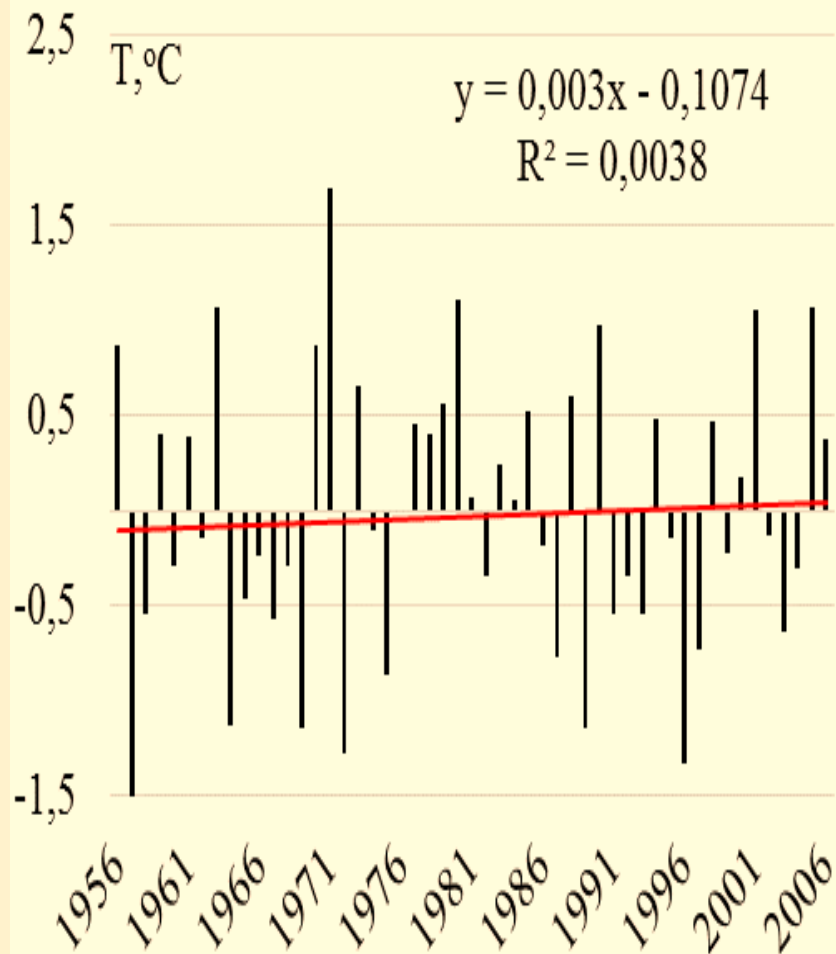
Glacier Geographic
Society
38°45'00" 72°08'00"



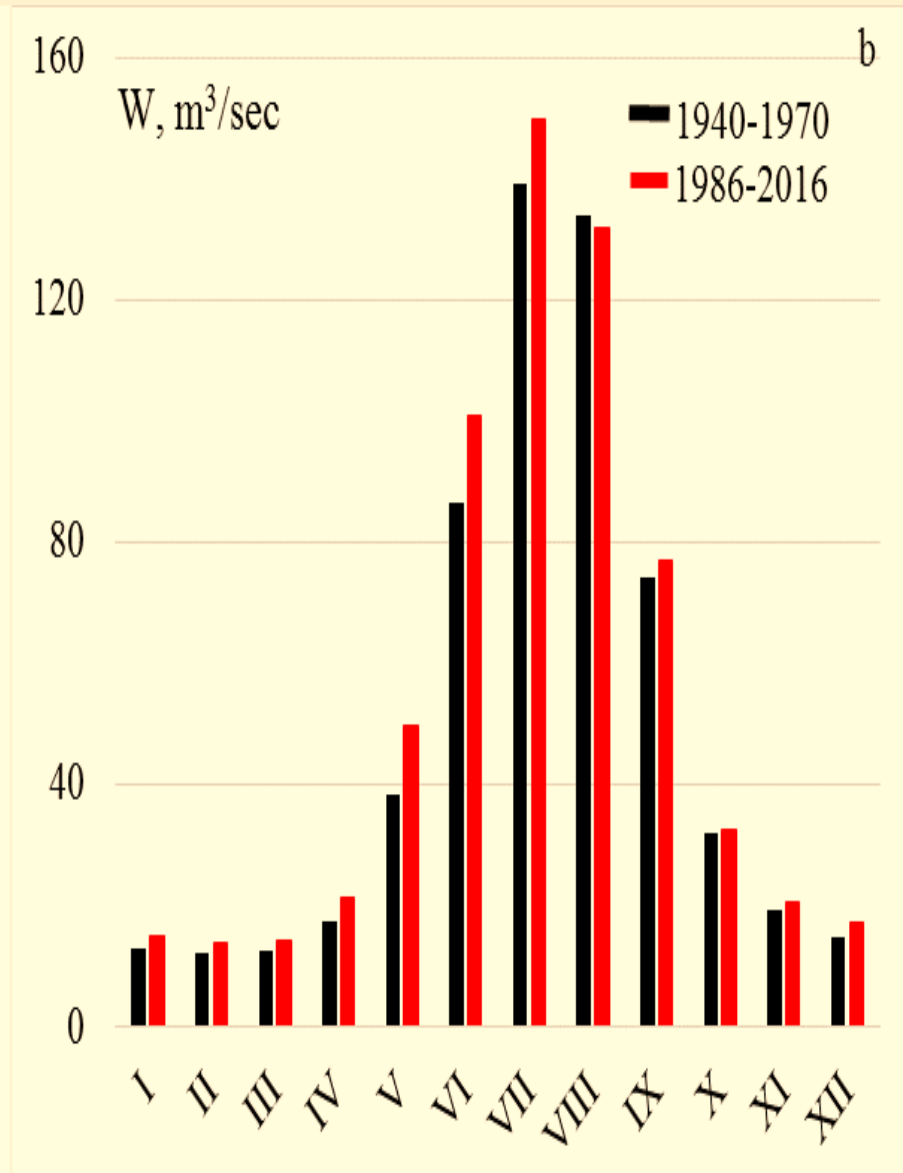
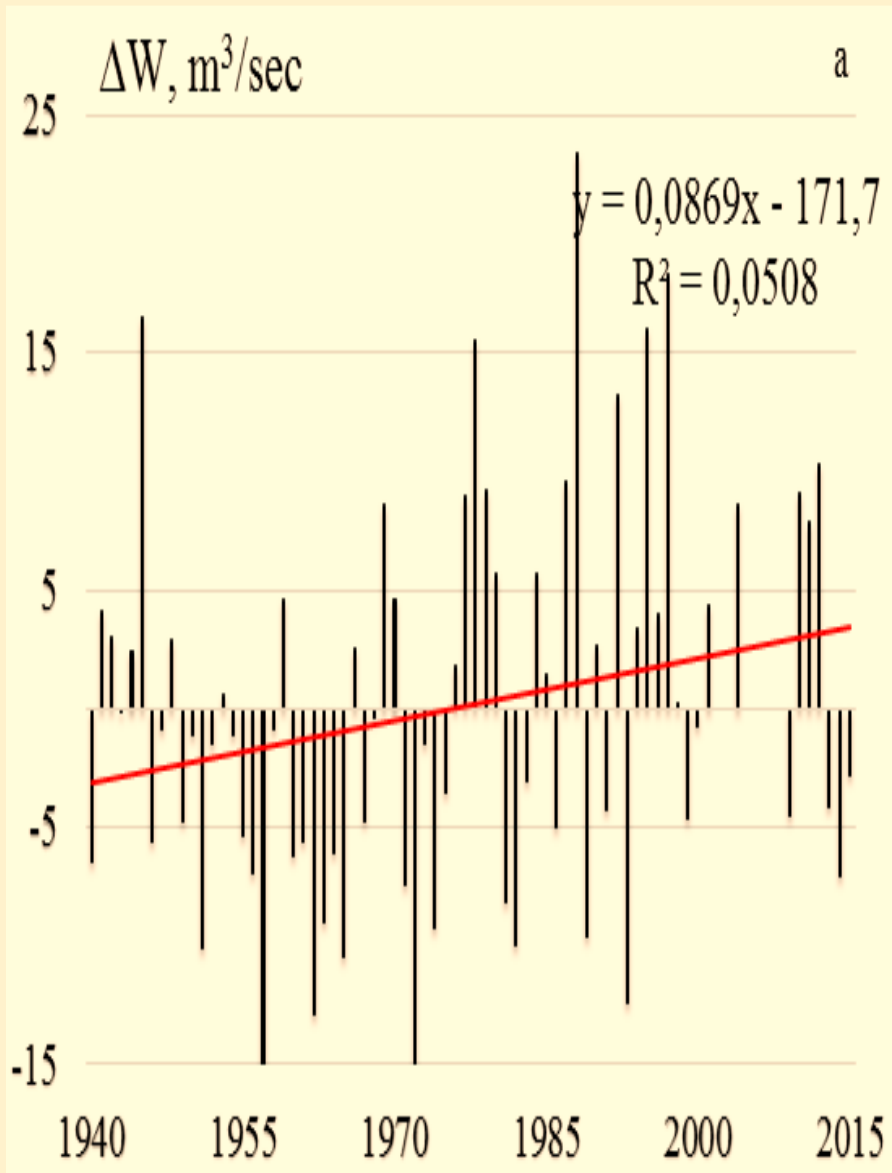
Length 103 km

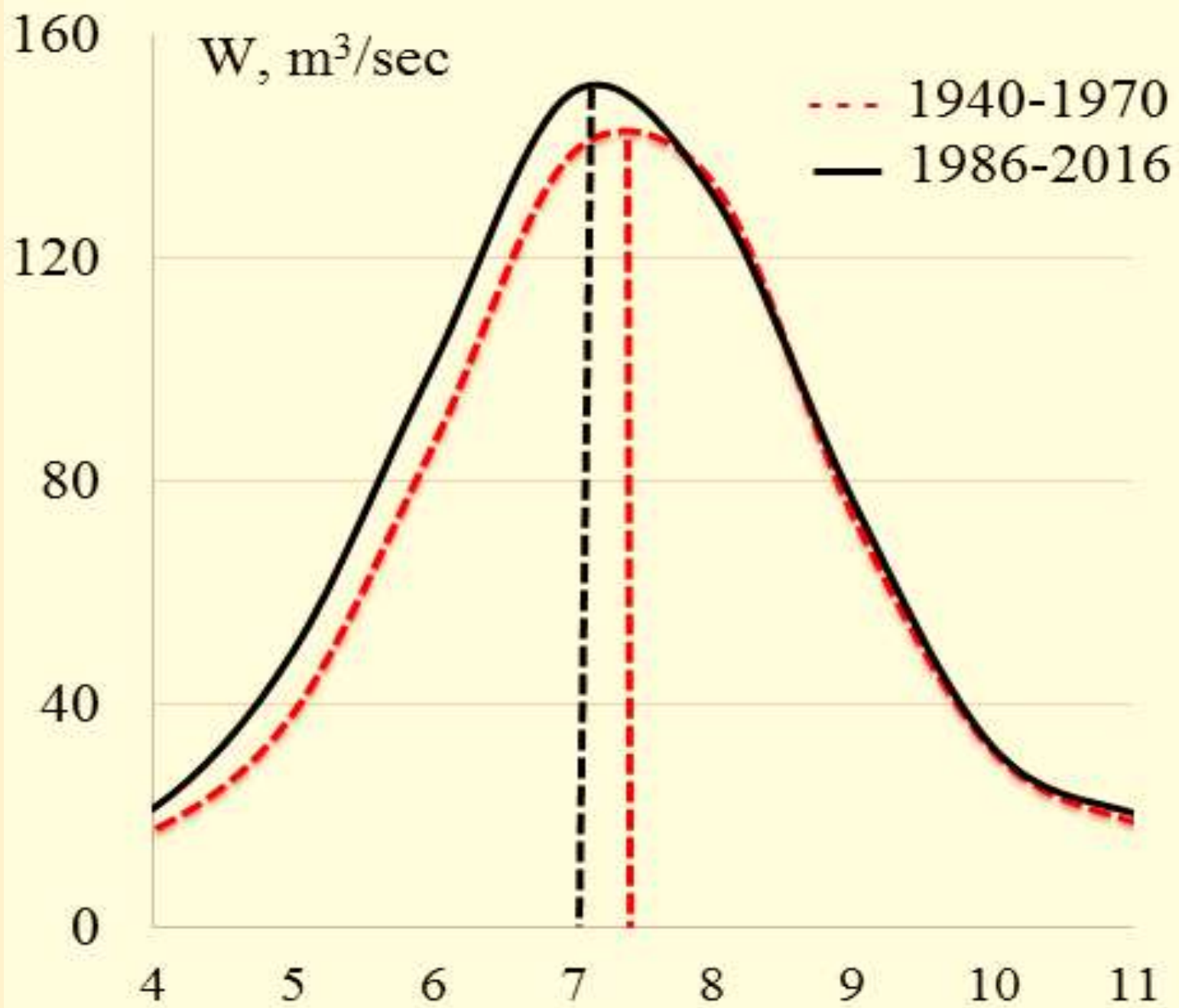
Basin area 2070 km²

The formation of meteorological conditions of the river basin is entirely dominated by air masses of Mediterranean and Caspian cyclones.

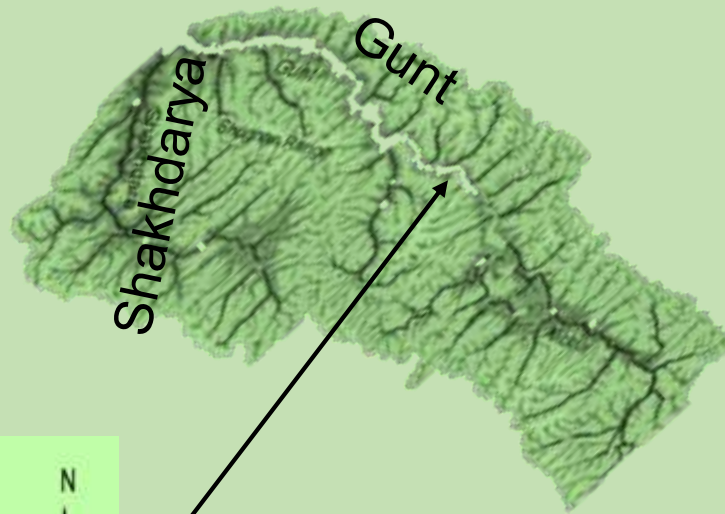


Mean annual temperature change for the period 1956-2006
is low and $0.003 ^\circ\text{C}/\text{year}$





Length 246 km
Basin area 14840 km²



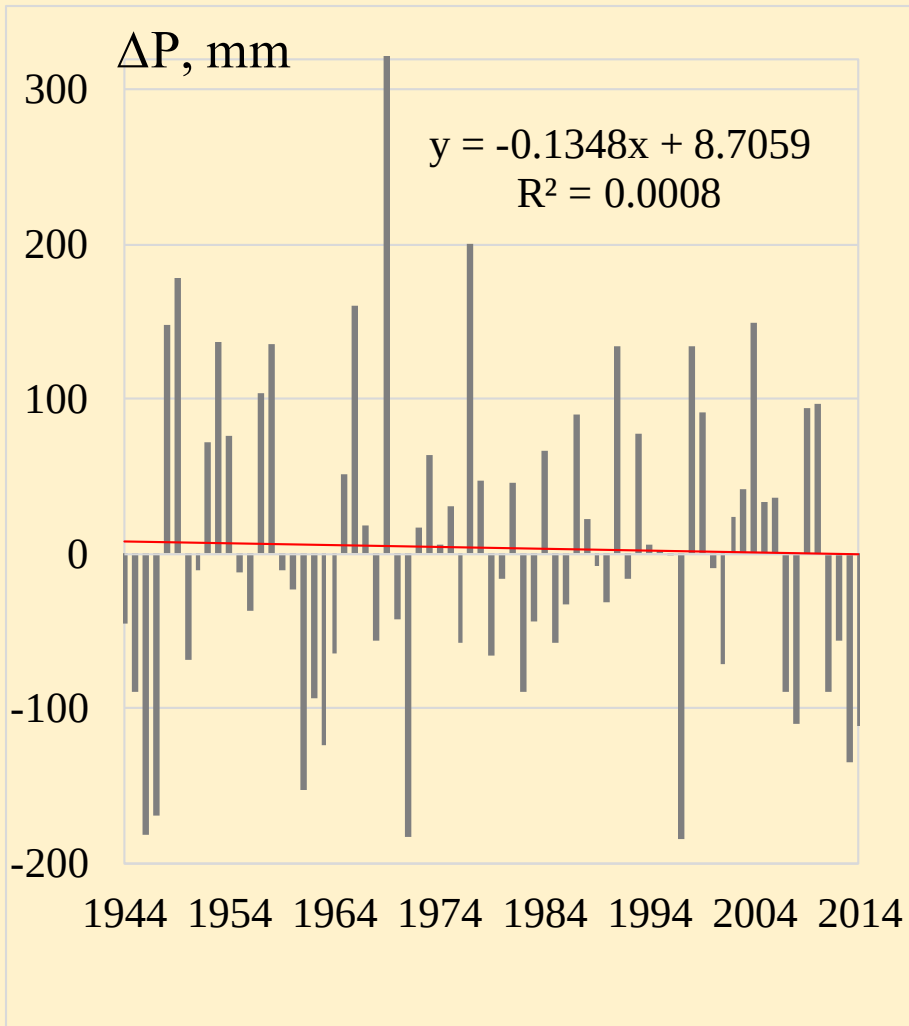
The formation of a certain amount of atmospheric precipitation in the Gunt River Basin is significantly affected by western, Indian monsoons and southern cyclones

To estimate the meteorological conditions of the Gunt River basin, the data of the Khorog and Bulunkul meteorological stations for the period 1944–2014 were used

GUNT RIVER BASIN

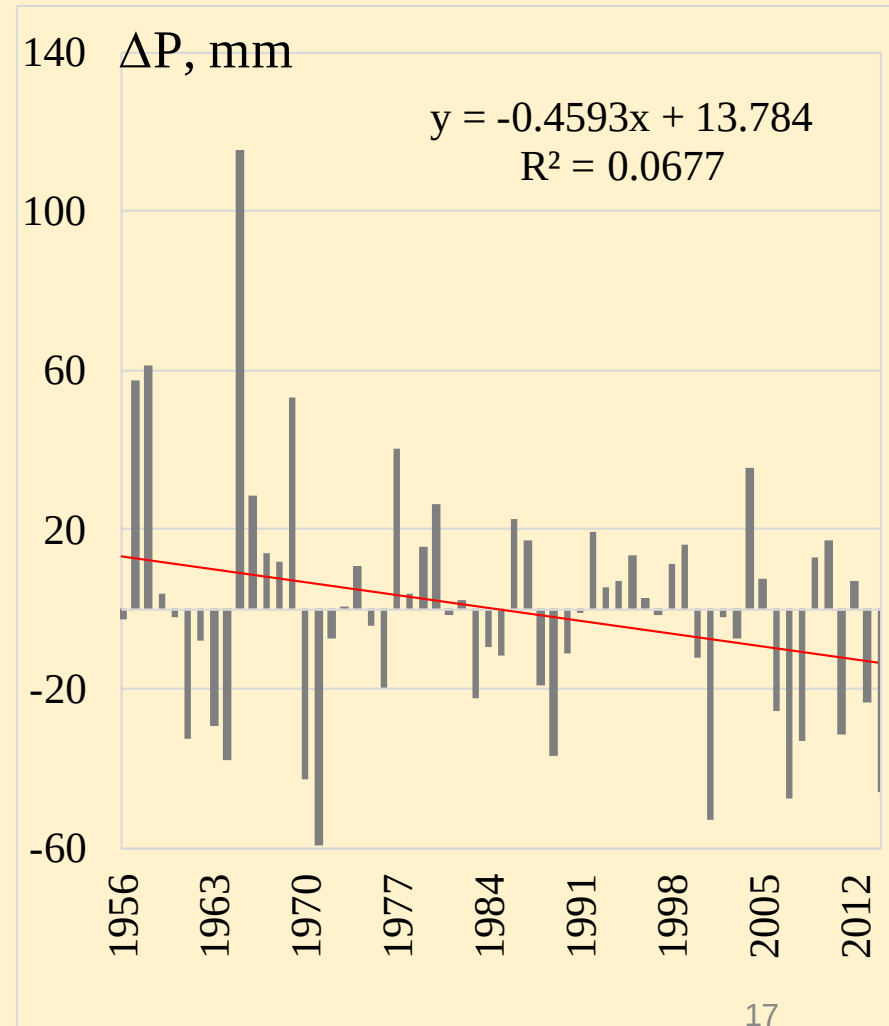
The western part

Meteostation Khorog



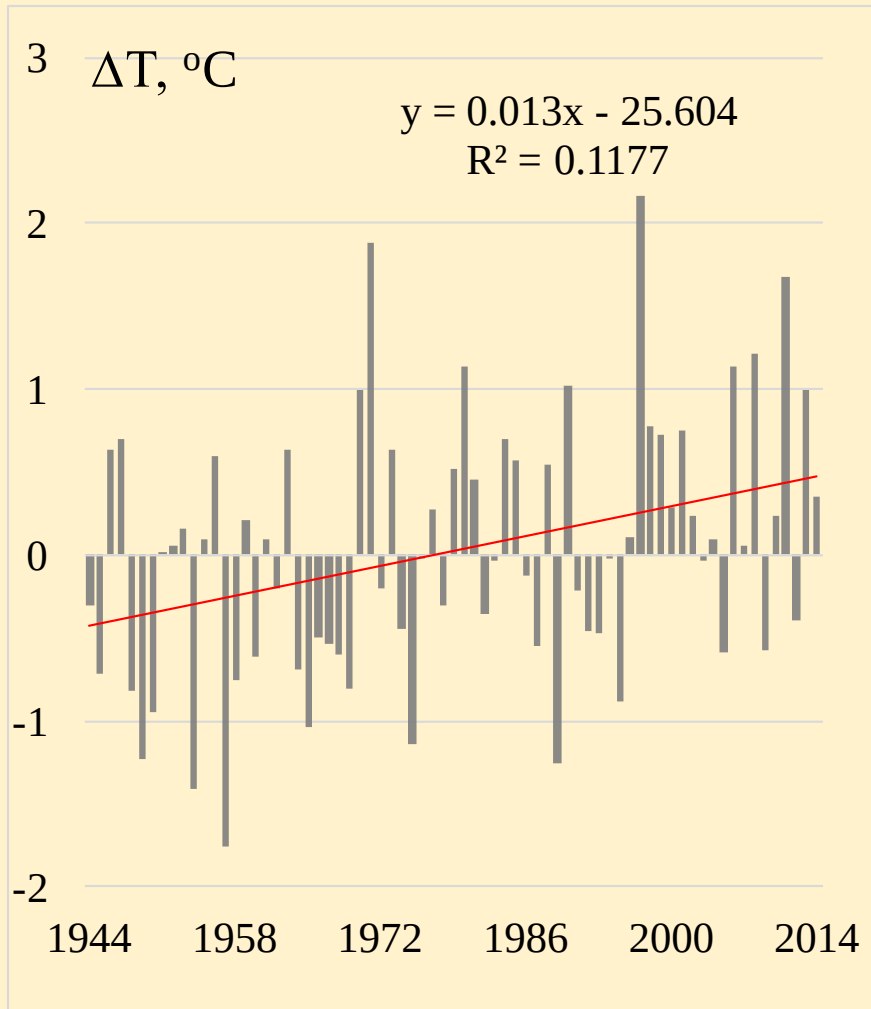
The eastern part

Meteostation Bulunkul

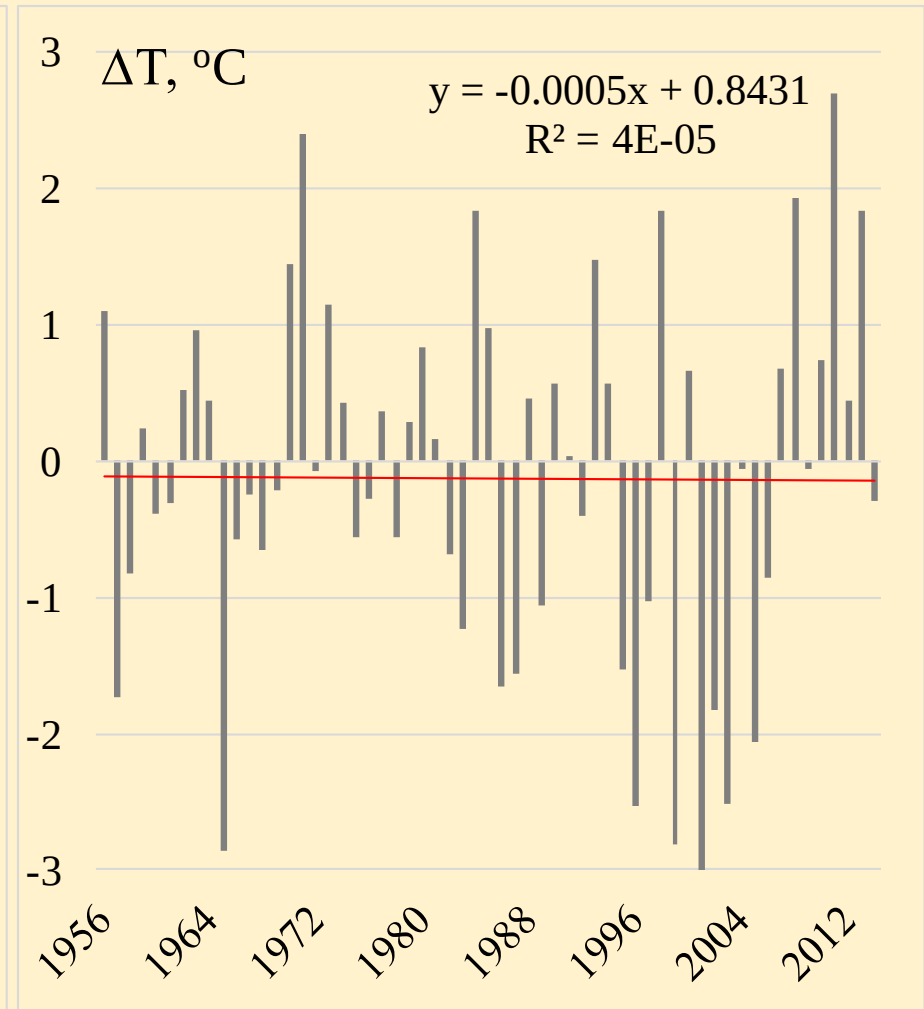


GUNT RIVER BASIN

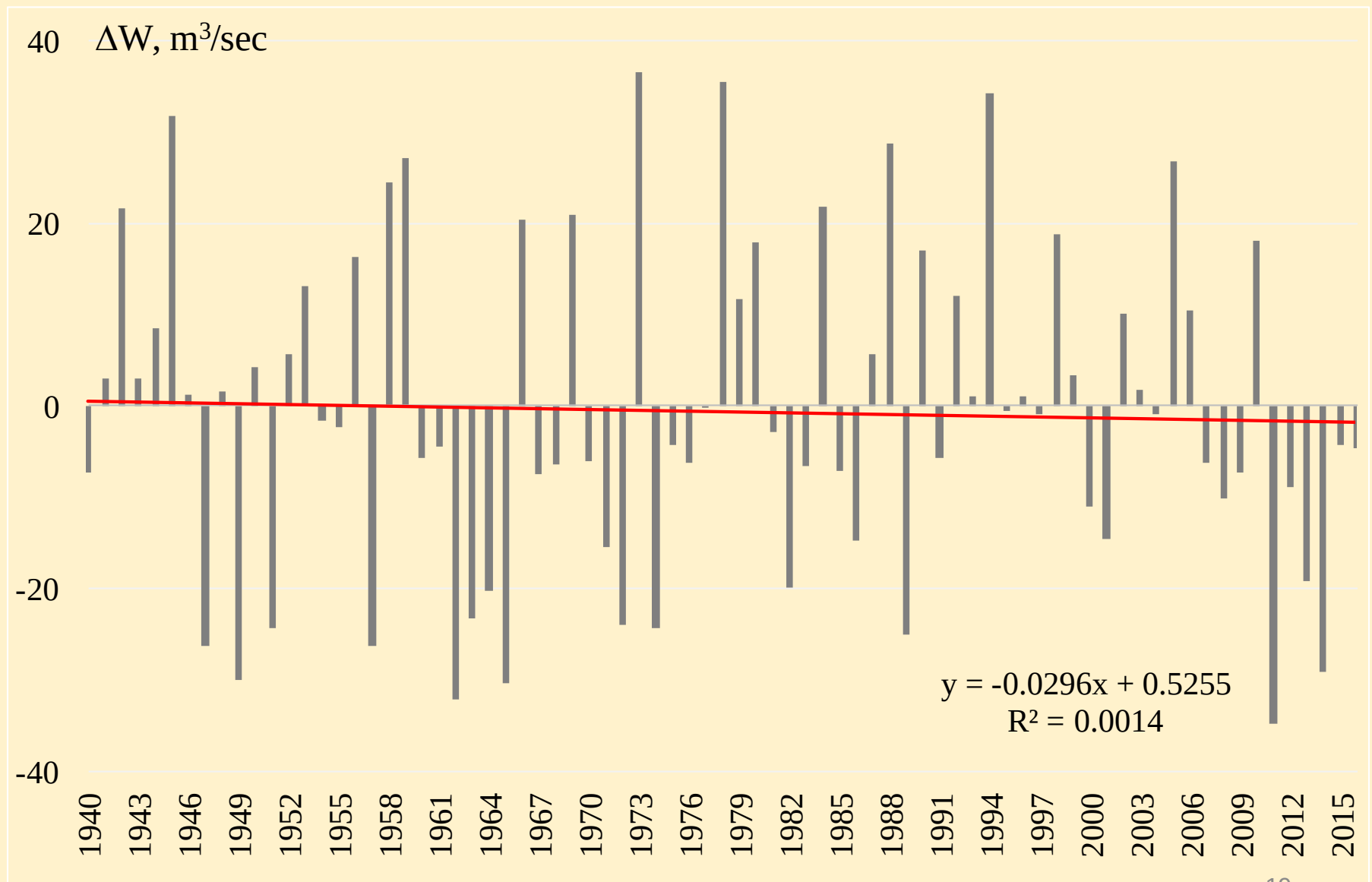
The western part Meteostation Khorog

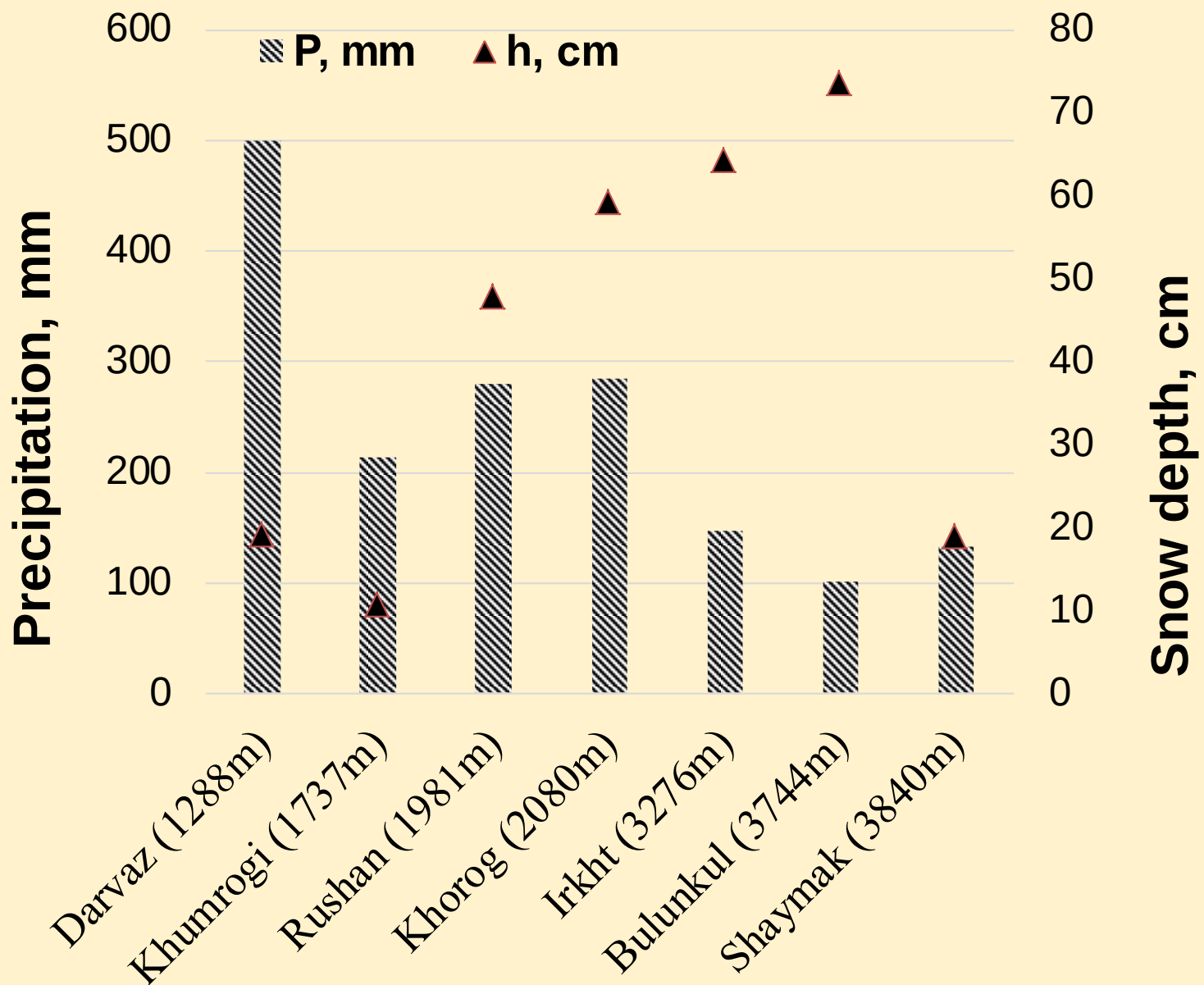


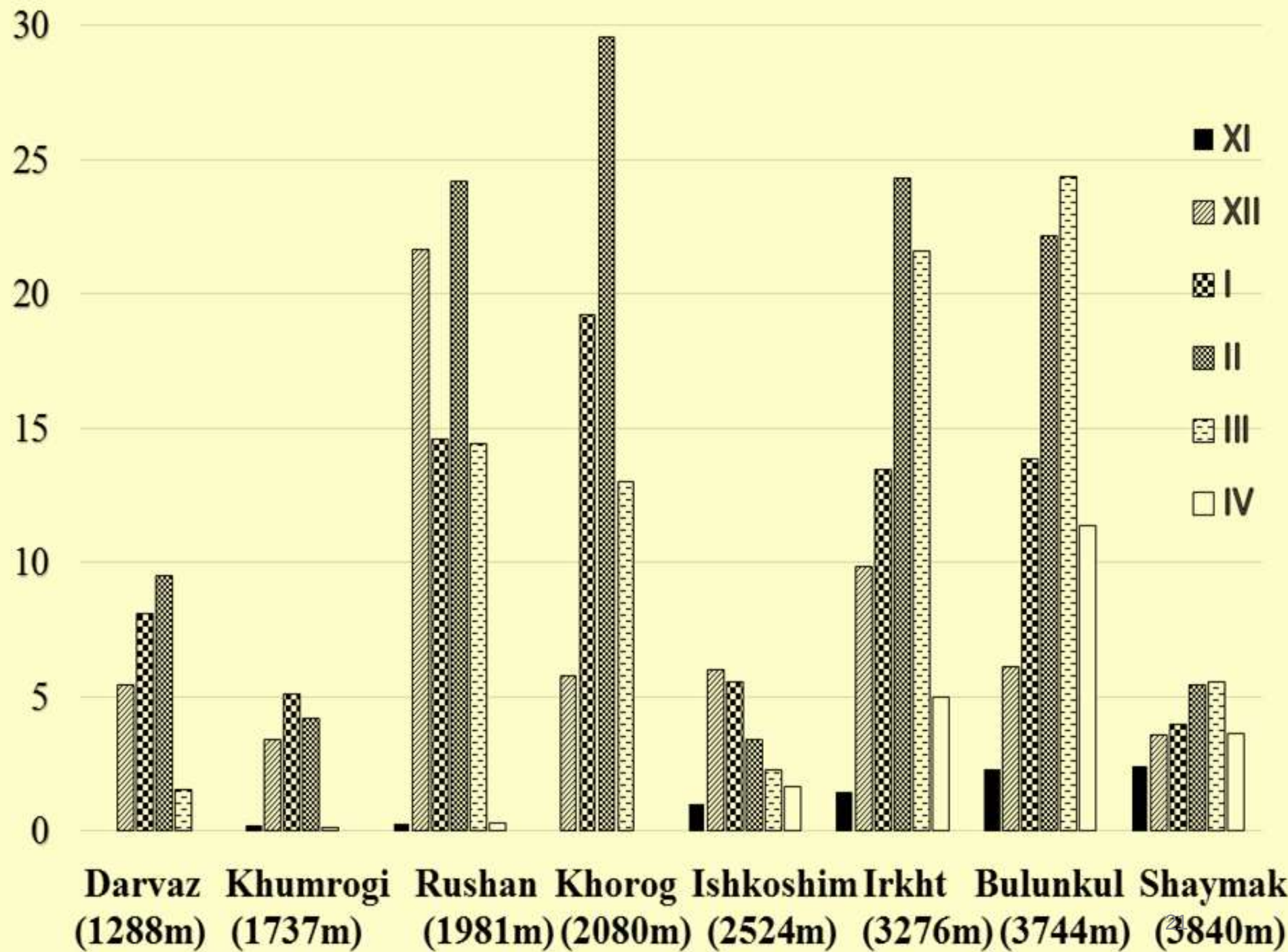
The eastern part Meteostation Bulunkul



The average annual discharge of the Gunt River relation to the long-term for the period 1940–2016







Publication

- 1. *Normatov P., Armstrong R., Hill A.*** The Pamir Mountainous climatic features influence on the Runoff formation of the Transboundary Pyanj River tributaries / Proc. Intern. Conference "Water for Sustainable development of the Central Asia", March 23-24 2018, Dushanbe, Tajikistan. pp. 85-92.
- 2. *Normatov P., Mirzokhonova S., Eshankulova R.*** The formation of the Vanch River runoff the tributary of the Transboundary Pyanj River in dependence of modern meteorological condition/ IGU Thematic Conference "Practical Geography and XXI Century Challenges", June 04-06 2018, Moscow, Russia, p.91.
- 3. *Normatov P., Idiev M., Eshankulova R., Normatov I.*** The influence of climatic peculiarities of the Mountainous region on the formation of river systems runoff/ IGU Thematic Conference "Practical Geography and XXI Century Challenges", June 04-06 2018, Moscow, Russia, p.95.
- 4. *Normatov P., Normatov I.*** Assessment of the snow cover formation and spatial distribution on the Mountain Pamir climatic zones/Proc. 2nd Baikal International scientific practical conference "Snow cover, atmospheric precipitation and aerosols: Technology, Climate and Ecology", June 25-30 2018, Irkutsk, Russia, pp. 34-41.

5. **Normatov I., Normatov P., Markaev B., Norkulova G.** The Pamir Mountain climatic zones in condition of modern Global Climate Change and their contribution to water resources of the Pyanj River/ Abstract 8th International Water Resources Management Conference (ICWRM-2018), June 13-15 2018, Beijing, China, p.189.
6. **Mirzokhonova S., Markaev B., Normatov P., Eshankulova R.** The spatial distribution of Precipitation by climatic zones of the Pyanj Transboundary River upstream/ Bull. Irkutsk St. Univ. Ser. "Earth Sci.", 2018, V.23, pp. 74-83.
7. **Mirzokhonova S., Normatov P., Frumin G., Markaev B.** Influence of climatic features of Mountain regions on formation of river system water flow/ J. Geography. Bull., 2018, V.18, No 4, pp. 63-69...
8. **Normatov P., Frumin G., Markaev B.** Hydrochemistry and Isotope composition of water of Transboundary Rivers / Bull. Rus. St. Hydrometeorology Univ., 2018, No50, pp. 81-87
9. **Normatov I., Normatov P.** Study of traces of climate change impact on hydrological characteristics and water availability in rivers of the Mountain/ Abstract 8th Global Friend –Water International Conference "Hydrological Processes and Water Security in a changing World", November 6-9 2018, Beijing, China, p.48

Thank You for Your Attention