



Research and Information Institute of Meteorology,  
Hydrology and Environment



## RESEARCH DIVISION OF SURFACE WATER

### *Seasonal changes of Ice phenomena and Ice cover*

Purevdagva Khalzan

**Main goal**

Study of physical, chemical and biological processes in surface waters and surface and ground water regime, resources and their interactions in the light of climate change and human influences

Assessment of influence of climate change and anthropogenic impact on water resources, regime, quality and aquatic life

Hydrological gauging stations - 152

Gauging stations on the Lakes- 18 posts

Gauging stations on the Rivers- 134 posts,

Data transmission to center in near real time– 113 (every day)

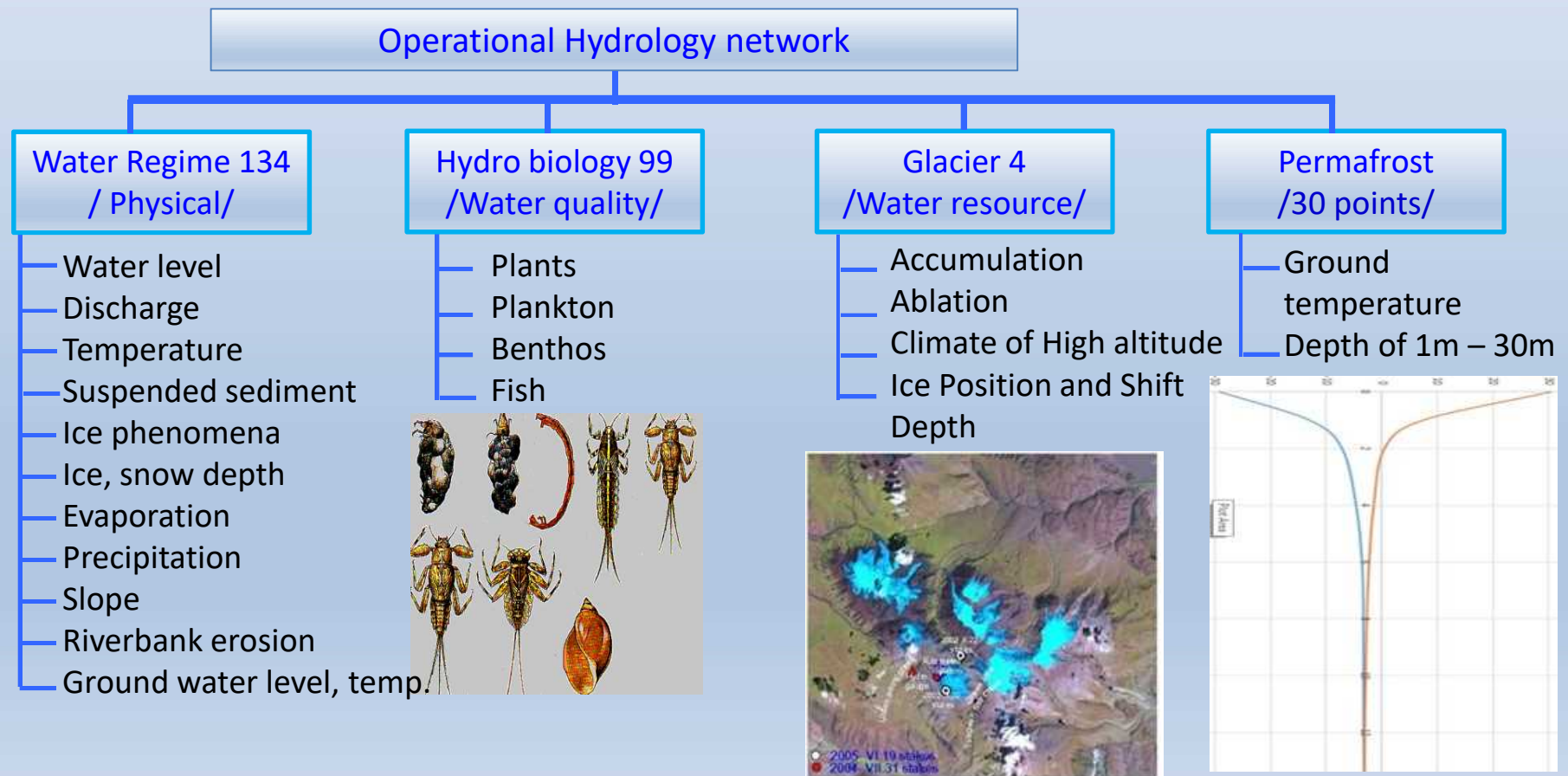
Hydrobiology sampling– 99 points (every month)

Ground water observation – 37 points

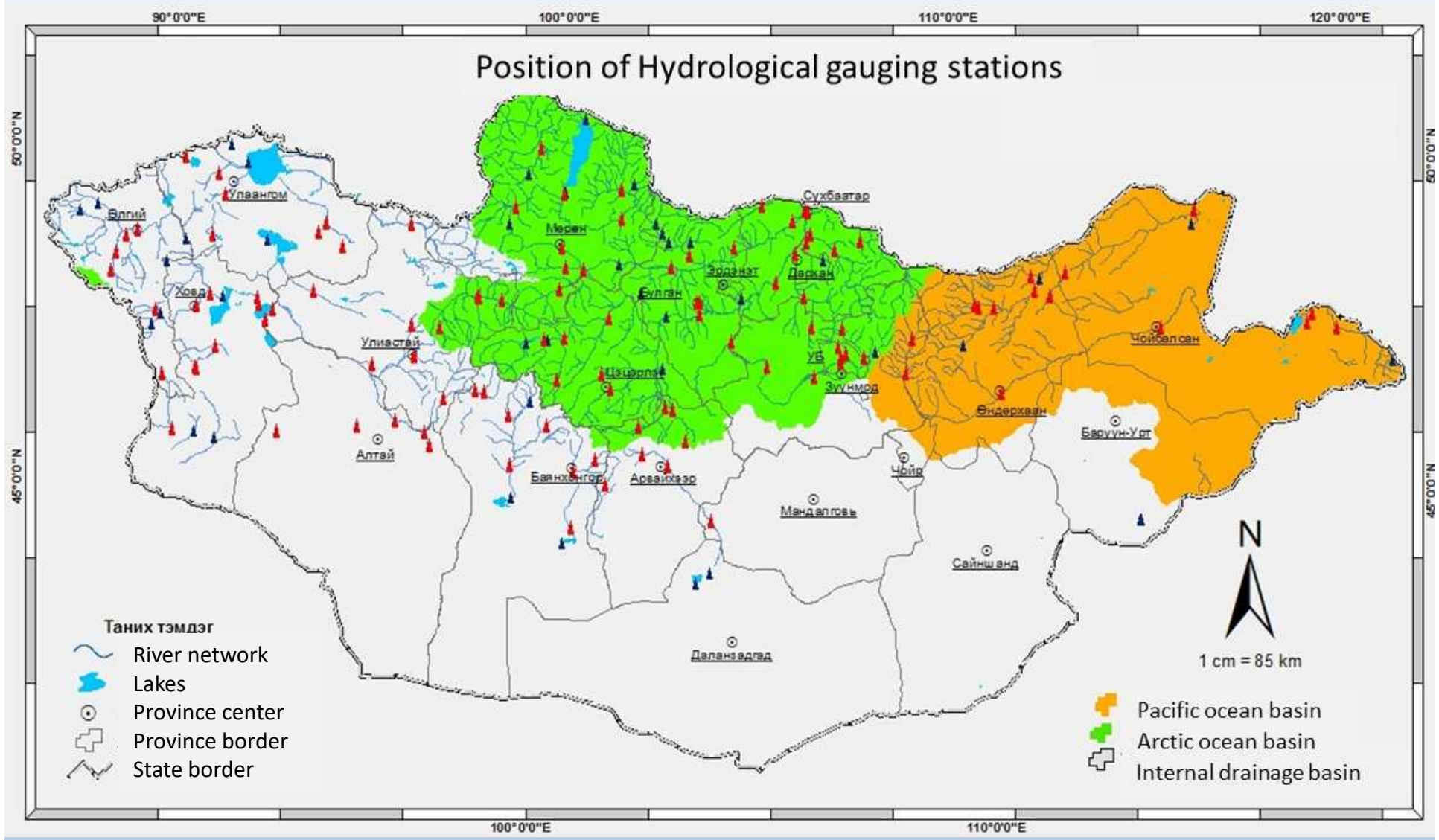
Glacier research – 4 Stations

Spring /small stream/ observation - 18 points

Permafrost /Ground Temperature/- 30 points



# Position of Hydrological gauging stations



## Activities

- Provision of methodological guidance to national hydrological network
- Hydrological service, including operational hydrological reviews, forecasts for prevention of water related disasters as floods, ice break and hydrological drought and improvement of methodologies for hydrological forecasts and information technology
- Development of hydrological database and applications of standard techniques to hydrological practices
- Provision with hydrological information and operative service to decision makers and public needs

## Products

### Forecasts & Hydrological service

- Monthly flow forecast
- Short range forecast for daily water level of rivers, (Flood and droughts) (April to September)
- Forecast of ice depth and phenomena /October to April/
- Forecast of time of complete ice cover and annual ice break (March and October)

### Reviews

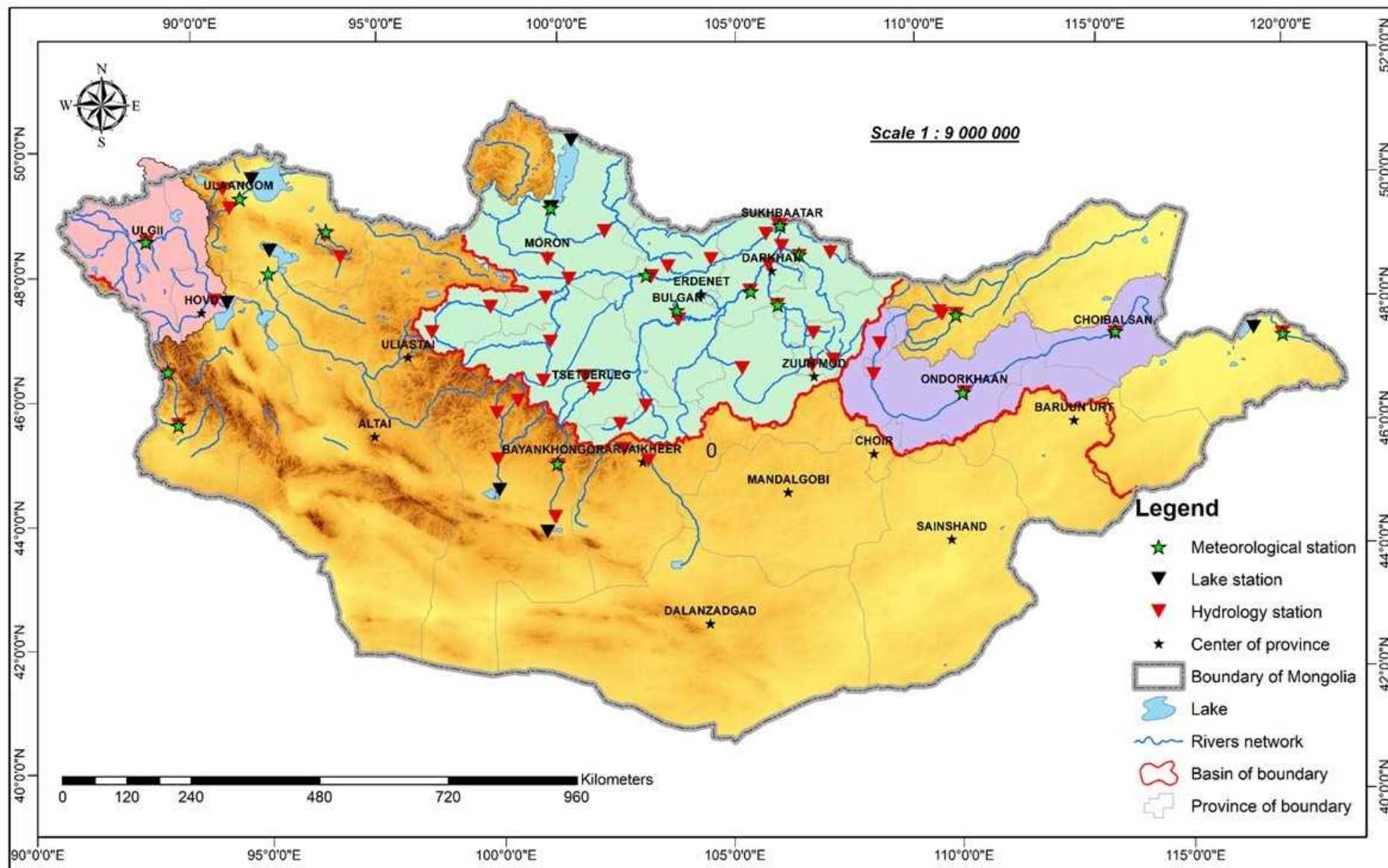
- Decade, month and annual reviews on hydrological regime and water resources

### Database

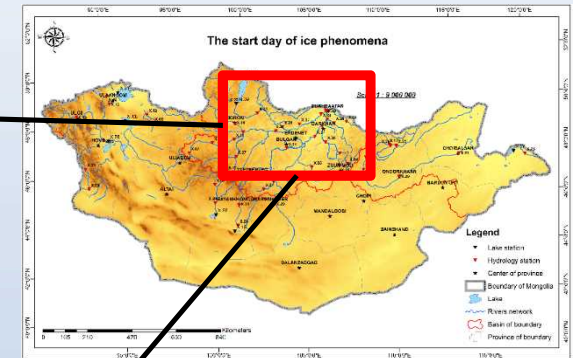
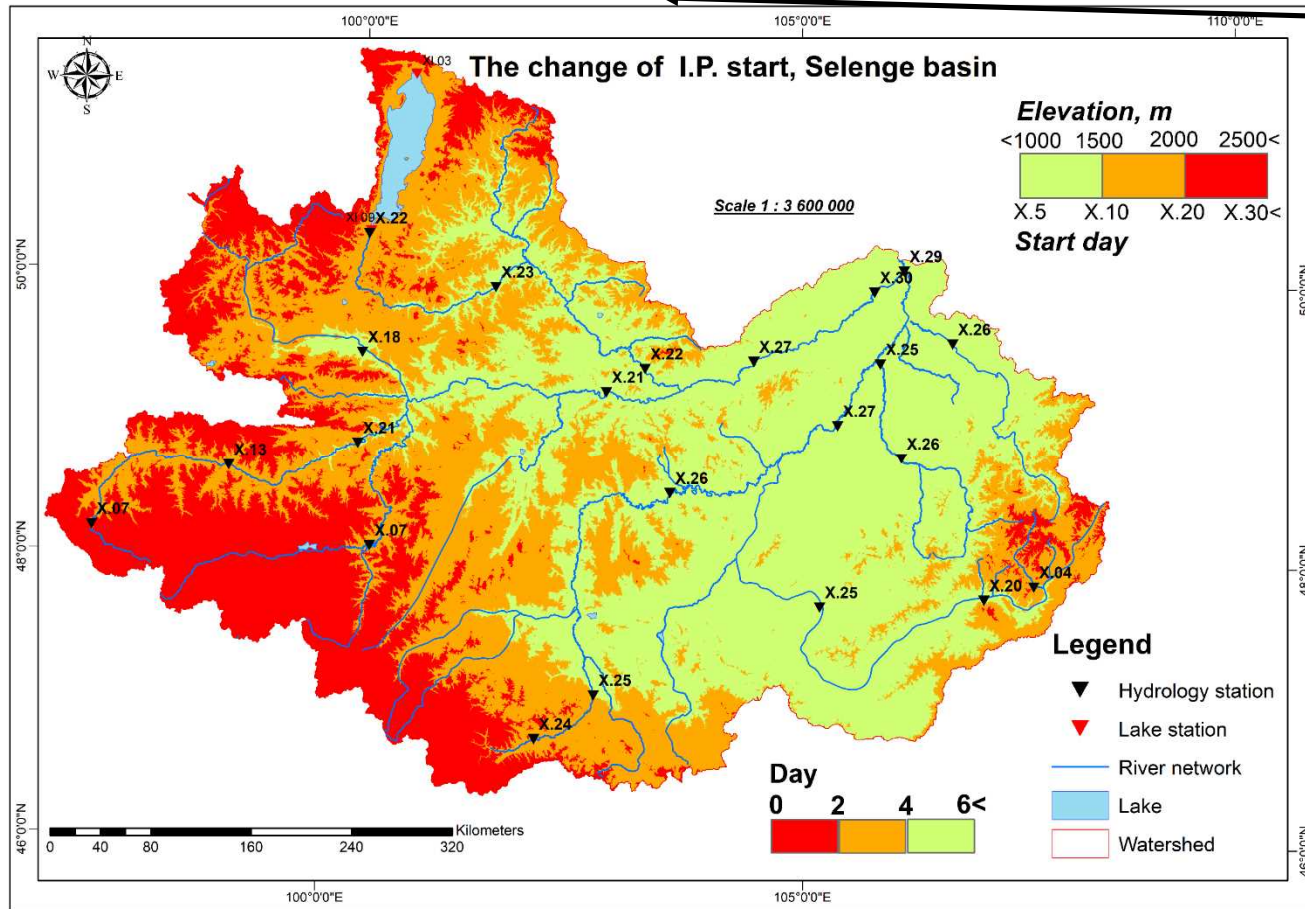
- Hydrological year book
- Hydrological database /since 1940th/



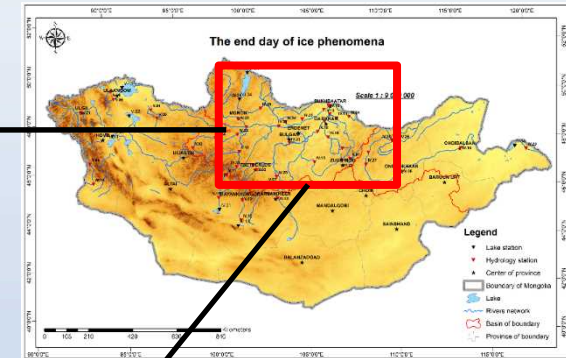
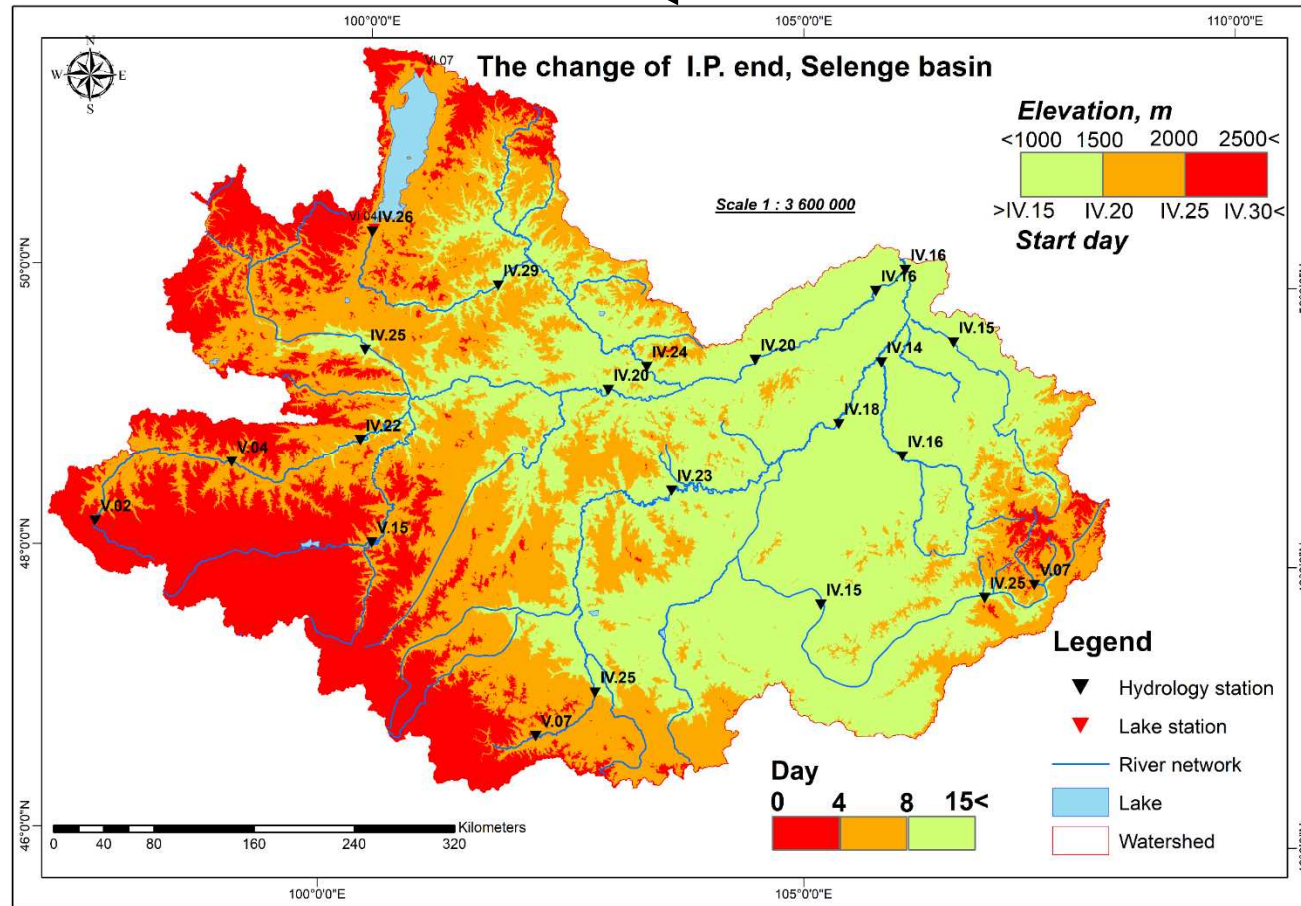
# Seasonal changes of Ice phenomena and Ice cover



The starting time changes of **Ice phenomena** - Selenge river basin, **278804.8** sq.km **1608** m. a.s.l.

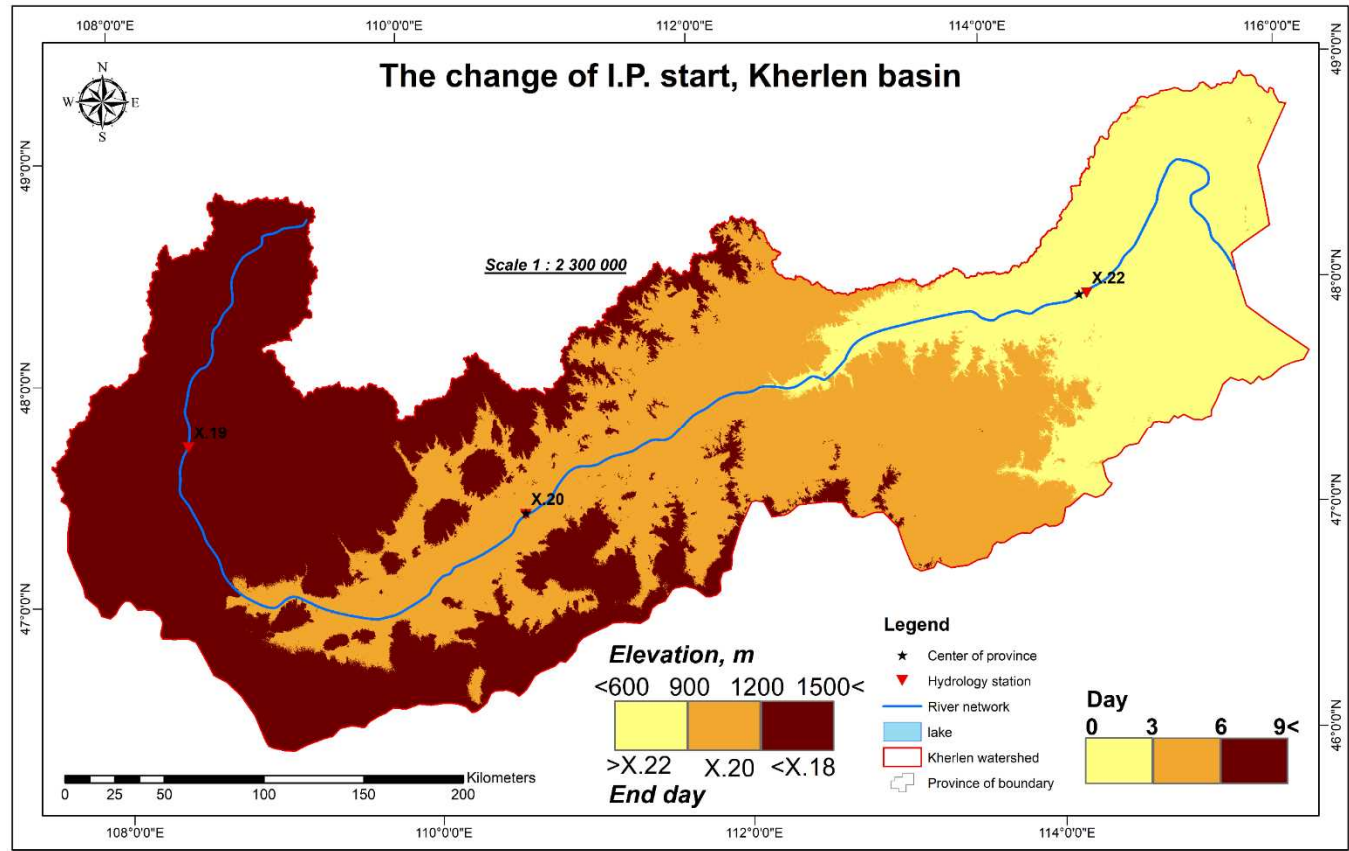
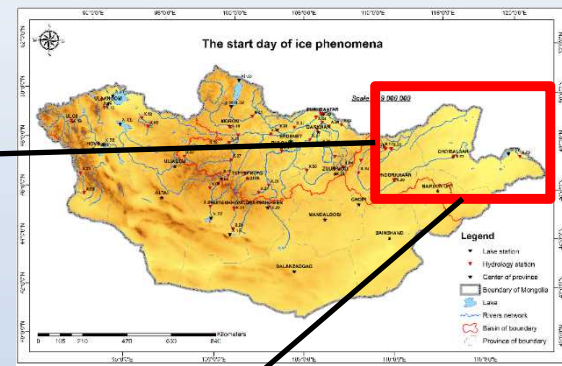


# The end time changes of Ice phenomena - Selenge river basin, 278804.8 sq.km 1608 m. a.s.l.



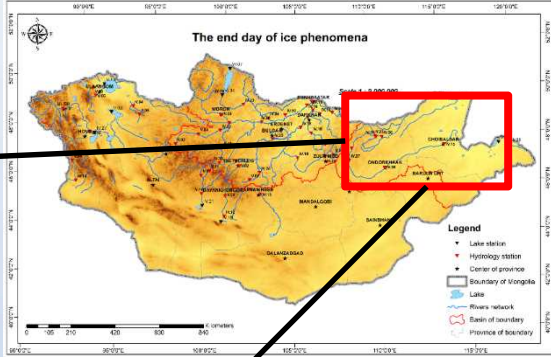
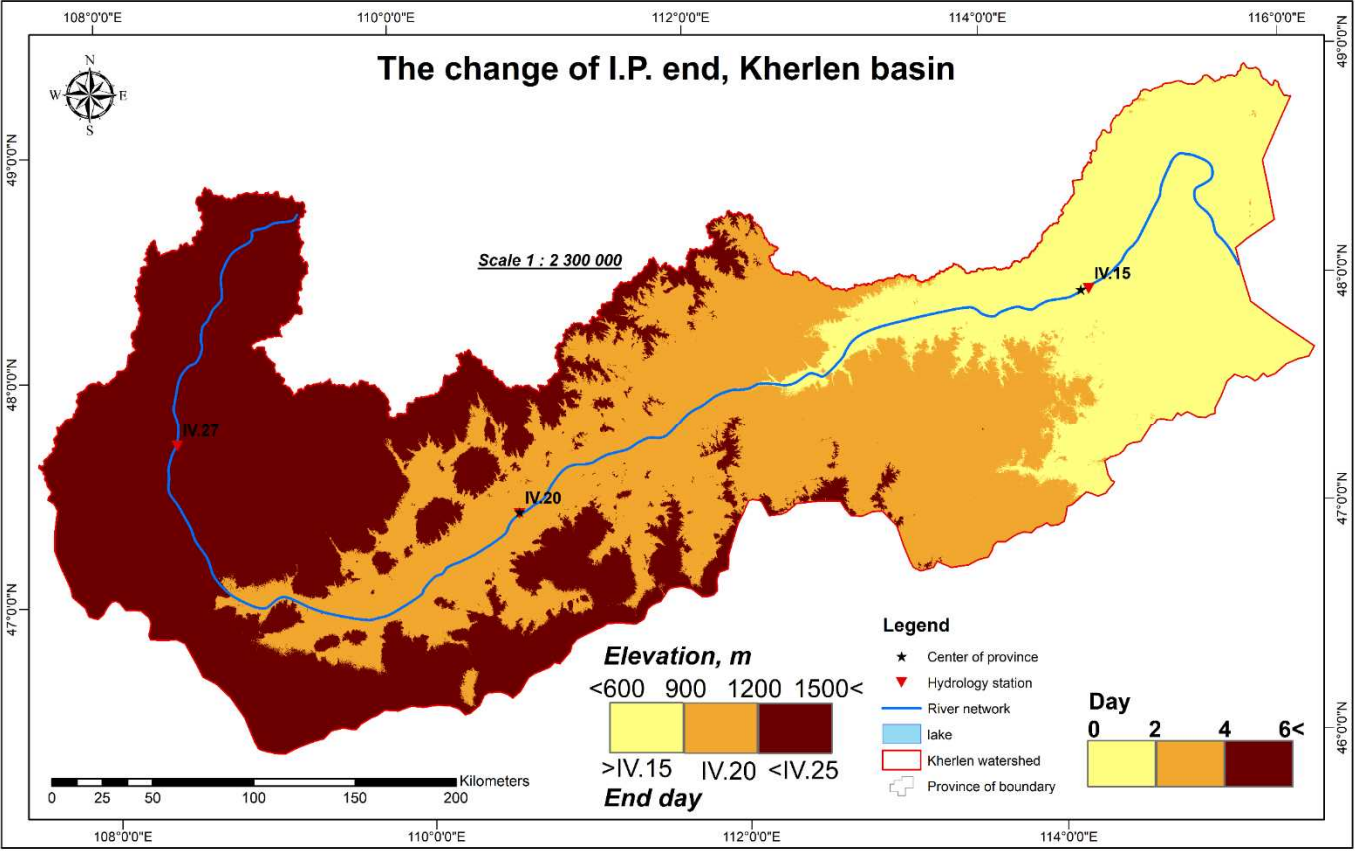


# Starting time changes of Ice phenomena Kherlen river basin, 95592.2 sq.km 1151 m. a.s.l..

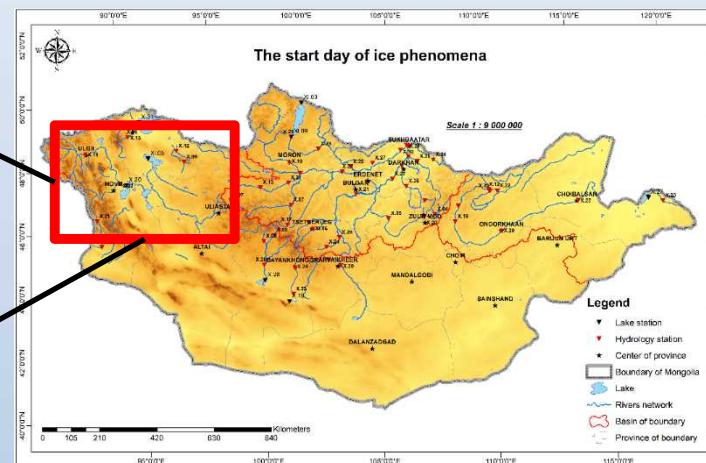
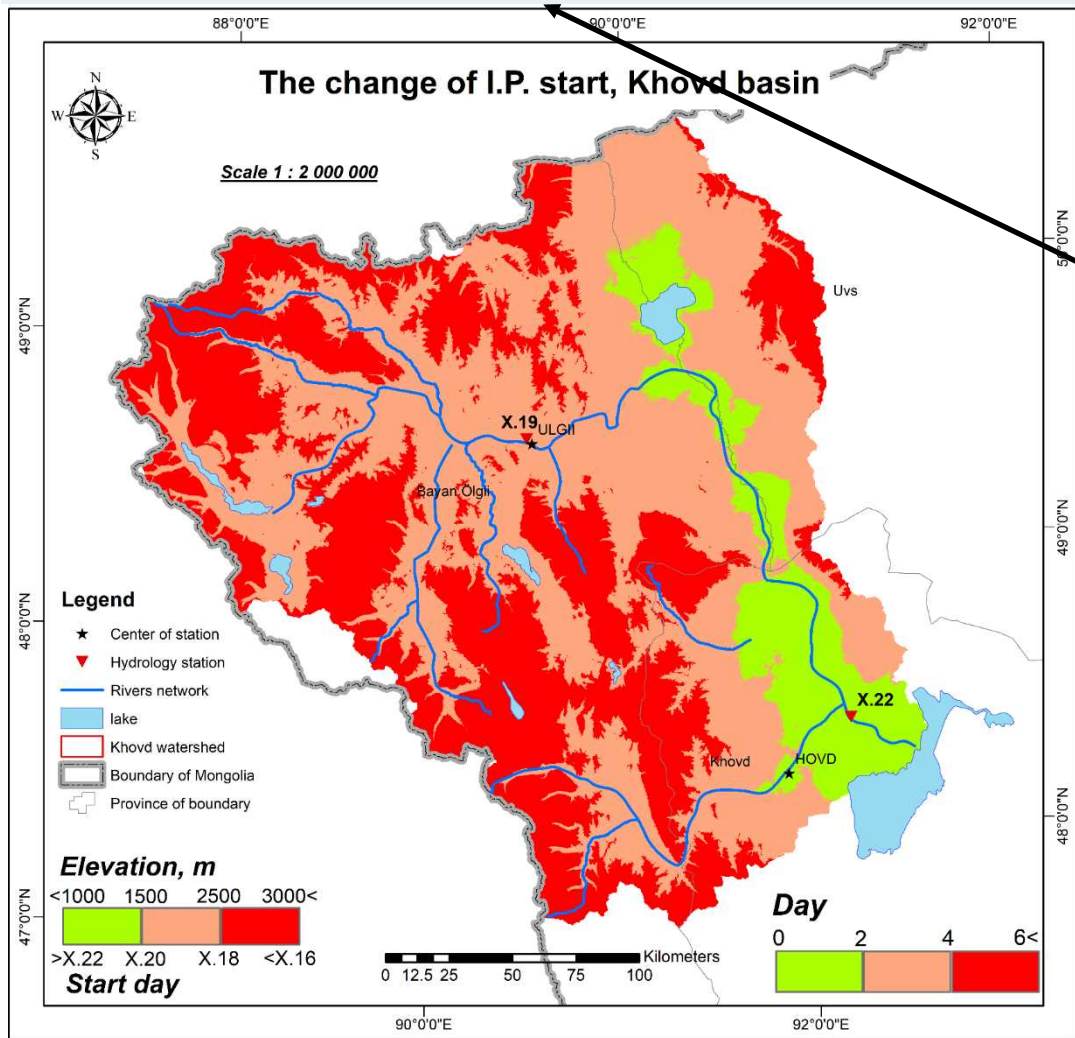


# End time changes of Ice phenomena

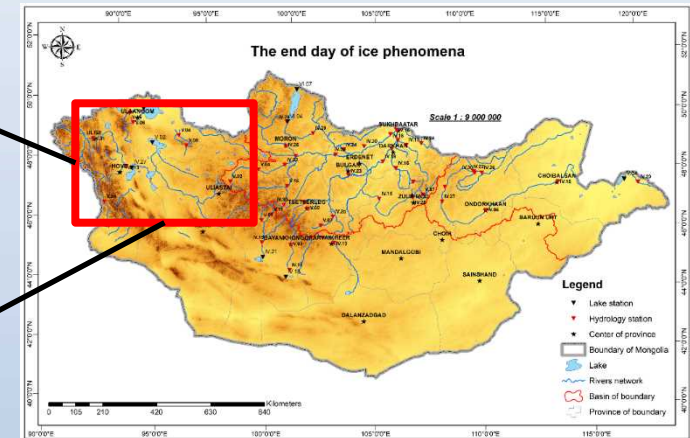
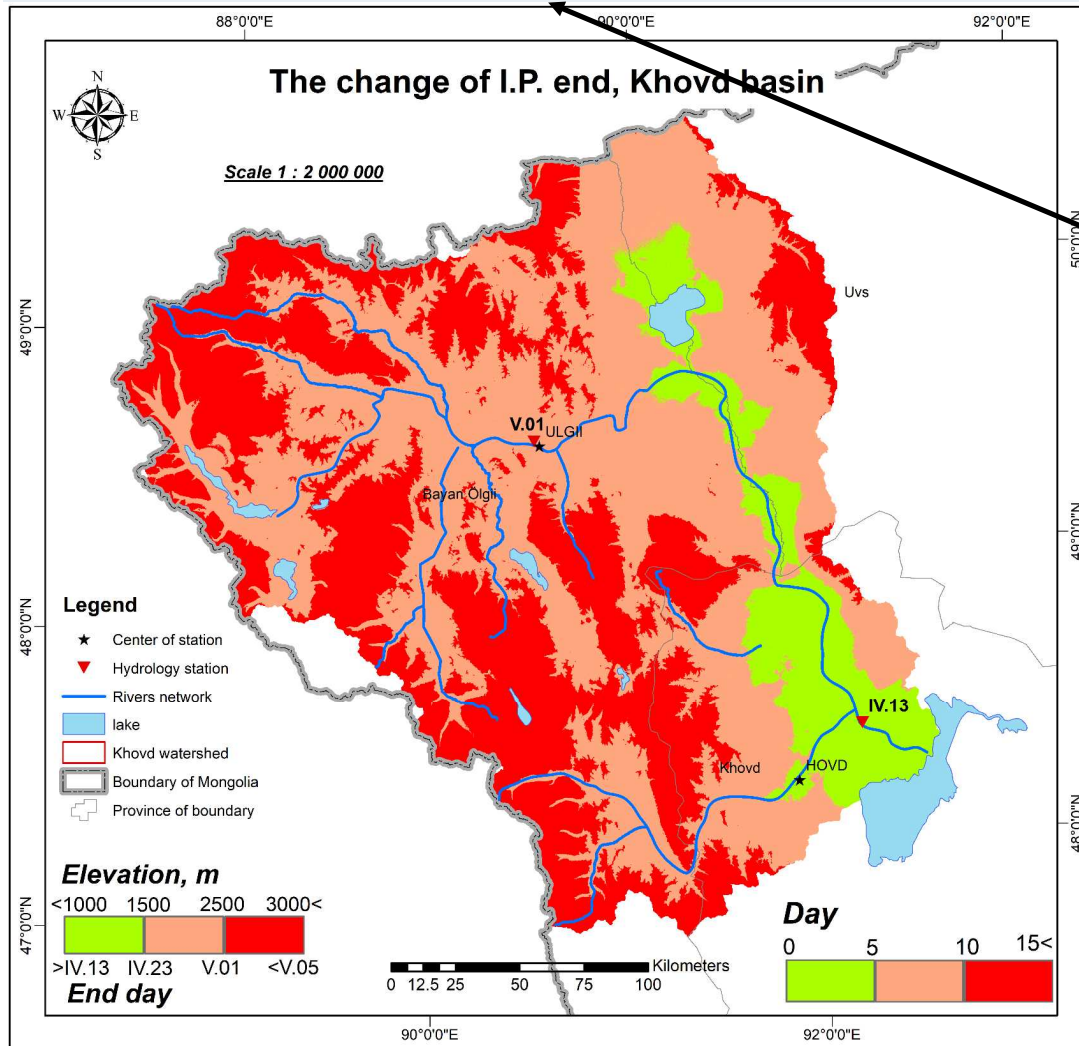
Kherlen river basin, 95592.2 sq.km 1151 m. a.s.l..



# Starting time changes of Ice phenomena Khovd river basin, 59138.6 sq.km 2275 m. a.s.l..



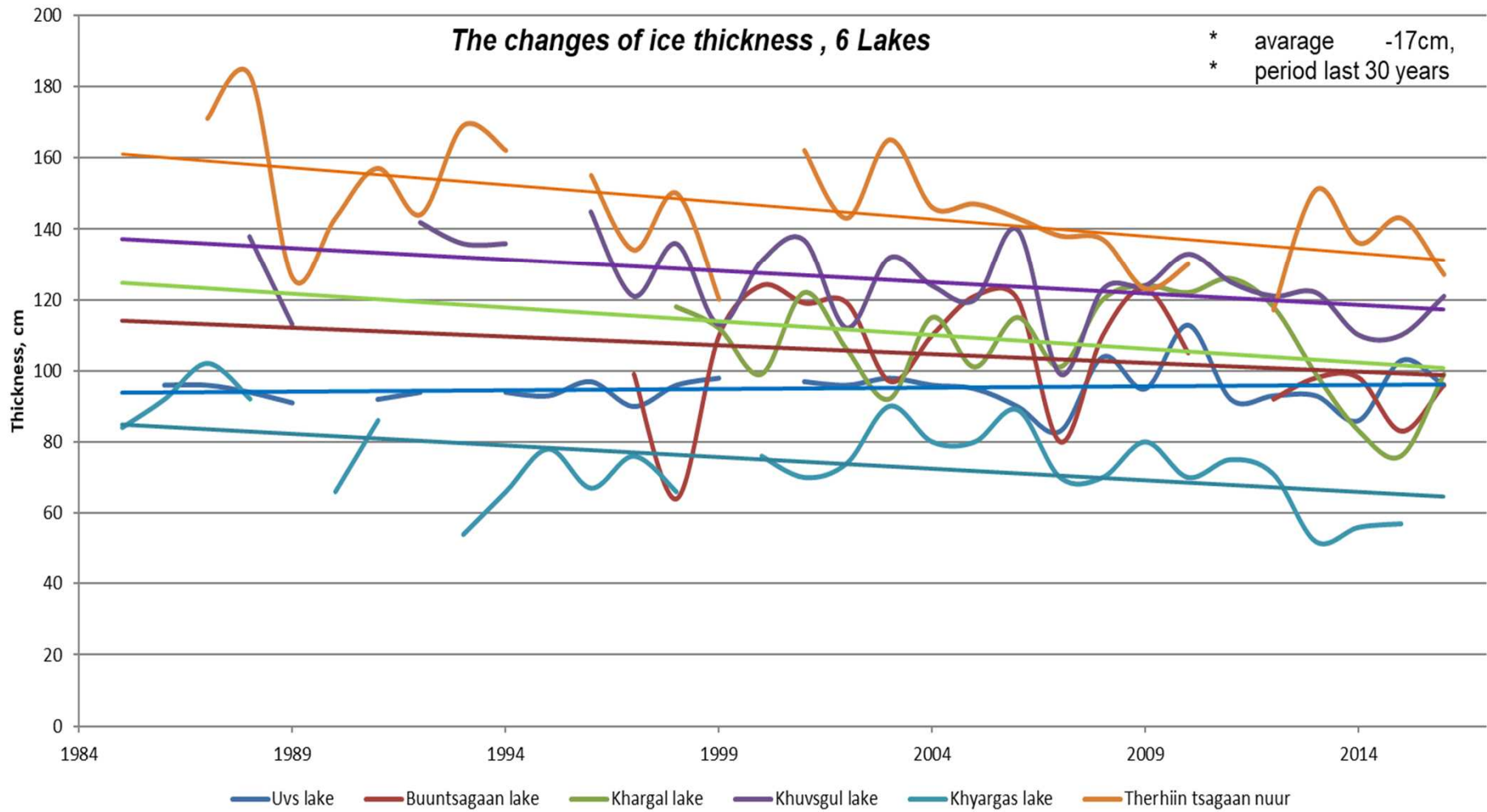
# End time changes of Ice phenomena



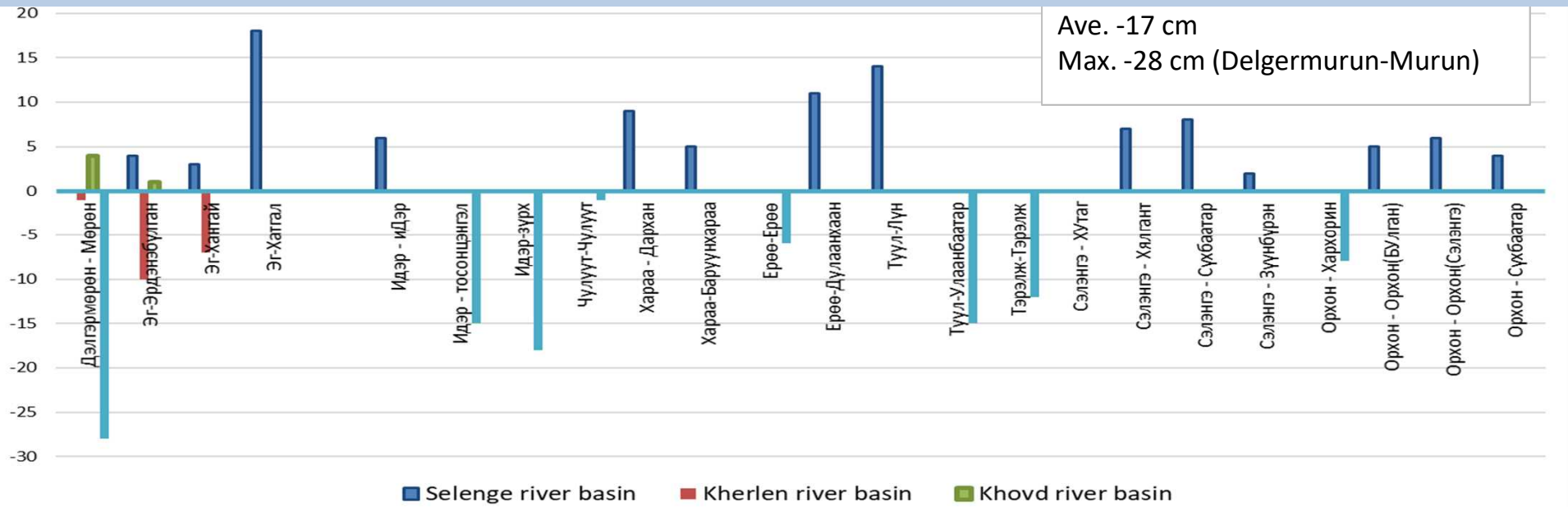


**The changes of ice thickness , 6 Lakes**

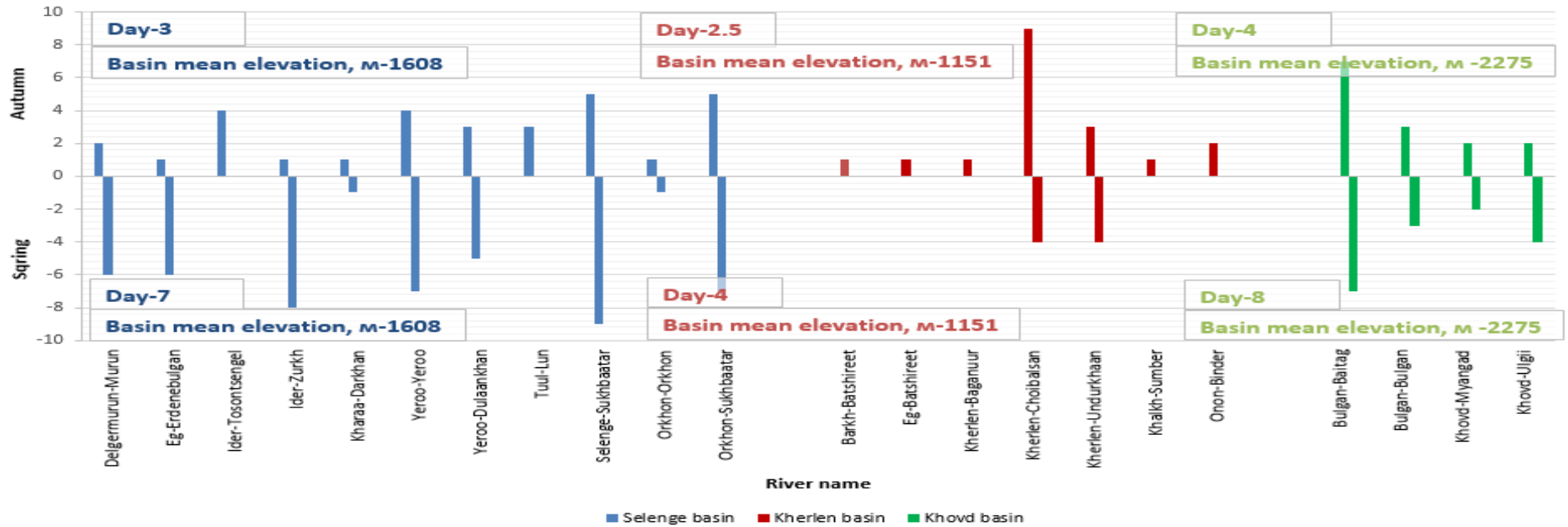
\* average -17cm,  
\* period last 30 years



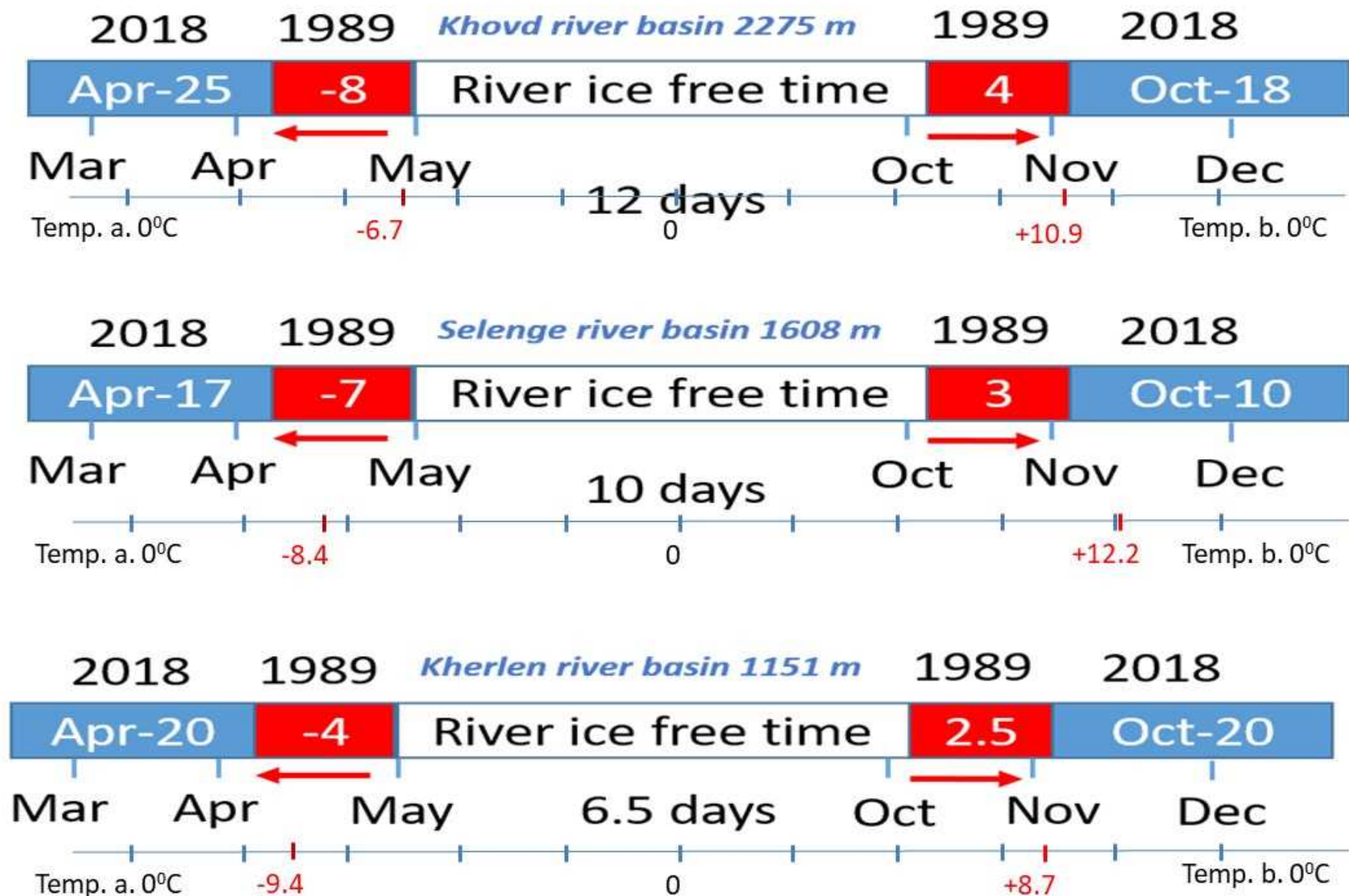
## Time changes of Ice thickness of lakes



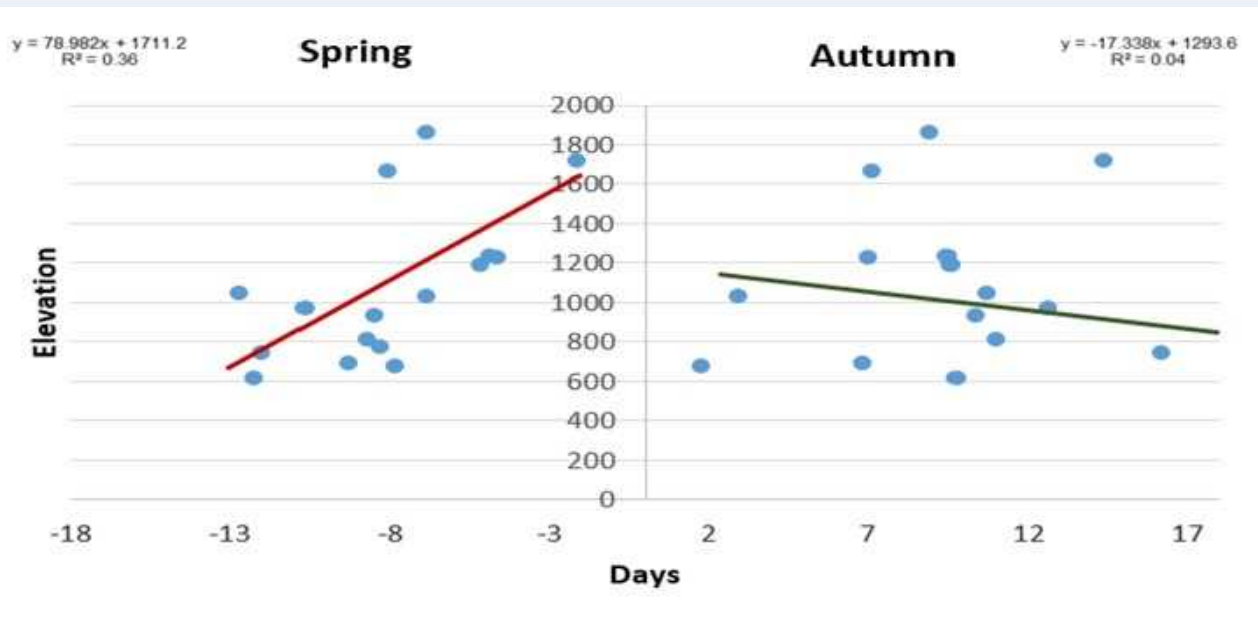
## Time changes of Ice phenomena of rivers



## Time changes of I.P. of three main Basins



The Air temperature passing above, below  $0^{\circ}\text{C}$ .



### Concluding

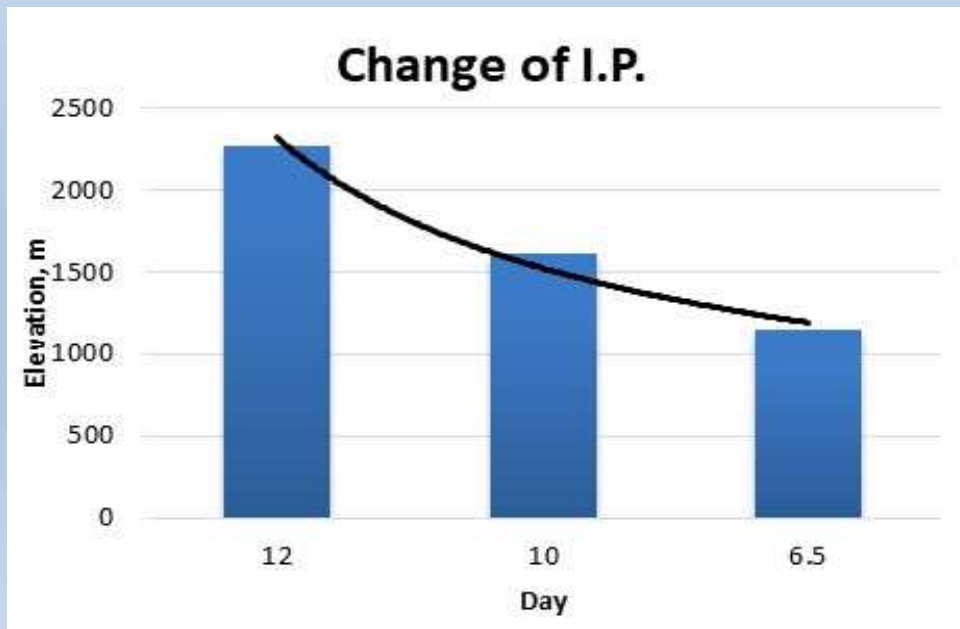
Average days

River Start time changes of I.P. – 6.3 days

River End time changes of I.P. – (-2.8) days

lakes Ice depth change is – (-17 cm)

Max(I.D.) – (-28 cm)





## 2019 forecast of Start of autumn I.P and Ice cover

**Forecast average efficiency - 70 %**

*Forecast of Autumn phenomena and lcy cover in 2019*

Д/д	Rivers and stations	Annual average						2019 forecast	
		Start day of autumn phenomena			lcy cover			Start day of autumn phenomena	lcy cover
		Avarage	Early	Late	Avarage	Early	Late	Time	
1	<u>Сэлэнгэ мөрөн – Хутаг сум</u>	X.31	X.15	XI.26	XI.19	XI.08	XII.09	X.20	XI.25
2	<u>Сэлэнгэ мөрөн - Хялгант баг</u>	XI.01	X.25	XI.09	XII.05	XI.24	XII.19	X.20	XI.30
3	<u>Сэлэнгэ мөрөн - Зүүнбүрэн сум</u>	XI.03	X.22	XI.25	XI.24	XI.01	I.01	X.31	XI.25
4	<u>Эг гол - Эрдэнэбулган сум</u>	X.27	X.11	XI.08	XI.25	X.23	XII.20	X.31	XII.05
5	<u>Эг гол - Хантай баг</u>	X.27	X.17	XI.04	XI.10	X.31	XII.01	X.20	XI.15
6	<u>Дэлгэрмөрөн – Мөрөн сум</u>	X.24	X.01	XI.21	XI.07	X.17	XII.01	X.20	XI.10
7	<u>Идэр гол – Зүрх баг</u>	X.20	X.01	XI.08	XI.10	X.21	XII.01	X.25	XI.10
8	<u>Орхон гол – Орхон сум</u>	X.24	X.11	XI.01	XI.01	X.16	XII.06	X.31	XI.15
9	<u>Орхон гол – Сүхбаатар сум</u>	X.27	X.15	XI.07	XI.18	XI.06	XII.10	X.31	XI.10
10	<u>Туул гол – Улаанбаатар хот</u>	X.24	X.12	XI.11	XI.13	X.28	XI.29	X.25	XI.15
11	<u>Хараа гол – Баруунхараа сум</u>	X.27	X.07	XI.13	XI.15	XI.01	XI.30	XI.10	XI.30
12	<u>Ерөө гол – Ерөө сум</u>	X.24	X.15	XI.02	XI.07	X.27	XI.25	X.30	XI.30
13	<u>Хануй гол - Эрдэнэмандал сум</u>	X.22	X.07	XI.18	XI.17	X.30	XI.27	X.20	XI.10
14	<u>Онон гол – Биндэр сум</u>	X.21	X.08	XI.10	XI.15	X.30	XII.03	XI.05	XI.10
15	<u>Хэрлэн гол - Өндөрхаан сум</u>	X.22	X.03	XI.04	XI.08	X.22	XII.01	X.15	XI.10
16	<u>Халх гол – Сүмбэр сум</u>	X.31	X.21	XI.16	XI.15	X.30	XII.01	XI.05	XI.15
17	<u>Богд гол – Улиастай сум</u>	X.16	X.01	XI.08	XI.14	X.24	XII.13	X.10	XI.15
18	<u>Түй гол – Баянхонгор сум</u>	X.28	X.17	XI.08	XI.17	X.24	XII.09	X.10	XII.05
19	<u>Ховд гол - Өлгий сум</u>	X.22	X.04	XI.08	XI.04	X.17	XII.02	X.25	XI.05
20	<u>Булган гол – Булган сум</u>	X.25	X.01	XI.08	XI.16	X.26	XI.27	X.15	XI.20

THANK YOU FOR YOUR  
ATTENTION