



Kabul University
Geoscience Faculty
Hydrometeorology Department

Glacier Observation (Mass Balance) Report

Upper Kabul River Basin

**Pir Yakh Glacier, Chumar Valley, Paryan
District,
Panjshir province of Afghanistan**

By
Geoscience Faculty of Kabul University

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Atch. --- Photos

1. History,

The Faculty of Geoscience had been established in Hamal 1359 (March 1980). It covered the Geology, Geography and Meteorology Departments. In 1361 (1982) the Department of Hydrology has been added and in 1375 (1996) it has been combined with the Meteorology Department to the Hydrometeorology Department. In 1387 (2008) the Departments of Environment Protection and Disaster Management has been established at the Faculty of Geoscience and in 1391 (2013) upgraded to an own faculty.



Fig-1 Geoscience Faculty of Kabul University

The Department of Geography has been established in 1330 (1951) together with the branch of History at Kabul University. Due to the development of Geography and its growing importance, the Department of Geography has been separated from the faculty of Literature and Human Science. The aim of the Geography Department was to train the young geographers as teachers. Later, the need for geographical knowledge and the demand for research have grown especially for different ministries and organizations working in spatial-related fields.

At the beginning, the Department of Geography had a partnership with the University of Nebraska and then by bringing changes in academic curriculum the partnership was signed with Germany since 1359. After a break due to the war, since 2001 the close relationship with German universities is still going on.

The Department of Geology has been established in 1334 (1955) with the support of Afghan and German experts in order to educate geologist. Since it's establishment the Department of Geology has an academic and technical cooperation with the Geology Department of Bonn University. According to the development plan of Kabul University and the specialization in different academic fields in 1359 (1980), the Department of Geology has been integrated with the Faculty of Geoscience.

The Department of Meteorology has been established in 1342 (1963) and in 1359 (1980) transferred from the Faculty of Natural Science to the Faculty of Geoscience. In 1361, (1982) the Department of Hydrology has been established and integrated with the Department of Meteorology in 1375, (1996). The new established Department of Hydrometeorology focused its academic activities on the education of Meteorologist and Hydrologist for the different sections of the national economy of country.

2. Report Summary

In the July 06, 2017 the Hydrometeorology of Department of Geoscience Faculty, Kabul University laid down the foundation of new academia and launched the Observation/Monitoring of the Glaciers for the first time ever in Afghanistan in Upper Kabul River Basin by doing a site visit (Mass Balance Measurement) and installing the measurement sticks, the subjected glacier is located in 150 KM to north side of the Kabul city, in Chumar Valley, Paryan District, Panjshir province of Afghanistan.

The local people call the glacier Pir Yakh which means (Old Ice) the Pir Yakh glacier is the biggest Glacier in the province by 2.1 KM length and 0.8 KM wide, the glacier tongue starts on 4,400 M above the sea level and the accumulation zone pique ends on 5,070 M above the sea level.

The Kabul University Mass Balance Measurement mission began on July 06, 2017 and finished on July 08, 2017 and last for three days, first day on 03:00 AM we moved toward the glacier from Kabul and 08:30 PM camped on the Chumar valley, next day at 4:00 AM we moved to Glacier and reached on 2:00 PM on the glacier tongue by 3:15 we reached to a proper location for installing the first measurement stick by 4:30 after installing the second stick we moved toward the camp and by 8:00 reached to the camp, our camp was 2,950 m walking distance of the glacier, next day

early morning we moved toward the Kabul and by 9:00 PM we reached to Kabul city. Due to time budget limitation and we couldn't go to upper glacier zone (Accumulation Zone) to do Snow pit, but for next year plan to do a complete Mass Balance Measurement by scheduling more time and a proper budget.



Fig-2 Drilling for installing the measurements sticks
Using Heucke Ice Drill



3. Staffing

Our first mission is completed by close coordination of the our team including

1. Abeer Ahmad Sajood Assistant Researcher as team leader
2. Associate Prof. Hedayatullah Arian
3. Abdullah student and trainee
4. Mohammad Naser Student and Trainee
5. Ruhullah driver
6. Kamaludin local coordinator
7. Abdul Momen local guide and porter
8. Ghulam Rabani local guide and porter

4. Work Narrative

We have installed the two measurement sticks on the ablation zone in 4 M depth, we used PVC Pipe 0.5"D x 2M with an expansion joint at med with total length of 4M

The below table shows the characteristics of installed sticks

No	Name of stick	Elevation Above the see	Latitude	Longitude	Date installed
1	PY 10	4546 m	E70° 10.797'	N35° 35.922'	7/7/17
2	PY 20	4740	E 70° 10.549'	N 35° 35.845'	7/7/17

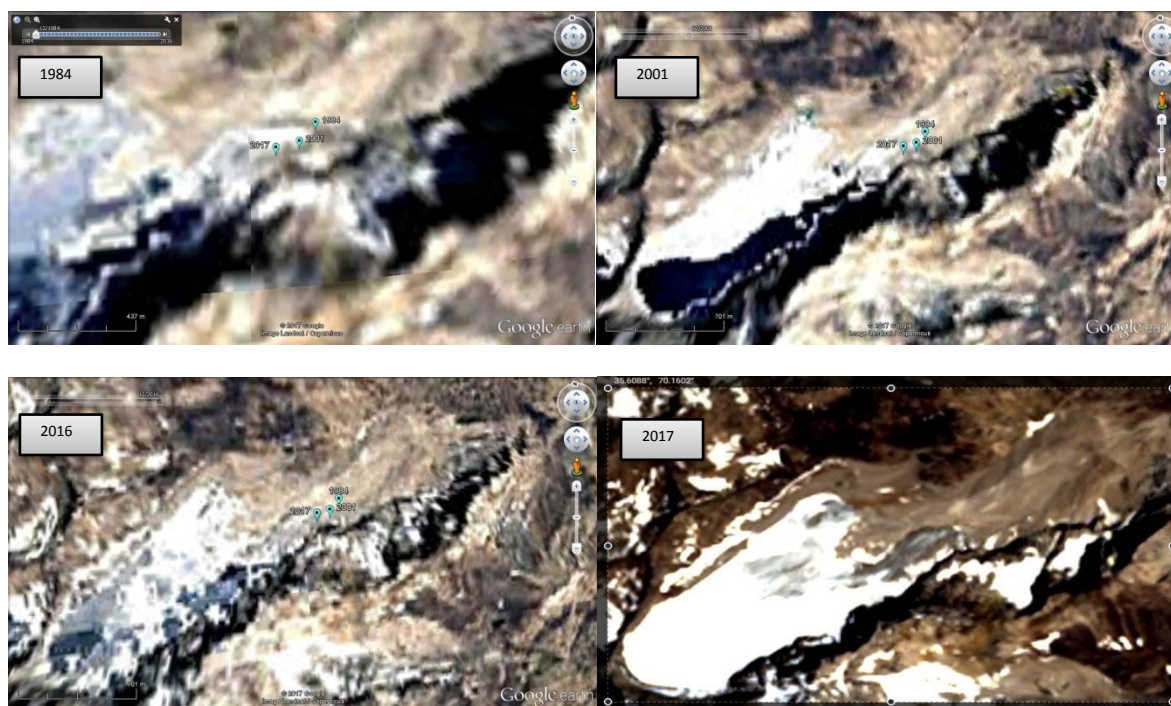
5. Findings

On the first stage of the selection of the glacier when we planned to do an observation, the start point of the Pir Yakh glacier tongue according to satellite landsat image captured 1984 was 4381m above the see level, in 2017 what we saw the glacier tongue has been decreased and moved backward to 4475m above the see level, the glacier tongue since 1984 is retreated 211m which means 6.39 m/y.

The current discharge from the glacier on the date of observation is 2.08 CM/Sec

By next year observation of the Measurement Sticks and doing Snow pit more details will be revealed.

The images show the location of the glacier tongue in series of time



6. Equipment

Our field Equipment that we used are donated by CHARIS in cooperation of University of Colorado Boulders and World Glacier Monitoring Services WGMS, as below;

No	Description	Quantity
1	Mountain boots	4
2	Tent with 2 person capacity	2
3	Sleeping Pad	4
4	Glacier sunglasses	4
5	Harness	4
6	Carabineers	4
7	Slings	3
8	Crampons	4
9	Ice-Axe	2
10	Ice screws	2
11	Gaiter	3
12	Heucke Ice Drill 1 with drilling facility for 8m depth	1
13	Walking poles	4
14	Snow Pit Equipment complete set (Pro Snow Kit III)	1
15	Quickdraws	1
16	Climbing Rope	1
17	Traxion Pulley	1
18	Rescue Pulley	1
32	Camera	1
33	Waterproof Hand GPS	1
34	Sleeping bag	4
35	truck	1

7. Challenges

For the completing of the first ever Glacier Observation in country like Afghanistan there is always challenges lays ahead, we have listed some of them:

- The most challenging factor was timing of the mission since we had three days we had work 16 hr/day to overcome our first mission.
- Since it was the first time of our team to visit a glacier in the altitude of more than 4,500 M above the see level so none of our team member was ready for hiking in such altitude with non-proper pathway and we lost lots of time.
- A big part mountain had fallen down on the surface of the glacier and covered almost surface of the ablation zone, finding a plane surface with no rock was difficult to us for installing the measurement sticks. see Pics 13-17
- Our thermal Drill was adjusted with its own Gas balloon and its equipment we changed the Gas balloon and its equipment according to available local features but it wasn't working properly on the site over the glacier and wasted lots of our time.
- A tight budget situation forced us to make as much as possible shorter the mission duration (3 days) so we could not do the Snow pit and its analyzing

8. Fun

We had a good cooperation and excitement to see for the first time a glacier within Afghanistan and seeing the glacier tongue was the best memory that we keep it forever from this trip, the local people were always amazed hearing that a group is going to climb to heist mountain on the province and doing some academic works and every one was encouraging us.

The hospitable local people were always welcomed us by providing fresh and organic dairy products and we had good time while having breakfast, lunch and dinner with them.



9. Communication:

For the first time launching the Glacier Observation we had to communicate with several parties and governmental agencies for arraignment and completing of such mission including:

- Communication and coordination with Research Project: Contribution to High Asia Runoff from Ice & Snow (CHARIS) with leadership of Dr. Richard



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Armstrong for support and donation of required equipment for completing this mission.

- Communication with World Glacier Monitoring Services (WGMS) with leadership of Dr. Michael Zemp for registering this mission and subjected glacier and support this project.
- Arranging meetings and communication with Geoscience Faculty of Kabul University for making the official communication and introducing our team to security departments of the states.
- Meeting the Government, security and cultural departments of Panjsher Province to inform then by official letter from Kabul University of such a research project.
- And finally meeting the local people for making the arrangement, cooperation and for providing local staff and renting the porters.

10. Financial Report

The Geoscience Faculty would like to thanks to Dr. Richard Armstrong and Dr. Michael Zemp for their support and donations of the tools and equipment, however Mr. Abeer Ahmad Sajood has paid all the field trip expenses, but for the future missions we need a stable financial support for the continuation of this research project.

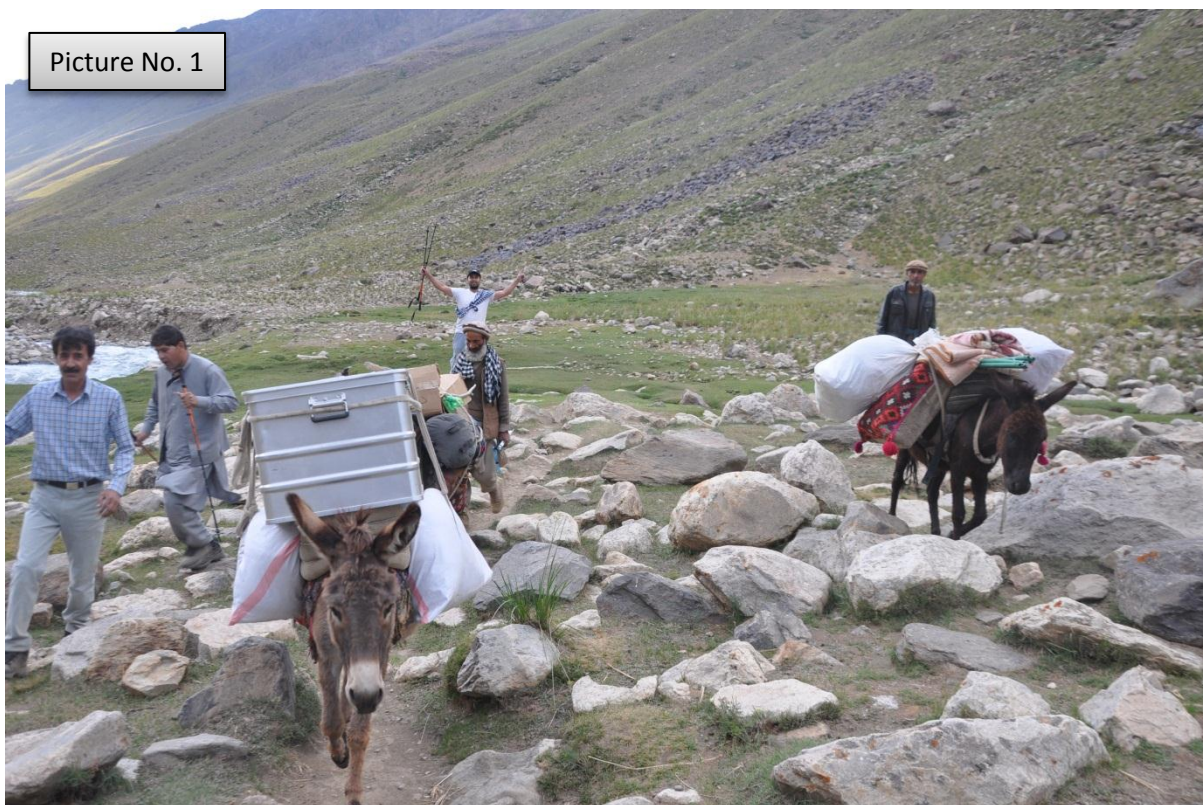
The government of Afghanistan agrees with such project and encouraged our team but currently has no budget for such a project.

11. Conclusion

- The Hydrometeorology Department of the Geoscience Faculty, Kabul University has leached Glacier Monitoring for the first time in Afghanistan successfully in 2017 however we have not enough expert staff.
- As the Glacier Monitoring (Mass Balance Measurement) is yearly base operation our team is ready for the future operations in order to stand as an active member of WGMS in the future.

A special thanks to Prof. Abdul Ghias Safi Dean of Geoscience Faculty for his unlimited supports to our team, former Dear of the Faculty Prof. Mohammad Naim Eqrar for his always supports and encourages sine the idea of this project, Prof. Hedayatullah Arian for his taking part to this Project our rest team who helped for a successful mission.

Picture No. 1



Picture No. 2



Picture No. 3

Moving at night for saving time



Picture No. 4



Picture No. 5



Picture No. 6



Picture No. 7

No proper way to the glacier, we lost most of the time and energy in climbing



Picture No. 8



Picture No. 9



Picture No. 10



Picture No. 11

The glacier tongue has
retreated 104m since 2001

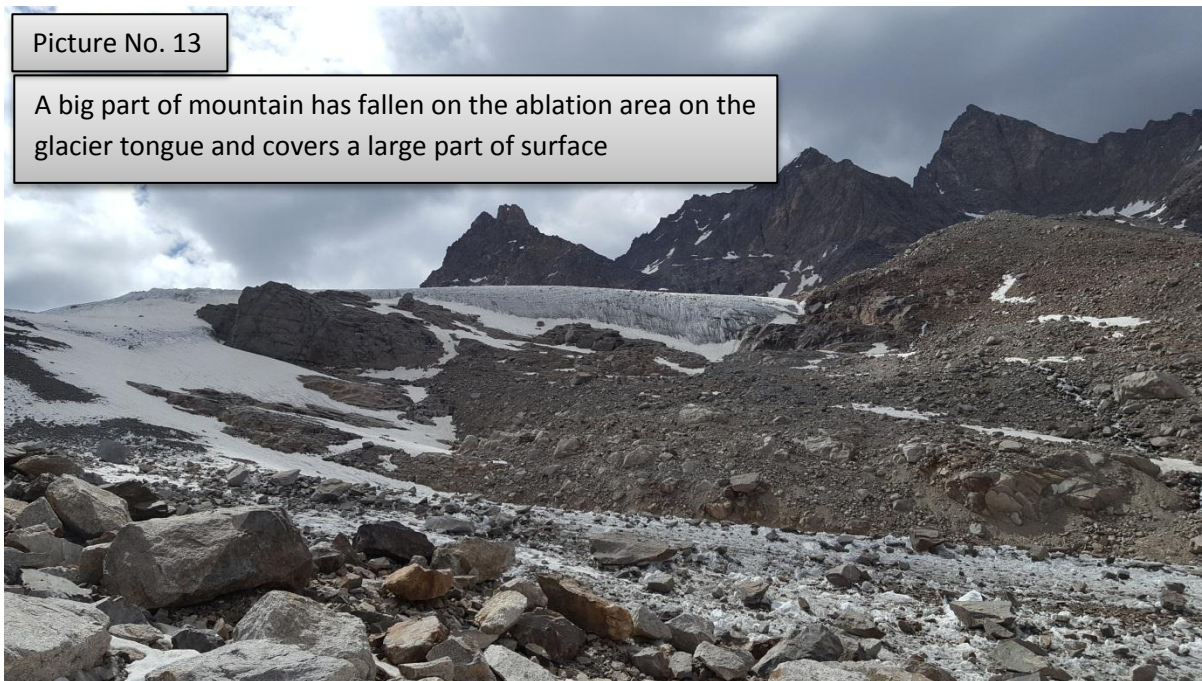


Picture No. 12



Picture No. 13

A big part of mountain has fallen on the ablation area on the glacier tongue and covers a large part of surface



Picture No. 14





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Picture No. 15



Picture No. 16





Picture No. 17

The clear surface of the ablation zone where the sticks installed is covering with 20-30cm snow



Picture No. 18

Drilling to 4m depth for installation of stick



Picture No. 19

Installation of measurement stick



Picture No. 20



Picture No. 21

Glacier discharge measurement



Picture No. 22



Picture No. 23



Picture No. 24



Picture No. 25



Picture No. 26

