Nepal Geographical Society (NGS) Webinar Series – 2nd Episode

NGS Successfully Organized Second Episode of NGS Webinar Series

Nepal Geographical Society (NGS) has successfully organized second webinar on 7 September 2022 based on its plan of organizing webinars series in different crosscutting contemporary issues from geographic perspective. Dr. Til Prasad Pangali Sharma was the speaker of the event and had presented his research work **"Assimilation of Snowmelt Runoff Model (SRM) Using Satellite Remote Sensing Data in Budhi Gandaki River Basin, Nepal"**. In the second episode of NGS webinar, there was joined participants from different countries i. e., Nepal, China, India and USA including professional geographers/geoscientists, universities professors/faculties, researchers working in different sectors, and students actively participated on the event. Following the presentation, interesting discussion was held. Dr. Pangali Sharma responded queries and comments raised by the participants.

Mr. Tibendra Raj Banskota, Joint Secretary of NGS hosted the event, and Dr. Bipin Kumar Acharya, President of the NGS had stated welcome remarks of the event with welcoming to the speaker and all the participants as well as appreciations to the Mr. Mahesh Pathak for his valuable contribution to purchase annual cost of Zoom Meeting. The next, Dr. Basanta Paudel, the General Secretary of NGS has delivered vote of thanks and appreciations to the speaker and all the participants of the event. The 3rd episode of the webinar series will be held on first week of October, 2022 on another geographic theme.

Once again Nepal Geographical Society express sincere gratitude to the event presenter Dr. Til Prasad Pangali Sharma and the all the participants of the event.

About Speaker and Abstract

Title: Assimilation of Snowmelt Runoff Model (SRM) Using Satellite Remote Sensing Data in Budhi Gandaki River Basin, Nepal

Abstract: Himalaya region, a significant source of fresh water, is recognized as a water tower of the world. Many perennial rivers originate from Nepal Himalaya, located in the central part of the Himalaya region. Snowmelt water is essential freshwater for living, but it poses flood disaster potential, which is a significant challenge for sustainable development. Besides, existing climate change largely affects snowmelt hydrology. Therefore, river discharge measurement requires crucial attention in the face of climate change, particularly in the Himalayan region. The Snowmelt Runoff Model (SRM) is a frequently used method to measure river discharge in snow-fed mountain river basins. This study attempts to investigate snowmelt contribution to the overall release of the Budhi Gandaki River Basin (BGRB) using satellite remote sensing data products through the application of the SRM model. The model outputs were validated based on station-measured river discharge data. The results show that SRM performed well in the study basin with a coefficient of determination (R^2) >0.90. Moreover, this study finds the Moderate Resolution Imaging Spectroradiometer (MODIS) snow cover data and European Centre for Medium-Range Weather Forecasts (ECMWF) meteorological datasets are highly applicable to the SRM in the Himalaya region. Besides that, the study shows that snow days have slightly decreased in the last three years, hence snowmelt contribution to overall discharge has decreased slightly in the study area. Finally, this study concludes that MOD10A2 and ECMWF precipitation, and 2-meter temperature products are highly applicable to measure snowmelt and associated discharge through SRM in BGRB, Nepal. Moreover, it also helps with proper freshwater planning, efficient use of winter water flow, and mitigation and preventive measures for the flood disaster.

Keywords: Snowmelt runoff; SRM; MODIS; ECMWF; Gandaki River

Speaker:
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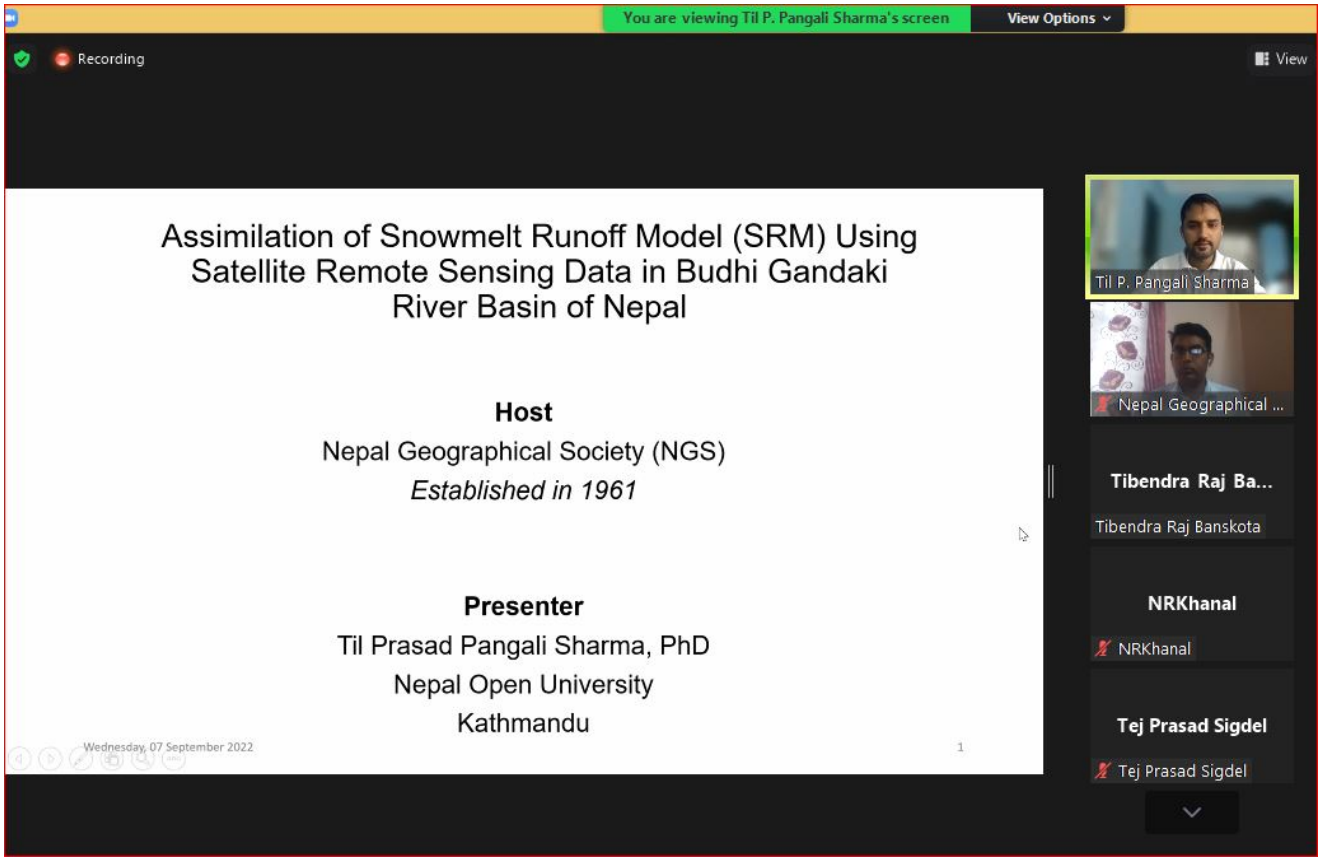
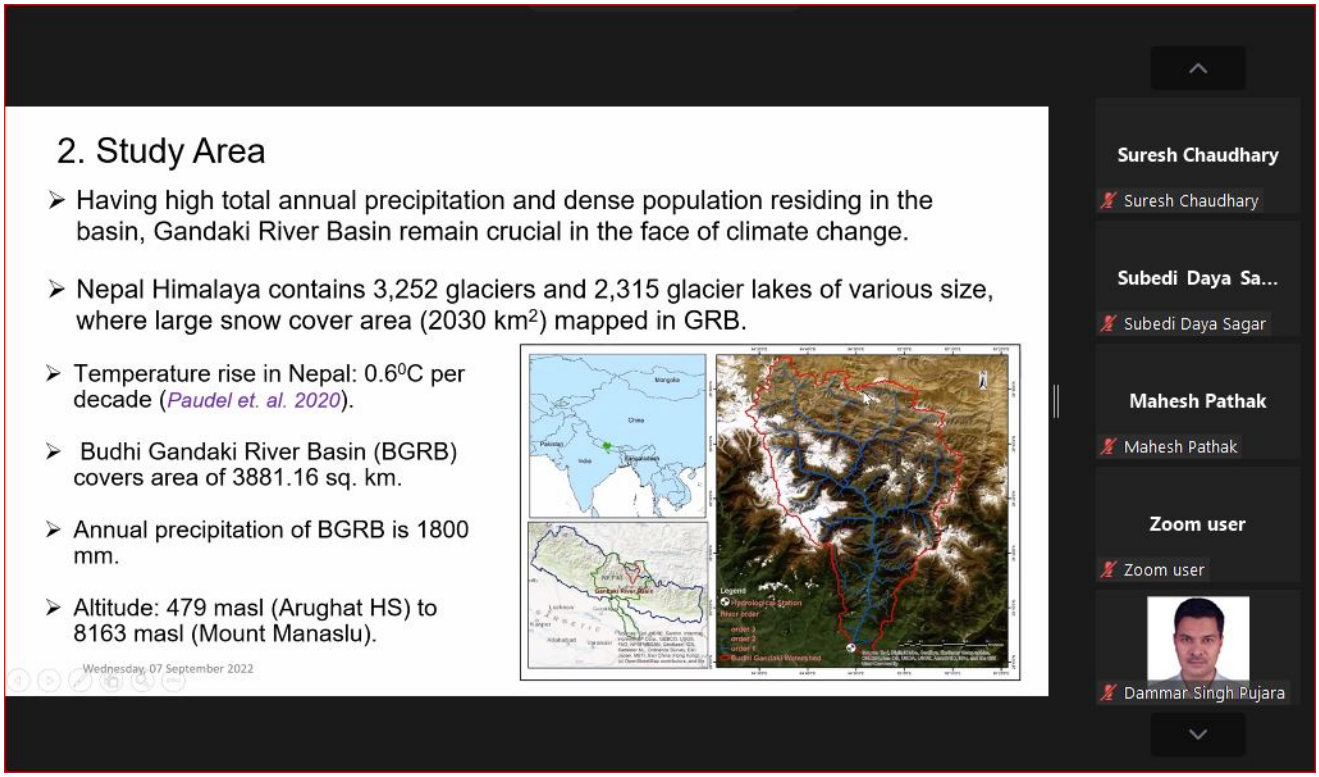
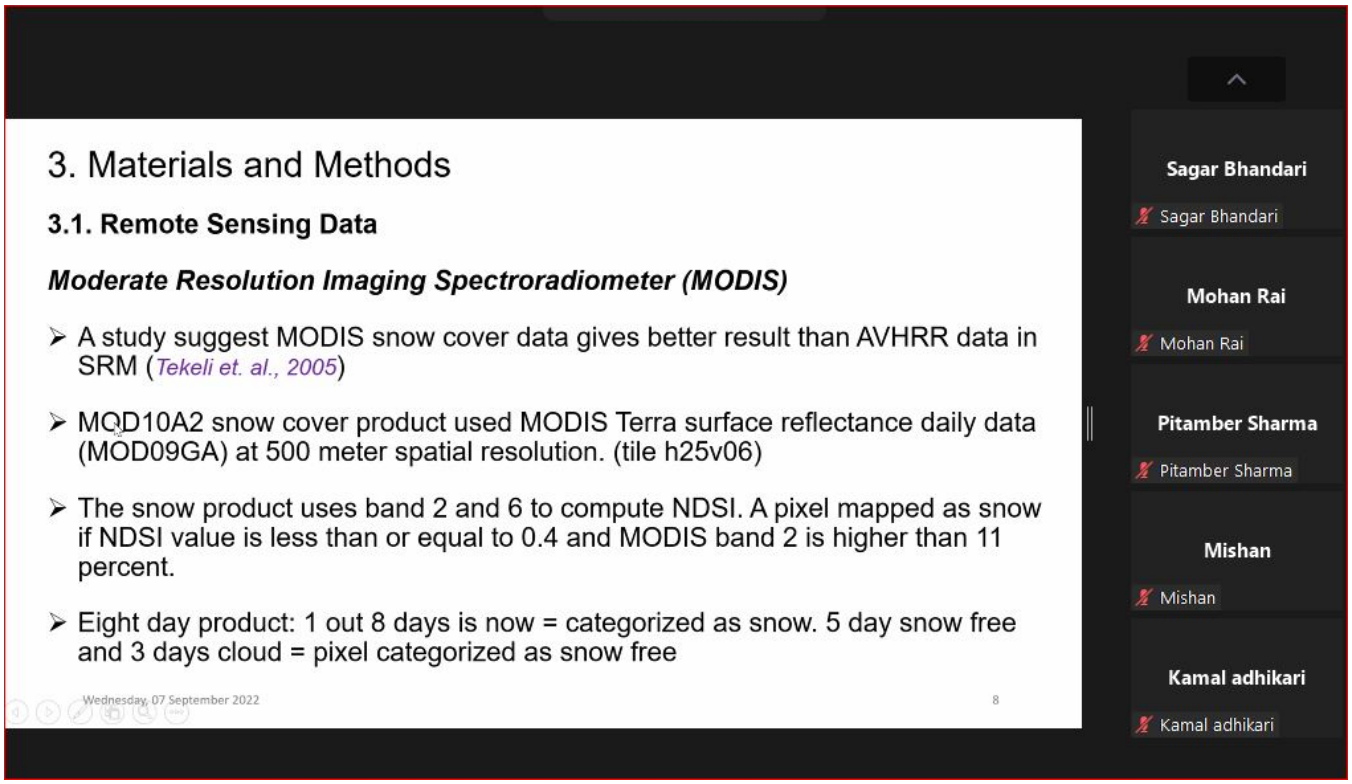
Til Prasad Pangali Sharma has accomplished his Master's degree in Geography from Tribhuvan University, Kathmandu Nepal in 2013 and obtained M.Phil degree in Development Geography from University of Bergen, Norway in 2016. He has completed his PhD degree from University of Chinese Academy of Sciences, Beijing, China in 2021. He is associated with Nepal Open University as a faculty member, and contributing in several research and development projects in Nepal. He has already published over 15 research articles on different national and international scientific journals, and actively participated in various national and international seminars, workshops, conferences and training programs in the related fields.

Some Glimpse of the Second Episode of NGS Webinar Series






3. Materials and Methods
3.1. Remote Sensing Data
Moderate Resolution Imaging Spectroradiometer (MODIS)
A study suggest MODIS snow cover data gives better result than AVHRR data in SRM (Tekeli et. al., 2005)
MOD10A2 snow cover product used MODIS Terra surface reflectance daily data (MOD09GA) at 500 meter spatial resolution. (tile h25v06)
The snow product uses band 2 and 6 to compute NDSI. A pixel mapped as snow if NDSI value is less than or equal to 0.4 and MODIS band 2 is higher than 11 percent.
Eight day product: 1 out 8 days is now = categorized as snow. 5 day snow free and 3 days cloud = pixel categorized as snow free
Wednesday, 07 September 2022
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Sagar Bhandari
Sagar Bhandari
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Mohan Rai
Pitamber Sharma
Pitamber Sharma
Mishan
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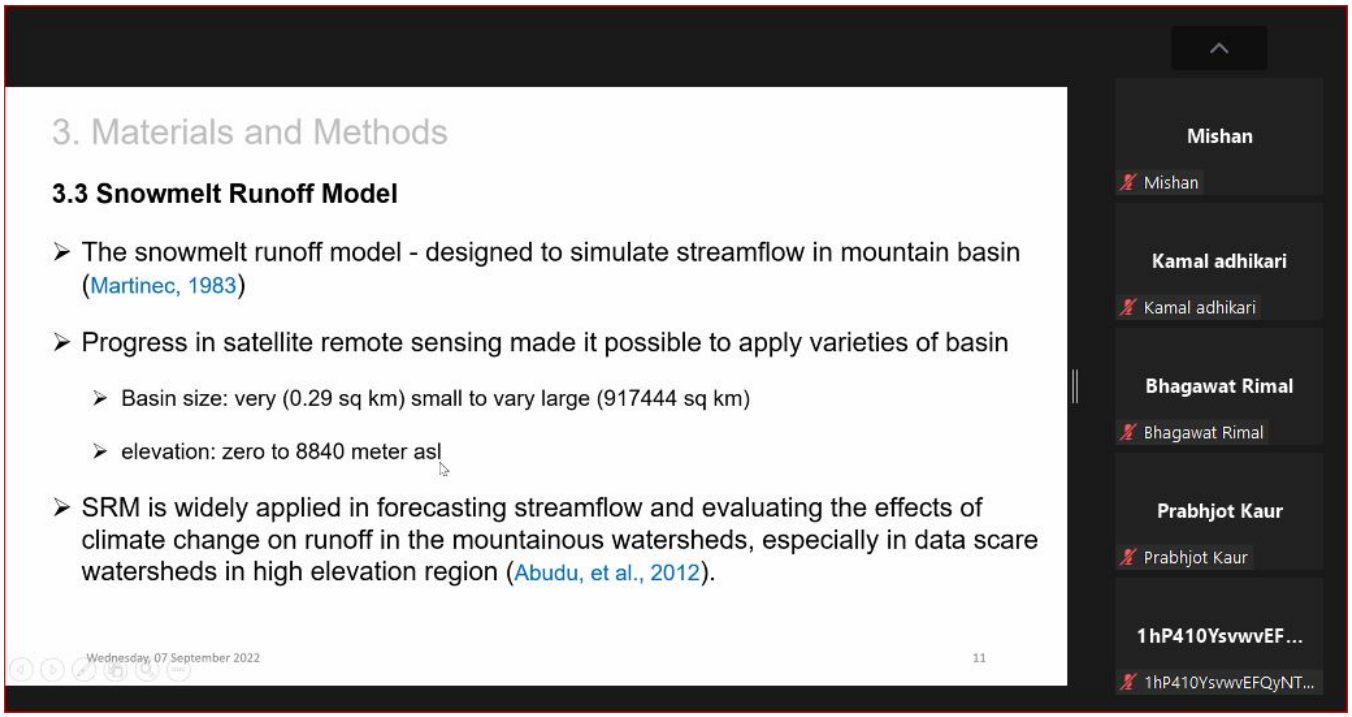
Kamal adhikari


3. Materials and Methods
3.3 Snowmelt Runoff Model
The snowmelt runoff model - designed to simulate streamflow in mountain basin (Martinec, 1983)
Progress in satellite remote sensing made it possible to apply varieties of basin
Basin size: very (0.29 sq km) small to vary large (917444 sq km)
elevation: zero to 8840 meter asl
SRM is widely applied in forecasting streamflow and evaluating the effects of climate change on runoff in the mountainous watersheds, especially in data scare watersheds in high elevation region (Abudu, et al., 2012).
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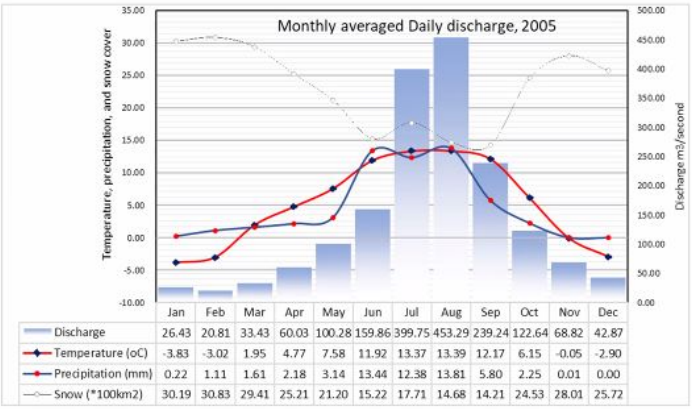
Mishan
Mishan
Kamal adhikari
Kamal adhikari
Bhagawat Rimal
Bhagawat Rimal
Prabhjot Kaur
Prabhjot Kaur
1hP410YsvwvEF...
1hP410YsvwvEFQyNT...

4. Results

4.1 Snow Cover Area

- About 77 percent snow cover observed during Jan, Feb, and March.
- About 38 percent snow cover during June, July, August, and September.
- Inverse relation between snow cover area and temperature rise.

Monthly average daily discharge, 2005



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Discharge	26.43	20.81	33.43	60.03	100.28	159.86	399.75	453.29	239.24	122.64	68.82	42.87
Temperature (oC)	-3.83	-3.02	1.95	4.77	7.58	11.92	13.37	13.39	12.17	6.15	-0.05	-2.90
Precipitation (mm)	0.22	1.11	1.61	2.18	3.14	13.44	12.38	13.81	5.80	2.25	0.01	0.00
Snow (*100km2)	30.19	30.83	29.41	25.21	21.20	15.22	17.71	14.68	14.21	24.53	28.01	25.72

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Tibendra Raj Banskota

Mahesh Pathak
Mahesh Pathak

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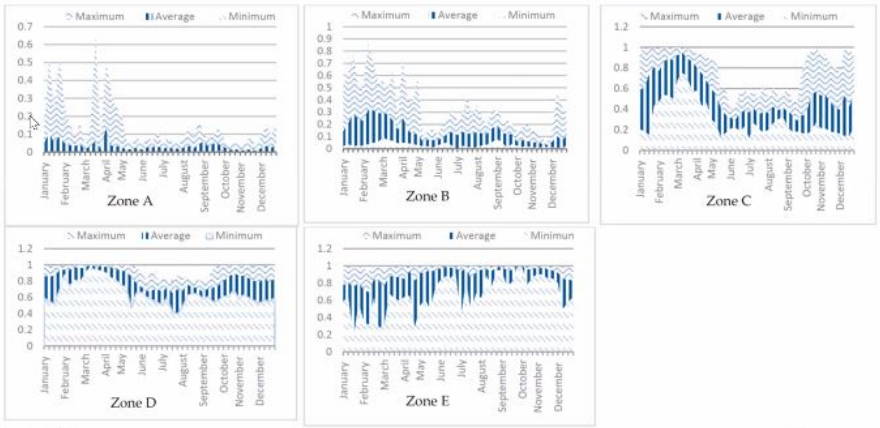
4. Results

4.2 Zone wise snow cover fraction (SCF)

Snow cover fraction value 0 means no snow while SCF value 1 show complete snow cover.



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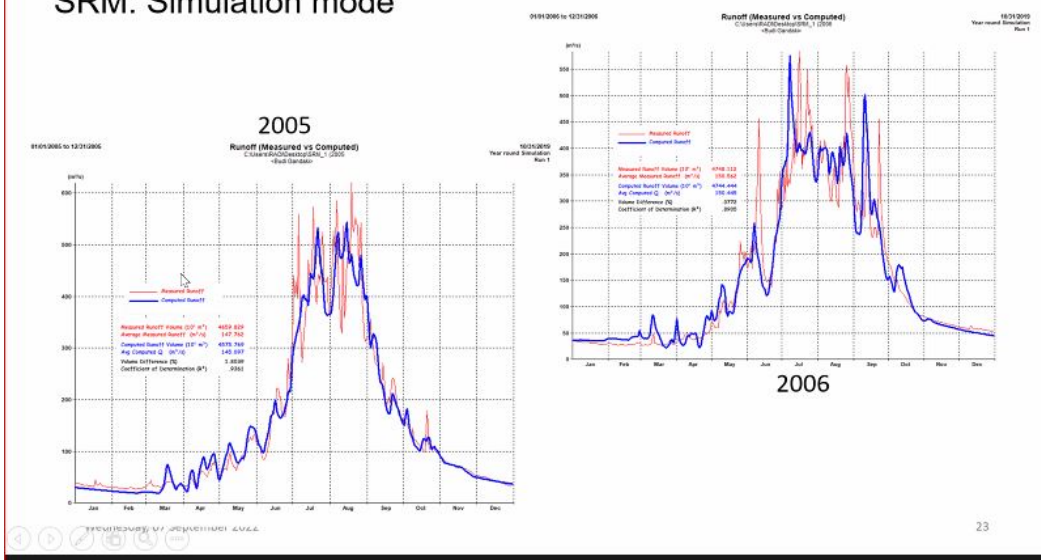
Ram Shrestha
Ram Shrestha

Sagar Bhandari
Sagar Bhandari

Mohan Rai
Mohan Rai

Pitamber Sharma
Pitamber Sharma

SRM: Simulation mode



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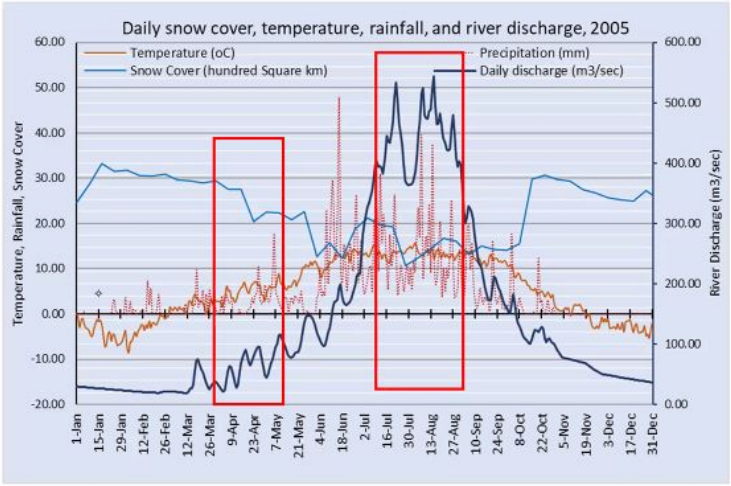
Tibendra Raj Banskota
Mahesh Pathak
Mahesh Pathak
Khagendra Pou...
Khagendra Poudel

SRM Input variables and their relation to discharge

The peak discharge measured during July and August in both observed and modelled result.

High fluctuations in precipitation does not correspond to the initial discharge.



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Tej Prasad Sigdel
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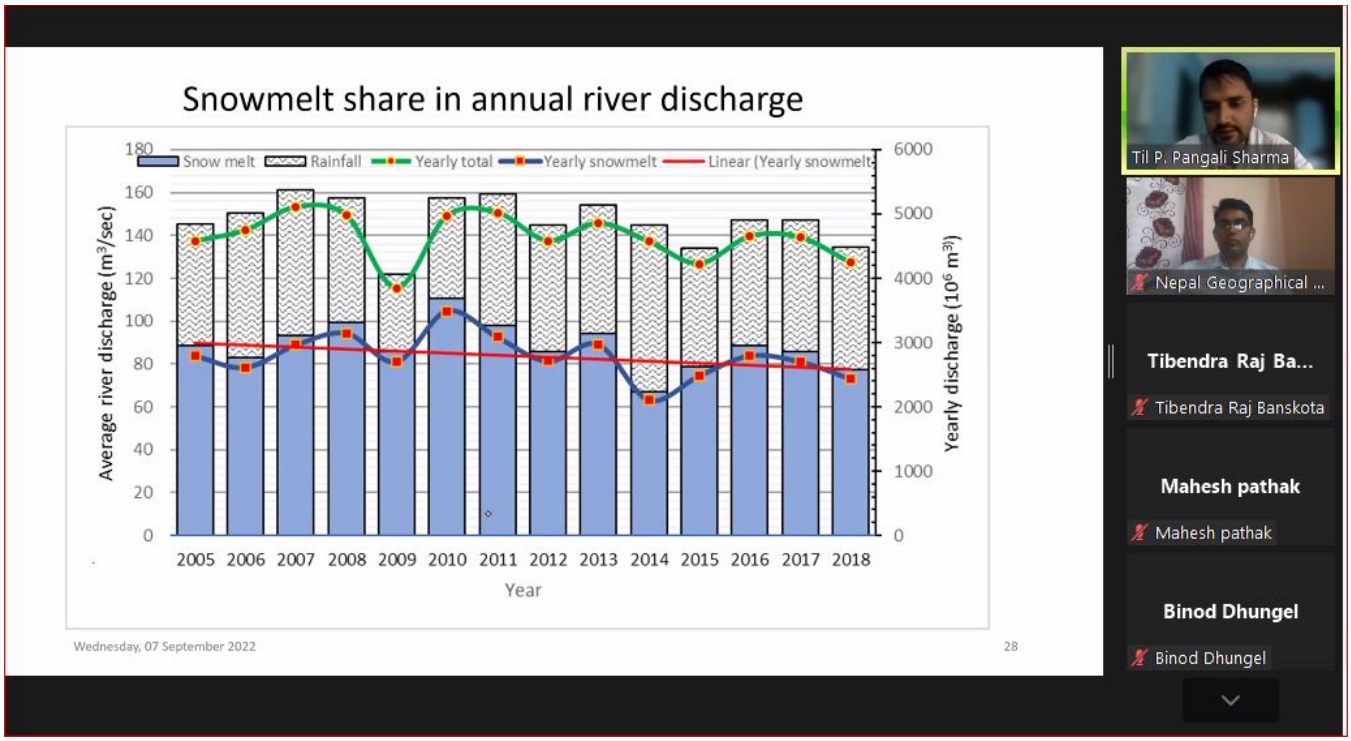
Khagendra Poudel
Yayawar
Yayawar

Keshav K Acharya


Snowmelt share in annual river discharge
Snow melt
Rainfall
Yearly total
Yearly snowmelt
Linear (Yearly snowmelt)
Average river discharge (m³/sec)
Yearly discharge (10⁶ m³)
Year
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
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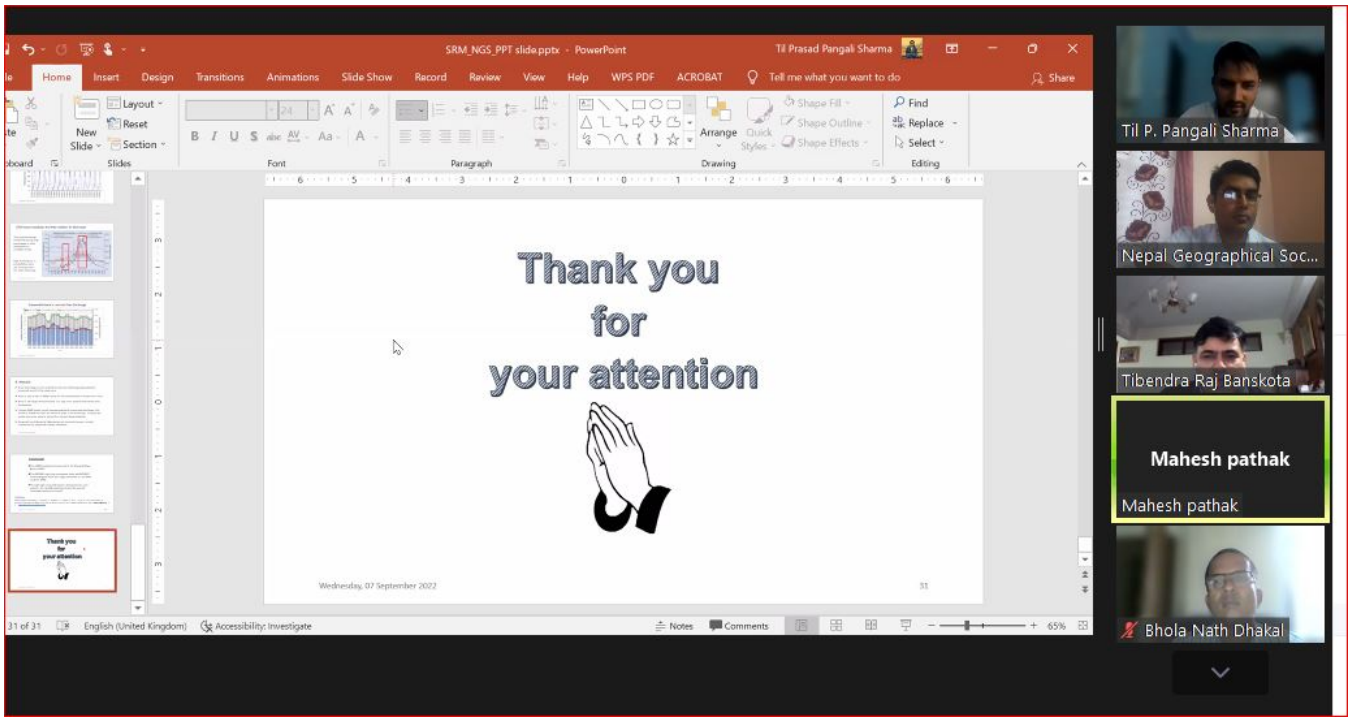
Til P. Pangali Sharma
Nepal Geographical ...
Tibendra Raj Ba...
Tibendra Raj Banskota
Mahesh pathak
Mahesh pathak
Binod Dhungel
Binod Dhungel


SRM_NGS_PPT slide.pptx - PowerPoint
Til Prasad Pangali Sharma
Thank you
for
your attention
Til P. Pangali Sharma
Nepal Geographical Soc...
Tibendra Raj Banskota
Mahesh pathak
Mahesh pathak
Bhola Nath Dhakal

TOKEN OF LOVE

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Nepal Geographical Society Would Like To Honor

Dr. Til Prasad Pangali Sharma

For his valuable contribution as a speaker entitled "Assimilation of Snowmelt Runoff Model (SRM) Using Satellite Remote Sensing Data in Budhi Gandaki River Basin, Nepal" on Nepal Geographical Society (NGS) Webinar Series, Episode 2 held on 7 September 2022 by NGS.

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President

Dr. Basanta Paudel
General Secretary

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