**Outstanding Points in Career:**

Fall 2013 to present (Date samples only)

2008 – 2013

2008 – 2013

2009 – 2013

2011 – 2012

**Awards, Scholarships, Fellowships**

**Presentations (subheading can be deleted in not applicable)**

1. ***Sharma, A. R.;*** *& Déry, S. J. (2018). Contribution of atmospheric rivers to extreme snowfall across British Columbia, Canada.* 8th GEWEX Open Science Conference: Extremes and Water on the edge, 6 - 11 May 2018. Canmore, AB.
2. ***Sharma, A. R.;*** *& Déry, S. J. (2018). Variability and trends in runoff in the rivers of British Columbia’s Coast and Insular Mountains.* Canadian Geophysical Union (CGU) Meeting, UBC, Vancouver, 29 May2017
3. **Sharma, A. R.,** & Déry, S. J., (2016). *On the critical need for mountain observatories to monitor and detect amplified climate change in British Columbia (BC)’s Mountains.* In 2nd annual INARCH Workshop¸ Grenoble, France. October ,2016.
4. Sharma, A. R., & Déry, S. J. (2015). Climate change impacts on water resources in the Nechako River Basin, BC. In American Geophysical Union Fall Meeting. San Fransisco,CA. <https://doi.org/10.13140/RG.2.1.3705.8969>
5. Sharma, A. R., Déry, S. J., & Cannon, A. J. (2014). Elevational dependence of climate variability and trends in British Columbia’ s Cariboo Mountains. In 5th Annual Pacific Northwest Climate Science Conference. 5th Annual Pacific Northwest Climate Science Conference
6. Sharma, A. R., Shrestha, A. B., & Bajracharya, S. R. (2013). Climatological variability and trends in the Koshi River Basin, Nepal. Eighth Annual Himalayan Policy Research Conference (Vol. 1, p. 26). Himalayan Journal of Development and Democracy, Nepal Study Center, University of New Mexico.
7. Shrestha, M. S., Bajracharya, S. R., & Sharma, A. R. (2014). Accuracy of satellite-based rainfall estimates in small mountainous catchments: A case of Khudi Khola. In 7th Workshop of International Precipitation Working Group. Tsukuba,Japan. <https://doi.org/10.13140/RG.2.1.4754.4724>

UNBC Research Grant (2015)

UNBC Ph.D. Scholarship (2015)

UNBC Travel Award (2014/2015/2016/2017)

Young Scientists Research & Action Awards for Disaster Risk Reduction (Round III) (2008/09)

8. Picketts, I. M., Déry, S. J., Parkes, M. W., **Sharma, A. R.**, & Matthews, C. A. (2020). Scenarios of climate change and natural resource development : Complexity and uncertainty in the Nechako Watershed. *Canadian Geographer / Le Géographe Canadien*, 1–14. <https://doi.org/10.1111/cag.12609>

7. **Sharma, A. R.**, & Déry, S. J. (2020). Variability and trends of landfalling atmospheric rivers along the Pacific Coast of northwestern North America. *International Journal of Climatology*, *40*(1), 544–558. <https://doi.org/10.1002/joc.6227>

6. Hernández-Henríquez, M. A., **Sharma, A. R.,** Taylor, M., Thompson, H. D., & Déry, S. J. (2018). The Cariboo Alpine Mesonet: Sub-hourly hydrometeorological observations of British Columbia’s Cariboo Mountains and surrounding area since 2006. *Earth System Science Data*, *10*, 1655–1672. <https://doi.org/10.5194/essd-2018-45>

5. Hernández-Henríquez, M. A., **Sharma, A. R**., & Déry, S. J. (2017). Variability and trends in runoff in the rivers of British Columbia’s Coast and Insular Mountains. *Hydrological Processes*, *31*(18), 3269–3282. <https://doi.org/10.1002/hyp.11257>

4. **Sharma, A. R.**, & Déry, S. J. (2016). Elevational Dependence of Air Temperature Variability and Trends in British Columbia’s Cariboo Mountains, 1950–2010. *Atmosphere-Ocean*, *54*(2), 153–170. <https://doi.org/10.1080/07055900.2016.1146571>

3. Pokharel, R., Poudel, J., **Sharma, A. R.**, & K Grala, R. (2016). A Study of Climate Variability and Socioeconomic Impact on Tourism Industry of Nepal. *Sustainability in Environment*, *2*(1). <https://doi.org/10.22158/se.v2n1p20>

2. Shrestha, A. B., Bajracharya, S. R., **Sharma, A. R.**, Duo, C., & Kulkarni, A. (2016). Observed trends and changes in daily temperature and precipitation extremes over the Koshi river basin 1975 – 2010. *International Journal of Climatology*. <https://doi.org/10.1002/joc.4761>

1. **Sharma, A. R.** (2015). Climate Change and Community Perceptions in the Khudi Watershed, Lamjung, Nepal. *Hydro Nepal : Journal of Water, Energy and Environment*, *17*, 49–54. <https://doi.org/10.3126/hn.v17i0.13275>

**Publications:**

**PEER REVIEWED**



**Dissertation Abstract**

Atmospheric rivers (ARs) are synoptic-scale atmospheric phenomena that transport moisture from the (sub)-tropical regions of the Pacific Ocean to British Columbia and southeastern Alaska. Despite the substantial role of ARs on water resources in this region, understanding of their climatology and contributions to hydrology remains limited. I use a combination of a regional AR catalog, reanalysis datasets, gridded precipitation, observed river runoff data, and topographic information, to provide insights on the climatology of landfalling ARs (LARs) and to quantify changes in the contribution of LARs to the precipitation, river runoff, and their extremes in British Columbia and southeastern Alaska (BCSAK).

Each year BCSAK experiences 35±5 LARs with the highest number in autumn (13±2) and an average duration of 2±1.8 days. The frequency of LARs significantly increases (p <0.05) at 1.8 events decade-1 during 1979-2016. Higher numbers of LARs occur during the neutral phase of El Niño-Southern Oscillation, the positive phases of the Pacific Decadal Oscillation and the Pacific-North American Pattern, and the 2013/2014 Pacific oceanic blob years. LARs contribute 13% of annual total precipitation with higher contributions (up to 33%) along coastal regions with more modest values (~9%-15%) in the Interior Mountains during 1979-2012. LARs contribute >90% (spatial range: <5%-97%) of annual extreme precipitation in BCSAK during 1979-2012 with the higher values over elevated terrain. AR related precipitation days increase significantly during 1979 2012. LARs contribute 14±6% (spatial range: 3%-29%) of the total annual runoff in BCSAK during water years (WYs) 1979-2012. Coastal watersheds experience >80% of their annual maximum runoff from LARs during WYs 1979-2016. ARs control the distribution of peak runoff in most of BCSAK with >60% of the 168 watersheds analyzed having greater than five of the top 10 annual maxima runoff associated with them. Local (field) significance tests show that AR related annual maximum runoff magnitude is significantly higher than non-AR-related annual maximum runoff for 30% (17%) of the watersheds studied. My work quantifies the linkages between ARs and their impacts on hydrological processes across BCSAK that has broader implications on community water supply and management, hydropower operations, and flood risk assessment and mitigation.

**DISSERTATION TITLE:**

ROLE OF ATMOSPHERIC RIVERS ON THE HYDROLOGY OF WESTERN CANADA

***April 17, 2020***

**Doctor of Philosophy**

**Natural Resources and Environmental Studies**

**Degrees**

MSc. Natural Resources and Environmental Studies; University of Northern BC, Prince George, Canada (2014)

MSc. Environmental Science; Tribhuvan University, Kathmandu, Nepal (2010)

BSc. Environmental Sciences; Tribhuvan University, Kathmandu, Nepal (2007)

**Examining Committee:**

Chair: Dr. Margot Parkes

University of Northern British Columbia

Supervisor: Dr. Stephen Dery

University of Northern British Columbia

Committee Member: Dr. Ellen Petticrew

University of Northern British Columbia

Committee Member: Dr. Brian Menounos

University of Northern British Columbia

Committee Member: Dr. Alex Cannon

Research Scientist, Environment Canada

External Examiner: Dr. John Gyakum

McGill University

**Welcome to the PhD Oral Defence for**

**Student’s name**