How is your research tackling some of the major challenges facing humanity in the 21st century?

My research focuses on climate change study, which is one of the major challenges facing humanity in the 21st century. The tool we mainly relied on is the coupled cryosphere – land surface – climate modeling system. We conduct the interdisciplinary study of climate change issues related to extreme precipitation events, agriculture and wetland change in the Canada Prairies. We use the coupled modeling system as a platform too examine important questions such as:

- What adaptive cropping strategies can be implemented to take advantage of changing climate? What effect will future cropping choices have on regional weather patterns and hydrological systems?

- What are the effects of climate change on prairie wetlands, the species that depend on them, and the ecosystem services they provide. In particular, we want to assess possible impacts of climate change on waterfowl populations, mediated via changing wetland extent; and wetland-climate feedbacks at local/regional scales and possible on-farm benefits of wetland retention and restoration.

- To what extent the human induced perturbations, such as agricultural expansion (grassland turned into agriculture), deforestation or reforestation, will change the weather and hydrological regimes over the prairies.

How is your research making the world a better place?

I describe myself as a climate scientist bridging the disciplines of meteorology, physics, hydrology, and environmental-related science. My career goal is to contribute, through my research, to improve not only the understanding of the fundamental convective mechanisms at different scales and different latitudes, but also its application to climate change and extreme weather study with the powerful tool of the advanced continental-scale convection-permitting regional climate modeling system that we have been developing which can simulate the cryosphere–atmosphere– climate interactions. With the best possible understanding of the system's physics,

we will be able to see how the coupled Earth system responds to climate changes that are crucial to inform the decision-making process and tackle the adaptation and mitigation issues.

What is your approach to teaching?

My goals for students and classroom teaching approaches are different for different courses. For the climate change introductory courses (ENVS 826: Climate Change), my primary objective is to explain the subject in a motivating and engaging manner that shows the theory's elegance and beauty and its application in explaining the real-world climate related phenomena. I also make student accessibility a priority. I like to pursue a flexible manner of instruction.

For the graduate-level courses, I believe that the emphasis should be on collaboration, planning, and critical review. For instance, as the instructor of a graduate level statistics course ("ENVS 812: Statistical Methods in Environment and Sustainability"), I helped students move from the mathematical and statistical theory they learned to the application in their projects. The design of that course was to bridge the gap between big data analysis tools and scientific research. The course project helped develop a student's capacity to design a project, build feasible models, conduct simulations, evaluate the results, and explore possible improvements. I believe that the training of this type can build a solid foundation for the students' future scientific research.

What is your favourite course to teach?

Since I started at the University of Saskatchewan, I have been teaching three courses each year. My courses cover a wide range of content, including big data analytics for environment sustainability-related research (ENVS 812: Statistic Methods in Environment and Sustainability), frontiers of global climate change (ENVS 826: Climate Change), as well as the fundamental theory of atmospheric physics and dynamics (PHYS 322: Atmospheric Physics). Those are all my favourite courses.