Global Water Futures 2021 Operations Team Meeting – Project Reporting Template

Project Name:	Storms and Precipitation Across the Continental Divide Experiment (SPADE)

Our major accomplishments to date are:

- Conducted a field experiment in the Canadian Rockies from 24 April to 26 June 2019. Two sites were installed on the eastern side of the continental divide and one site on the western side. Precipitation and weather conditions were documented simultaneously.
- Data collected during the field experiment were published in the Federated Research Data Repository (FRDR) and are described in a publication in the journal Earth System Science Data.
- Thirteen precipitation events were documented. While only rain occurred on the western side, mixed precipitation, snow and rain occurred on the eastern side, and differences in precipitation were observed at different elevations. Four precipitation events produced more than 20 mm of precipitation on the eastern side of the divide.
- Various types of ice crystals were documented, in particular during the longest precipitation event. These included capped-columns with dendrites.
- Moisture fluxes producing precipitation on either side of the continental divide came from the Pacific Ocean, the continental interior and from the south. The moisture from the south came after an atmospheric river landfall on the coast of California.
- Only the moisture flux from the continental interior produced precipitation that could cross continental divide but only under specific conditions.

Our current activities are:

- Finalizing the study on precipitation gradients with elevation in the southern Canadian Rockies.
- Finalizing the study on the flow field near Fortress Mountain.
- Finalizing the study on the atmospheric conditions leading to precipitation across the continental divide.

The main accomplishments expected by the end of the project are:

- Open access database of meteorological conditions, including precipitation phase, types, and macrophotography
- Conceptual model of the atmospheric conditions, moisture and condensate fluxes leading to precipitation across, or only one one side of, the continental divide.
- SPADE overview article published in BAMS which also highlights the critical contributions of students and the project's involvement with local communities

Here is a key visual from the project (figure, photo, table, graph, etc.)

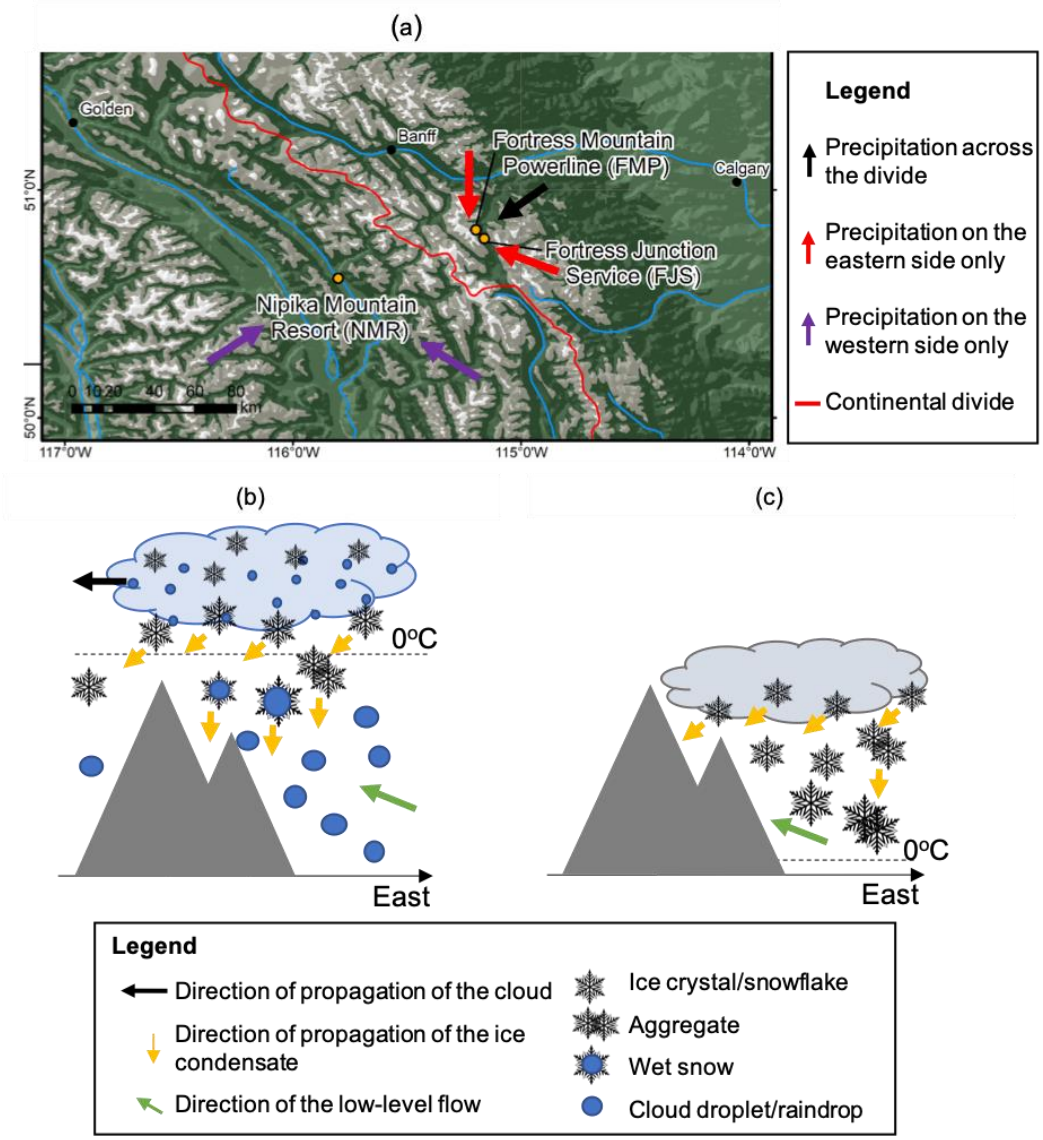

Figure 1: (a) Map of the study area showing the direction of the moisture flux leading to precipitation across the divide (black arrow), precipitation staying on the east side (red arrows) and precipitation staying on the west side (purple arrow). (b) and (c) are schematic diagrams of the atmospheric conditions and precipitation characteristics when precipitation crossed the divide and when the precipitation did not cross the divide, respectively. The colder cloud mainly forms on ice crystals and the warmer one contains liquid droplets and ice particles. The direction of propagation of the cloud and precipitation is shown. The ice condensate includes ice crystals and snowflakes. The cloud droplets and raindrops are the smaller and larger blue circles, respectively.