



University  
of Victoria

Graduate Studies

Notice of the Final Oral Examination  
for the Degree of Master of Science

of

**YAQIONG WANG**

BSc (Nanjing University of Information Science and Technology, 2013)

**“Statistical Homogenization of Undocumented Monthly  
Temperature Data in British Columbia for Trend Analysis”**

Department of Geography

Thursday, April 26, 2018  
10:00 A.M.  
Clearihue Building  
Room B007

Supervisory Committee:

Dr. David Atkinson, Department of Geography, University of Victoria (Co-Supervisor)  
Dr. Francis Zwiers, Department of Mathematics and Statistics, UVic (Co-Supervisor)  
Dr. Faron Anslow, Department of Geography, UVic (Member)

External Examiner:

Ms. Lucie Vincent, Climate Research Division, Environment and Climate Change Canada

Chair of Oral Examination:

Dr. Merwan Engineer, Department of Economics, UVic

## **Abstract**

Homogenization of monthly temperature data in BC is performed for 310 monthly maximum temperature series and 307 minimum temperature series from three networks: BC Hydro, BC Ministry of Forests Land Natural Resource Operations and Rural Development (Wildfire Management Branch) and the BC Ministry of Transportation and Infrastructure. The homogenization procedure is based on a penalized maximum t-test with mean-adjustment to detect inhomogeneities and make adjustments to the data. Before homogenization, quality control is performed on 797 stations at the daily time step.

Trends at each location, in three sub-regions and across the province are analyzed based on resulting homogenized PCIC monthly temperature products. In order to measure the influence homogenization has on trends and validate the trends results calculated from the PCIC homogenized datasets, climate trends derived from the PCIC homogenized dataset are compared to those calculated from PCIC datasets without the homogenization and those from the homogenized temperature products existing in BC from ECCC1 respectively.

The brief trend analysis components are listed below:

- Trends before and after homogenization are compared for the averaged time series within three sub-regions based on PCIC station data;
- Trends based on homogenized PCIC stations and AHCCD2 stations are compared;
- Spatial patterns of trends over BC are analyzed based on PCIC gridded datasets, and compared with those of CANGRD3;

Homogenization results show that 92 out of 310 stations (29.6%) for maximum temperature and 75 out of 307 stations (24.4%) for minimum temperature have no detected changepoint, which means they appear to be homogenous. BCH has the highest portion of homogenous stations, with 73.8% and 60.7% for maximum and minimum temperature, whereas FLNRO\_WMB has the lowest portion, with 10.5% for Tmax and 27.3 % for Tmin. Due to the limitations of data coverage, 80 and 81 stations for Tmax and Tmin variable have been analyzed for single station trend over 1990-2014. Comparing with the trends before homogenization, trends derived from homogenized PCIC stations have similar sign but smaller magnitude in general. The single station trend results have good agreement with results of AHCCD. Spatial patterns of trends that are based on the interpolated PCIC stations also agree well with those based on CANGRD products. Warming trends have been noticed temporally and spatially. Most of the seasons have distinctive positive trends across the province with exception of spring and some seasons over Vancouver Island.