

Enabling Canadian kindergarten to grade 12 (K-12) school groups to monitor Earth Systems across Canada themselves will empower and cultivate their passion for the sciences, guiding them to become the scientists of the future. The innovative Community Science Liaison (CSL) program will support this aim by transforming Canadian scientific outreach practices, establishing long-term two-way relationships between kindergarten to grade 12 (K-12) schools and scientific programs such as EON-ROSE (Earth-System Observing Network - Réseau d'Observation du Système terrestre). The CSL concept emerged from the pan-Canadian EON-ROSE research collaboration that was inspired by the serendipitous outcomes from EarthScope to monitor entire Earth Systems across Canada. EON-ROSE will include ~1400 observatories across the Canadian landmass with broadband seismometers, GNSS receivers, infrasound and pressure sensors, weather packages, riometers, permafrost monitors, etc. that will produce openly available real-time data. The first EON-ROSE station was installed in the Yukon (2018) and a multi-sensor deployment to monitor Mt Meager in the Garibaldi volcanic belt (150 km north of Vancouver, BC) started during the summer 2019. The EON-ROSE collaboration consists of more than 300 scientists from Canadian universities, federal-provincial-territorial government agencies, industry, and international collaborators. The CSL program will use the EON-ROSE connections to network with, and include, other scientific research programs across Canada.

Local community members with a passion for science will be recruited as CSLs from communities across Canada starting in northwestern Canada where there are 36 EarthScope stations. The CSL program will seek to foster scientific curiosity among these northwestern communities, including their Indigenous populations. Many of these communities lack scientists, or even qualified science teachers. CSL training workshops, designed by the scientists, will run concurrently with EON-ROSE conferences (starting with the EarthScope transition to EON-ROSE meeting May 2020). Scientists from EON-ROSE and other programs will provide mentorship, enabling CSLs to lead community consultations while designing and guiding hands-on, place- and curriculum-based K-12 Citizen Science projects to address community curiosity or concerns. The Geological Bumble Bee (GBB; Figure 1) program is an example of a Citizen Science program that will expand under the CSL umbrella, to permit these K-12 groups to monitor these important pollinators, which are under threat due to climate change. The GBB program (2012 to present) has involved ~800 Calgary grade 2-9 students building and installing ~800 bumble bee boxes while concurrently collecting rocks to characterize the glacial material deposited by glaciers ~15,000 years ago. These students return to the field in the fall to collect their boxes and analyze the bumble bee colonies that occupied their boxes. K-12 Citizen Science groups will be invited to present their results at the annual EON-ROSE conferences – completing the research cycle.

Place- and curriculum-based CS projects were proven by the Wood Street School (Yukon) to be very successful at engaging high school students in the northern Canadian context – 100 % of these students graduated from high school and 60% pursued STEM post-secondary programs. This speaks to the potential for this CSL program to make scientists household names (e.g. Figure 2).



Figure 1: Geological Bumble Bee Citizen Science Program. The top photograph is of an installed bumble bee box (the hole is the right size for the bumble bee but too small for most birds). The plastic roof keeps rain out of the box. The bottom figure is the grade two group with the City of Calgary Mayor at the Calgary Environmental Expo. This group won the “Making A Difference Award” for their “Incredibee Booth”. One student wrote “I used to think that bees were mean, nasty...Now I know that bees are helpful to the world” in his journal, which speaks to the strong impact of this program on these students.

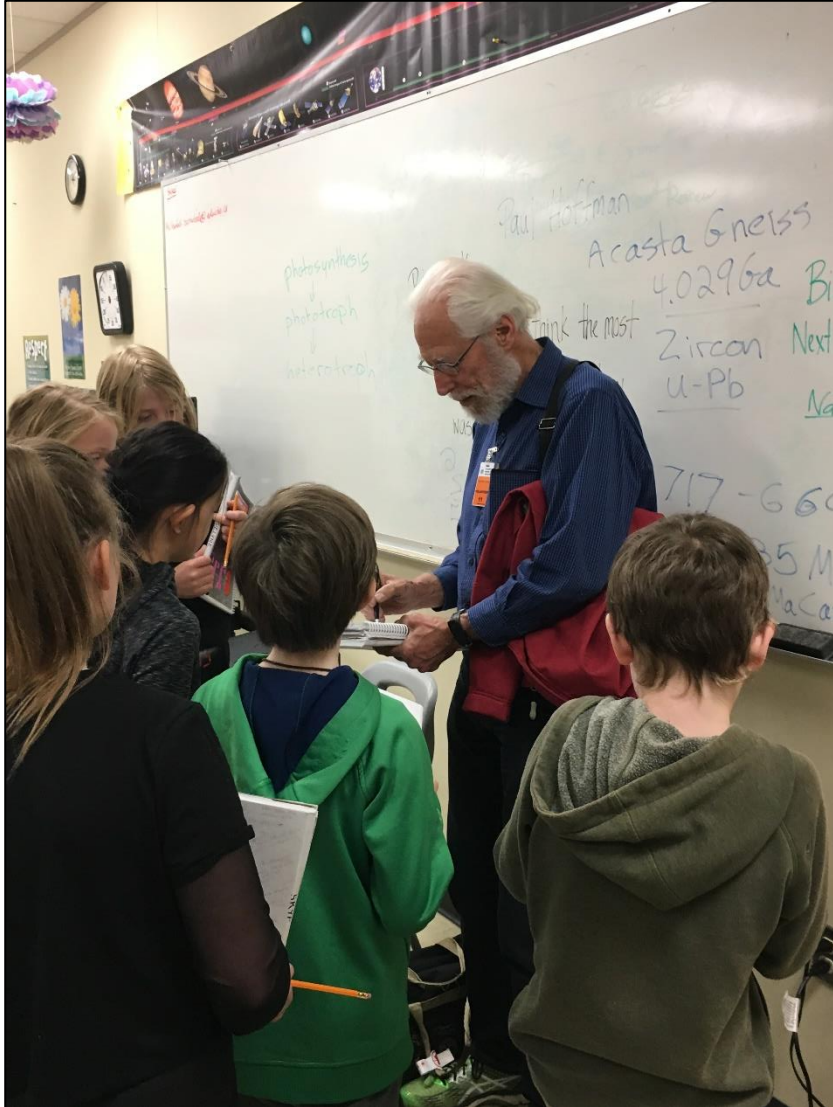


Figure 2. Paul Hoffman (United Plates of America, Snowball Earth, EON-ROSE advisor) is a gifted story-teller who greatly enjoyed sharing his stories with this grade 5 group about what motivated him to become a scientist along with rocks from his world travels that were instrumental to his supporting the “Snowball Earth Theory”. Future speaker series will include tours through Community Science Liaison communities to encourage such interactions between K-12 school groups and scientists. One of the goals of the CSL program is to make our scientists household names – as per these students gathered around Paul to get their sciences journals signed.