

Some Astronomy Teaching Resources in Ontario (Emphasis on Grade Nine)

John R. Percy (john.percy@utoronto.ca), Astronomy & Astrophysics, University of Toronto

November 2016

I hope these resources will enable you to achieve the goals of an astronomy and space unit which may be the students' last exposure to this exciting science: to understand the "big ideas" of astronomy (not the trivial "number facts") and to be engaged and excited by them, and by the nature of the universe; to think critically about these and other topics; to appreciate the roles of observation and simulation in astronomy; to appreciate the historical and cultural and societal dimensions of astronomy; to realize that, even in the centre of a city, there is much that can be seen in the sky, and much on the Internet, including awesome images of astronomical objects; to carry out at least one "authentic" scientific activity in astronomy, and at least one *observation*; and to communicate astronomy through print, electronic, or other media. You and your students may be able to "connect" with astronomy by visiting an observatory, science centre, or planetarium, or by inviting an astronomer into your classroom, either physically or virtually.

My outreach webpage, including a whole section of resources for teachers:

<http://www.astro.utoronto.ca/~percy/EPOindex.htm>

My grade nine workshop notes:

<http://www.astro.utoronto.ca/~percy/grade9workshop.htm>

STAO resource for the grade nine astronomy/space unit, developed for International Year of Astronomy 2009, subsequently revised. Highly recommended!

<https://stao.ca/cms/gr-9-astronomy> click on "pathways..."

Ask an Astronomer: There are several places where you and your students can have your questions answered by astronomers; University of Toronto's is:

askanastronomer@universe.utoronto.ca

<http://www.astro.utoronto.ca/connect-with-an-astronomer/ask-an-astronomer/>

Astronomical Society of the Pacific. The best source of astronomy education materials, on-line catalogue, on-line quarterly teachers' newsletter (TNL), on-line astronomy activities – much of it developed and tested with NSF or NASA funding.

<http://www.astrosociety.org/publications/universe-in-the-classroom/> (TNL)

<http://www.astrosociety.org/education/educational-resources/> (Excellent!)

Astronomy Clubs. There are (in addition to the RASC Centres mentioned below) astronomy clubs in many cities and towns in Ontario, and across Canada. Many of them have outreach activities for schools – visits, star parties etc. See:

<http://www.skynews.ca/resources/astronomy-clubs/>

Astronomy Education Review: This important free on-line journal is now (as of 2013) "dormant" but the archived material can be useful:

http://portico.org/stable?cs=ISSN_15391515

Astronomy Picture of the Day: Although not all astronomy is done by NASA, there's no better source of engaging images, especially as the images are so well captioned. Students can look at them as scientists would:

<http://apod.nasa.gov>

Books on Astronomy. Any written by Terence Dickinson, published by Firefly Books, especially *Exploring the Night Sky* and *Extraterrestrials* for young people, and *Night Watch* and *The Universe and Beyond* and *Summer Stargazing* for anyone. Also Dan Falk's *Universe on a T-Shirt* and *In Search of Time*. And Ray Jayawardhana's *The Neutrino Hunters*, and *Strange New Worlds*.

Canada Science and Technology Museum. TEMPORARILY CLOSED. Wide variety of programs for students, teachers, and the public, including planetarium programs, and sky viewing.

<http://cstmuseum.techno-science.ca/en/>

Canadian Astronomical Society, the organization of professional astronomers in Canada, is developing a new education website and programs. Stand by! For now, our twitter account:

@AstroCanada

and see http://casca.ca/page_id=155

Canadian Space Agency has information and a web site on Space, including material for students and teachers.

<http://www.asc-csa.gc.ca/eng/educators/default.asp>

Cosmic Connections: Gives presentations and star parties for school classes and other youth groups. A fee is charged. (416) 728-0062. info@cosmicconnections.ca

<http://www.cosmicconnections.ca>

David Dunlap Observatory, Richmond Hill. The future of the DDO is presently unclear. Let's hope that it once again becomes a centre for education and public outreach!

<http://www.theddo.ca>

Discover the Universe: a national bilingual source of authoritative astronomy workshops and information for Canadian teachers:

<http://www.discovertheuniverse.ca>

Dunlap Institute of Astronomy and Astrophysics, University of Toronto, has a strong mandate for outreach, *including speakers and planetarium programs for teachers*.

<http://universe.utoronto.ca>

Frequently Asked Questions (and Answers: I keep a list on my website:

<http://www.astro.utoronto.ca/~percy/faq.htm>

Laurentian University, Doran Planetarium, Sudbury. Shows in English and French.

<http://www.laurentian.ca/planetarium>

Let's Talk Science. Award-winning national science outreach program has some astronomy activities for school classes and youth groups.

<http://www.letstalkscience.ca>

McMaster University, W.J. McCallion Planetarium, Department of Physics and Astronomy. Planetarium programs.

<http://www.physics.mcmaster.ca/planetarium/>

Ontario Science Centre. Wide variety of curriculum-based programs and exhibits for students, teachers, and the public, including planetarium programs and *OmniMax* films (e.g. *Hubble*).

<http://www.ontariosciencecentre.ca>

Perimeter Institute for Theoretical Physics has a strong program of outreach to students, teachers, and the general public:

<http://www.perimeterinstitute.ca/outreach>

Royal Astronomical Society of Canada has Ontario branches or “Centres” in: Belleville, Ottawa, Kingston, Niagara, Toronto, Hamilton, Kitchener-Waterloo, London, Mississauga, Sarnia, Windsor, and Thunder Bay. Many have programs for schools and the public.

<http://www.rasc.ca/x> where x is the name of the Centre

Royal Ontario Museum, Education Department, Toronto. Wide variety of curriculum-related programs for students and teachers, using on-site or mobile planetariums. Also has an excellent meteorite collection.

<http://www.rom.on.ca/en/education/school-visits> e.g. search on StarLab or astronomy

Science North, Sudbury. School programs; 3D films, planetarium.

<http://www.sciencenorth.ca>

SkyNews, Box 10, Yarker ON K0K 3N0. Astronomy and stargazing from a Canadian perspective; edited by Gary Seronik and published by the Royal Astronomical Society of Canada; the best magazine resource on astronomy for school libraries!

<http://skynews.ca>

Starry Night: This planetarium software is widely used in Ontario schools. Use it to predict what you can observe in tonight’s sky, or to identify what you observed in last night’s sky. Or to simulate daily and yearly sky motions. Or much more.

<http://astronomy.starrynight.com>

The Sun on Line: There are several sites where you can safely access daily images of the sun, to study its varying appearance, and supplement your own real, safe views of the sun; one is:

<http://umbra.nascom.nasa.gov/images/> (click on “continuum”)

University of Toronto, Department of Astronomy. Public open house on the first Thursday evening of each month. Occasional free non-technical public lectures at other times. New initiatives to support teachers (TBA).

<http://www.astro.utoronto.ca/astrotours> and <http://www.universe.utoronto.ca>

Western University, Hume Cronyn Observatory, Department of Physics and Astronomy, London. Summer open houses, with sky viewing; winter programs by appointment. Other activities. The Centre for Planetary Sciences also has extensive outreach activities.

<http://physics.uwo.ca/community/index.html> (Physics/Astronomy)

<http://cpsx.uwo.ca/outreach> (Centre for Planetary Sciences)

York University, Department of Physics and Astronomy, Downsview. Tours all year, day or evening, by appointment. Public tours on Wednesday evenings. On-line resources. (416) 736-2100x77773.

<http://astronomy.info.yorku.ca>