IUGG 2019
General Assembly GIFT Workshop
Presenter Application

Thank you for your interest in presenting at the International Union of Geodesy and Geophysics (IUGG) 2019 General Assembly Geosciences Information for Teachers (GIFT) Workshop. The workshop is scheduled for **July 15-17, 2019**, at the 2019 General Assembly (GA) of IUGG. The GA will be held in the Palais des Congrès in Montréal, Québec, Canada. The GIFT workshop typically is attended by 50-75 educators, primarily middle and high school teachers, but includes educators working in elementary schools and informal community-based education centers as well. Participating in the IUGG GIFT workshop is an excellent way to share your science and associated educational resources with an international group of teachers and help them bring these resources directly into their classrooms.

IUGG is soliciting applications from **teams** composed **of at least one scientist and at least one education specialist (e.g. outreach specialist, science teacher) if possible** to provide presentations during the workshop. A "presentation" will be composed of a **talk** on an Earth or space science topic appropriate for K-12 educators coupled **with one or more closely related hands-on classroom activities**, with a full time for presentation of 1.5 hours. If distance and travel costs precludes your bringing a full team, we will try to arrange for you to train a local volunteer educator to be your teammate. To ensure that the presentation is appropriate for the K-12 classroom, applicants are required to provide information on the relevance of the presentation topic to the Next Generation Science Standards or your equivalent national Standards.

The language of instruction will be English if possible. French presentations are acceptable. We require abstracts in both languages and encourage the use of two column bilingual slides in your presentation.

Applications for presentations will be taken through **March 15, 2019**. At least one of the individuals involved in the presentation must be an associate of IUGG (member of an IUGG affiliated scientific society) or be sponsored by an associate of IUGG. Applications will be reviewed by a committee drawn from Canadian IUGG scientists, K-12 teachers, and the US AGU EPO community, who will help identify the proposals that appear to be the most appropriate to teacher needs and IUGG goals and objectives. Final decisions on selected presentation teams will be made by **May 1, 2019**.

Each team of presenters will receive one free registration to the IUGG General Assembly, to be used by a member of the presenting team.. If we are able to raise the money, we hope to provide some travel support to the K-12 educator member of your team.

About Your Team

Name of Scientist Presenter

Position - Select All that Apply and/or Type in the Other Position Box:

- ☐ Scientist
- ☐ Professor
- ☐ E/PO Specialist
- ☐ K-12 Teacher

Other Position

Institution

International Unio

Address

Phone

Fax

Email

Name of sponsoring IUGG Associate if different than Scientist Presenter name

Brief description of your experience presenting to K-12 teachers. (If available, feel free to provide information about presentation evaluations.)

Name of Educator Presenter, if possible

Or

☐ I cannot bring a team, but I am willing and able to train a local volunteer surrogate to assist me.

Position of Educator Presenter- Select All that Apply and/or Type in the Other Position Box:

☐ Scientist

☐ Professor

☐ E/PO Specialist

☐ K-12 Teacher

Other Position

Institution

Address

Phone

Fax

Email

Name of sponsoring IUGG associate if different than Educator Presenter name

Brief description of your experience as a K-12 teacher and in presenting to K-12 teachers. (If available, feel free to provide information about presentation evaluations.)

List Other Team Members, Their Institutions, and Emails

About Your Presentation

Topic of Presentation

Title of Presentation

IUGG has three key science priority areas for this Workshop: 1) Beyond 100: The next century in Earth and Space Science, 2) Evolution of the Geomagnetic Field and Space Weather Hazards to Canada, and 3) The Natural Resources of Canada. Please indicate if you think your presentation is aligned with one of these areas or if it addresses a current issue/hot topic in Earth and Space science. (Check as many as you feel are appropriate to your presentation. Otherwise check "Does Not Apply".)

- ☐ Beyond 100
- ☐ Space Weather Hazards
- ☐ Natural Resources of Canada
- ☐ Current Issues/ Hot Topics
- ☐ Does Not Apply

What Current Issue/ Hot Topic?

Brief description of talk (150 words maximum)

Brief description of talk in French (150 words maximum)
Brève description de la conversation en français (ne pas plus de 150 mots)

Brief description of hands-on classroom activity or activities (may be computer-based and/or use mobile computing) (150 words maximum)

Brief description of hands-on classroom activity or activities (may be computer-based and/or use mobile computing) in French (150 words maximum)
Brève description de l'activité ou des activités pratiques en classe (peut être informatisé et / ou utiliser l'informatique mobile) en français (ne pas plus de 150 mots)

Grade level(s) of the activity/activities

- ☐ Elementary School
- ☐ Middle School
- ☐ High School

Length of the activity/activities

Describe how, as a result of your presentation (talk plus activities) a classroom teacher will be able to immediately make use of the resources you share (150 words maximum).

National/Regional Science Standards

Has your material/presentation been formally aligned with one or more regional or national Science Curriculum Standards? If so, which?

- ☐ Quebec
- ☐ Ontario
- ☐ Other Canadian Province/US State
- ☐ US Next Generation Science Standards
- ☐ Other Country
- ☐ No Alignment to Report

Additional Standards Alignment Information

Use this space to provide detailed standards alignment information about your presentation or application. In particular, if your presentation is not aligned with the US NGSS but is aligned with your National Standards, please provide as much detail as possible about this alignment, including your country, the name and a URL for your Standards, and the specifics of the alignment of your presentation. (Use the NGSS questions to guide the level of detail that you provide.) NGSS aligned presenters, please skip to the next set of questions:

How Your Presentation Supports the US Next Generation Science Standards (NGSS)

The US Next Generation Science Standards (NGSS) incorporate the three dimensions of learning from the National Research Council's *Framework for K-12 Science Education*. These include **1) Science and Engineering Practices, 2) Crosscutting Concepts, and 3) Disciplinary Core Ideas**. Your talk and activities should either address these dimensions so that students in the classrooms of teachers participating in the GIFT workshop can meet NGSS performance expectations or address your equivalent National Standards. From the lists below, choose the **one most relevant practice**, and the **one most relevant crosscutting concept** plus **no more than three disciplinary core ideas** (DCI's) addressed by your presentation. If your presentation is aligned with another set of national standards, but you know how your material aigns with NGSS, please answer these questions.

Science and Engineering Practices

☐ **1. Asking Questions and Defining Problems.** Students at any grade level should be able to ask questions of each other about the texts they read, the features of the phenomena they observe, and the conclusions they draw from their models or scientific investigations. For engineering, they should ask questions to define the problem to be solved and to elicit ideas that lead to the constraints and specifications for its solution. (NRC Framework 2012, p. 56)

☐ **2. Developing and Using Models.** Modeling can begin in the earliest grades, with students' models progressing from concrete "pictures" and/or physical scale models (e.g., a toy car) to more abstract representations of relevant relationships in later grades, such as a diagram representing forces on a particular object in a system. (NRC Framework, 2012, p. 58)

☐ **3. Planning and Carrying Out Investigations.** Students should have opportunities to plan and carry out several different kinds of investigations during their K-12 years. At all levels, they should engage in investigations that range from those structured by the teacher—in order to expose an issue or question that they would be unlikely to explore on their own (e.g., measuring specific properties of materials)— to those that emerge from students' own questions. (NRC Framework, 2012, p. 61)

☐ **4. Analyzing and Interpreting Data.** Once collected, data must be presented in a form that can reveal any patterns and relationships and that allows results to be communicated to others. Because raw data as such have little meaning, a major practice of scientists is to organize and interpret data through tabulating, graphing, or statistical analysis. Such analysis can bring out the meaning of data—and their relevance—so that they may be used as evidence. Engineers, too, make decisions based on evidence that a given design will work; they rarely rely on trial and error. Engineers often analyze a design by creating a model or prototype and collecting extensive data on how it performs, including under extreme conditions. Analysis of this kind of data not only informs design decisions and enables the prediction or assessment of performance but also helps define or clarify problems, determine economic feasibility, evaluate alternatives, and investigate failures. (NRC Framework, 2012, p. 61-62)

☐ **5. Using Mathematics and Computational Thinking.** Although there are differences in how mathematics and computational thinking are applied in science and in engineering, mathematics often brings these two fields together by enabling engineers to apply the mathematical form of scientific theories and by enabling scientists to use powerful information technologies designed by engineers. Both kinds of professionals can thereby accomplish investigations and analyses and build complex models, which might otherwise be out of the question. (NRC Framework, 2012, p. 65)

☐ **6. Constructing Explanations and Designing Solutions.** Asking students to demonstrate their own understanding of the implications of a scientific idea by developing their own explanations of phenomena, whether based on observations they have made or models they have developed, engages them in an essential part of the process by which conceptual change can occur. In engineering, the goal is a design rather than an explanation. The process of developing a design is iterative and systematic, as is the process of developing an explanation or a theory in science. Engineers' activities, however, have elements that are distinct from those of scientists. These elements include specifying constraints and criteria for desired qualities of the solution, developing a design plan, producing and testing models or prototypes, selecting among alternative design features to optimize the achievement of design criteria, and refining design ideas based on the performance of a prototype or simulation. (NRC Framework, 2012, p. 68-69)

☐ **7. Engaging in Argument from Evidence.** The study of science and engineering should produce a sense of the process of argument necessary for advancing and defending a new idea or an explanation of a phenomenon and the norms for conducting such arguments. In that spirit, students should argue for the explanations they construct, defend their interpretations of the associated data, and advocate for the designs they propose. (NRC Framework, 2012, p. 73)

☐ **8. Obtaining, Evaluating, and Communicating Information.** Any education in science and engineering needs to develop students' ability to read and produce domain-specific text. As such, every science or engineering lesson is in part a language lesson, particularly reading and producing the genres of texts that are intrinsic to science and engineering. (NRC Framework, 2012, p. 76)

Crosscutting Concepts

☐ **1. Patterns.** Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.

☐ **2. Cause and Effect: Mechanism and Explanation.** Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts..

☐ **3. Scale, Proportion, and Quantity.** In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.

☐ **4. Systems and System Models.** Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering.

☐ **5. Energy and Matter: Flows, Cycles, and Conservation.** Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations.

☐ **6. Structure and Function.** The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.

☐ **7. Stability and Change.** For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.

Disciplinary Core Ideas (DCI's)

When selecting a DCI, consider the grade level of your presentation.

Earth and Space Science

ESS1 Earth's Place in the Universe

☐ **ESS1A The Universe and Its Stars**

- K-2. Patterns of movement of the sun, moon, and stars as seen from Earth can be observed, described, and predicted.
- 3-5. The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their size and distance from Earth.
- 6-8. Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. The universe began with a period of extreme and rapid expansion known as the Big Bang. Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe.
- 9-12. The star called the sun is changing and will burn out over a life span of approximately 10 billion years. The sun is just one of more than 200 billion stars in the Milky Way galaxy, and the Milky Way is just one of hundreds of billions of galaxies in the universe. The study of stars' light spectra and brightness is used to identify compositional elements of stars, their movements, and their distances from Earth.

☐ **ESS1B Earth and the Solar System**

- K-2. Seasonal patterns of sunrise and sunset can be observed, described, and predicted.
- 3-5. The Earth's orbit and rotation, and the orbit of the moon around the Earth cause observable patterns.
- 6-8. The solar system contains many varied objects held together by gravity. Solar system models explain and predict eclipses, lunar phases, and seasons.
- 9-12. Kepler's laws describe common features of the motions of orbiting objects. Observations from astronomy and space probes provide evidence for explanations of solar system formation. Changes in Earth's tilt and orbit cause climate changes such as Ice Ages.

☐ **ESS1C The History of Planet Earth**

- K-2. Some events on Earth occur very quickly; others can occur very slowly.
- 3-5. Certain features on Earth can be used to order events that have occurred in a landscape.

- 6-8. Rock strata and the fossil record can be used as evidence to organize the relative occurrence of major historical events in Earth's history.
- 9-12. The rock record resulting from tectonic and other geoscience processes as well as objects from the solar system can provide evidence of Earth's early history and the relative ages of major geologic formations.

ESS2 Earth's Systems

☐ **ESS2A Earth Materials and Systems**

- K-2. Wind and water change the shape of the land.
- 3-5. Four major Earth systems interact. Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, organisms, and gravity break rocks, soils, and sediments into smaller pieces and move them around.
- 6-8. Energy flows and matter cycles within and among Earth's systems, including the sun and Earth's interior as primary energy sources. Plate tectonics is one result of these processes.
- 9-12. Feedback effects exist within and among Earth's systems.

☐ **ESS2B Plate Tectonics and Large-Scale System Interactions**

- K-2. Maps show where things are located. One can map the shapes and kinds of land and water in any area.
- 3-5. Earth's physical features occur in patterns, as do earthquakes and volcanoes. Maps can be used to locate features and determine patterns in those events.
- 6-8. Plate tectonics is the unifying theory that explains movements of rocks at Earth's surface and geological history. Maps are used to display evidence of plate movement.
- 9-12. Radioactive decay within Earth's interior contributes to thermal convection in the mantle.

☐ **ESS2C The Roles of Water in Earth's Surface Processes**

- K-2. Water is found in many types of places and in different forms on Earth.
- 3-5. Most of Earth's water is in the ocean and much of the Earth's fresh water is in glaciers or underground.
- 6-8. Water cycles among land, ocean, and atmosphere, and is propelled by sunlight and gravity. Density variations of sea water drive interconnected ocean currents. Water movement causes weathering and erosion, changing landscape features.
- 9-12. The planet's dynamics are greatly influenced by water's unique chemical and physical properties.

☐ ESS2D Weather and Climate

- K-2. Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region and time. People record weather patterns over time.
- 3-5. Climate describes patterns of typical weather conditions over different scales and variations. Historical weather patterns can be analyzed.
- 6-8. Complex interactions determine local weather patterns and influence climate, including the role of the ocean.
- 9-12. The role of radiation from the sun and its interactions with the atmosphere, ocean, and land are the foundation for the global climate system. Global climate models are used to predict future changes, including changes influenced by human behavior and natural factors.

☐ ESS2E Biogeology

- K-2. Plants and animals can change their local environment.
- 3-5. Living things can affect the physical characteristics of their environment.
- 6-8. Evolution is shaped by Earth's varying geological conditions. The fossil record documents the existence, diversity, extinction, and change of many life forms and their environments through Earth's history.
- 9-12. The biosphere and Earth's other systems have many interconnections that cause a continual co- evolution of Earth's surface and life on it.

ESS3 Earth and Human Activity

☐ ESS3A Natural Resources

- K-2. Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.
- 3-5. All materials, energy, and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not.
- 6-8. Humans depend on Earth's land, ocean, atmosphere, and biosphere for different resources, many of which are limited or not renewable. Resources are distributed unevenly around the planet as a result of past geologic processes.
- 9-12. Resource availability has guided the development of human society and use of natural resources has associated costs, risks, and benefits.

☐ ESS3B Natural Hazards

- K-2. Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that communities can prepare for and respond to these events.
- 3-5. A variety of hazards result from natural processes; humans cannot eliminate hazards but can reduce their impacts.
- 6-8. Some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions. Others, such as earthquakes, occur suddenly and with no notice, and thus they are not yet predictable. However, mapping the history of natural hazards in a region, combined with an understanding of related geological forces can help forecast the locations and likelihoods of future events.
- 9-12. Natural hazards and other geological events have shaped the course of human history at local, regional, and global scales.

☐ **ESS3C Human Impacts on Earth Systems**

- K-2. Things people do can affect the environment but they can make choices to reduce their impacts.
- 3-5. Societal activities have had major effects on the land, ocean, atmosphere, and even outer space. Societal activities can also help protect Earth's resources and environments.
- 6-8. Human activities have altered the biosphere, sometimes damaging it, although changes to environments can have different impacts for different living things. Activities and technologies can be engineered to reduce people's impacts on Earth.
- 9-12. Sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources, including the development of technologies.

☐ **ESS3D Global Climate Change**

- 3-5. If Earth's global mean temperature continues to rise, the lives of humans and other organisms will be affected in many different ways.
- 6-8. Human activities affect global warming. Decisions to reduce the impact of global warming depend on understanding climate science, engineering capabilities, and social dynamics.
- 9-12. Global climate models used to predict changes continue to be improved, although discoveries about the global climate system are ongoing and continually needed.

Explain how your workshop presentation connects to the Next Generation Science Standards. You may wish to reference one or more specific NGSS performance expectations that you address. These are different from the practices, crosscutting concepts, and core ideas (150 word maximum).

Workshop Materials for Your Presentation

Please upload workshop materials for review. These materials include resources that you provide to participants, such as activity lesson plans, datasheets, PowerPoint presentations for the talk or an outline of talking points, and supporting websites or datasets, if applicable. Applications that do not include workshop materials are typically not selected for GIFT workshops. GIFT workshop participants receive these digital resources prior to the workshop. You should own the copyright to these materials or they should be sharable under the Creative Commons license. In the past teachers have rated these resources as one of the most valuable aspects of the GIFT workshop. After the workshop, these resources will be made freely available to educators via the IUGG/IAGA websites. Making these resources available to other educators increases the reach and potential educational impact of your workshop content and activities.

If you have presented these materials to educators before, you may also wish to provide reviewers with past evaluation information. Upload all files in Word, pdf, or PowerPoint format. Upload tool will be on IUGG General Assembly Website.

If applicable, copy and paste the url for a supporting website.

Additional Information (Optional)

Use this space to provide any additional information you would like to share about your presentation or application.

Name Please enter a su Email