National Science Resources Center

THE NATIONAL ACADEMIES Smithsonian Institution

March 2009

Dear Principal, Science Supervisor or Teacher:

The following information may help you make a decision regarding sending teachers to the *Smithsonian Science Education Academy for Teachers—Earth's History and Global Change*. This event utilizes the scientific and educational resources of the Smithsonian Institution, combined with other museums and partners, to provide teachers with a unique week-long learning experience.

After an initial introduction to the conceptual structure of the course participants begin their investigation of these concepts with a look at the evidence for how the earth was formed and what the Earth was like in this early phase of its history. In this first section, and throughout much of the week, extensive use is made of the collections, particularly those not generally accessible to the public, of the Smithsonian Institution and the wide expertise of its scientific and educational staff. Moving forward in time participants examine evidence found in the rocks, in terms of their chemistry, structure and fossils, for past environments and tectonic activity. The Carnegie Institute has kindly opened its laboratories to participants, who will get the opportunity to meet and visit their laboratories that focus on fixing the age of these rocks. In addition, teachers will examine evidence gathered from drill cores. As the week unfolds the course moves into the era of more recent global change, and focuses on the impact of life and human activity on global systems. Some course sessions use inquiry-based pedagogical approaches as vehicles for teacher instruction that can translate into exciting classroom experiences for school students. The course syllabus therefore closely aligns with the National Science Education Standards grades 5–12 (of the National Research Council), and some state standards for science and technology education.

Concepts and content areas that relate to this academy, that are included in most state standards include:

- The formation of the Solar System
- The origin and evolution of the Earth System
- The structure of the Earth
- The formation of the oceans and atmosphere (and the influence of life)
- The properties and formation of earth materials
- Plate tectonics
- The rock cycle
- Fossil evidence (of Earth's history and global change)
- Extinction

- Energy in the Earth System
- Global Climate Change
- A wide range of standards that relate to scientific inquiry, included access to researchers and exemplary hands-on inquiry based sessions
- Understandings about the relationship between science and technology, and the process of technological design
- Standards that relate to the social perspective of science, such as the use of natural resources, environmental quality, and global change
- Understandings about the nature of science as a human endeavor, and the history of science and technology

The cutting-edge content, concepts, and pedagogy are presented using exhibits at a number of museums, visits to laboratories and presentations by experts in appropriate fields. In addition many sessions will be hands-on, where teachers explore new ways of teaching science concepts. The museum environment is particularly conducive to addressing the historical that relate to the topic, and which are often underemphasized by teachers.

The following list provides a breakdown of the sessions. Please note that some sessions are still tentative, being dependent on venue and staff availability. Sessions may be added or removed. The order of the program may also be subject to change

Sunday Evening

- Overview and introduction to the program
- Pre-assessment
- Conceptual mapping

Day 1

- How the Earth was Formed. *Museum floor exhibit*
- Meteorites, Lunar Rocks and Earth Oldest Rocks. *Behind the scenes in the Smithsonian collections*
- Evidence of Earth's Early History Through Studying Other Planets. *Presentation and behind the scenes inquiry with researchers at the National Air and Space Museum*

Day 2

- What do Rocks Tell Us About the History of the Earth. *Department of Mineral Science, Natural History Museum*
- Modeling Plate Tectonics. *NSRC classroom session*
- Volcanoes, the Atmosphere and the Oceans. *Smithsonian Volcanologist*
- Minerals and Rocks Tell A Story (Relating Rocks to Plate Tectonics). *Group activities behind the scenes in the Smithsonian collections*

Day 3

- Ocean Systems Fossils. *National Museum of Natural History. Museum floor exhibit session*
- Evidence From Fossils for Global Change. *Paleontology lab*
- Dating Our Planet. *Presentations and lab experiences at the Carnegie Institute*

Day 4

- Earth Systems From Space. *National Zoo—Science-on-a-Sphere*
- Global Climate Change. *Koshland Museum of the National Academies*
- Evidence of Global Change. *Presentation*
- Evidence From Drilling Cores. *Hands-on session. Video conference with scientists*

Day 5

- Extinctions: Present, Past and Future. *National Museum of Natural History*
- Economics and Consequences of Climate Change. *TBD*
- Post assessment and wrap-up

I hope this description of the program is helpful, and that you find a close match between your instructional needs and what has been planned for this week-long *Smithsonian Science Education Academy for Teachers: Earth's History and Global Change.*

Sincerely

David Marsland

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Smithsonian Institution