

## Proposal for Forming an IAA Study Group 1.10

**Title of Study:** **Terrestrial Analogue -  
Comparison of Terrestrial and Planetary Geology**

**Proposer(s):**  
(Must be member(s) of the Academy M or CM) Dr Marcello Corradini

**Primary IAA Commission Preference: Commission 1**

(From Commission 1 to Commission 6)

Commissions: 1 Space Physical Sciences, 2 Space Life Sciences, 3 Space Technology & Systems Development, 4 Space Systems Operations & Utilization, 5 Space Policy, Law & Economics, 6 Space and Society: Culture and Education

**Secondary IAA Commission Interests:**

(From Commission 1 to Commission 6)

### Members of Study Team

**Chair(s):** **Marcello Corradini (ESA-JPL, Member)**

(Must be member(s) of the Academy, M or CM)

**Secretary: Karen McBride (UCLA)**

**Other Members:**

(Open to members and non-members of the Academy)

Vicky Hipkin (CSA), Enrico Flamini (ASI) Alain Berinstain (CSA)  
Gian-Gabriele Ori (IRPS) Dave Pieri (JPL), Diana Blaney (JPL) Andrew Steel (Andrew Steele, Carnegie Institution Washington DC)

### Short Description of Scope of Study

**Overall Goal:**

(Expected scientific or practical benefit of the study group's efforts)

The cosmic study will investigate the synergy and commonality of studying geology on Earth and on another planet.

Terrestrial analogues are places on Earth that approximate, in some respect, the geological, environmental and putative biological conditions on a particular planetary body, either at the present-day or sometime in the past. Analogue studies are driven by the need to understand processes on Earth in order to interpret and groundtruth data sent back from Mars and other planetary bodies by unmanned orbiters and rovers.

Sedimentary formations as windows into Mars' geologic history. How similar are the fluvial and deltaic deposits on Earth and Mars, their formation, alteration, and possible diagenetic processes, and the geometries and accumulation mechanisms of their sedimentary bodies? What evidence of the transition from early conditions to the present frigid desert environment is preserved in sedimentary deposits? Can stratigraphic reconstruction of sequences and geometries be modeled using terrestrial deposits? Ancient depositional systems on Mars and terrestrial facies models include fluvial sedimentary environments, hydrothermal deposits, subsurface ice and permafrost deposits, and aqueously altered volcanic terrains and regolith.

Potential paleobiological repositories include glaciers, ice (polar)caps and their associated sediments. Terrestrial deserts be used as proxies for evidence of major Martian global climate changes.

Terrestrial volcanoes in all climatic areas from Iceland to Sicily, can be considered as analogue to the Martian volcanic edifices whose lifetime embraced and conditioned several climatic stages of Mars.

Human exploration and testing

Analogue campaigns can assist in the design and validation of technologies and systems to ensure full operability and functionality once deployed at the surface of Mars. Integrated analogue campaigns allow to test exploration strategies and operations planning to maximize the achievement of the mission objectives (e.g. scientific return or production of O<sub>2</sub>) and to ensure interoperability between the different elements of the mission.

One of the main goals is to investigate existing laboratory and university capacities and solicit interest, from developing countries and space emerging countries. A particular focus will be made to offer affordable access to space exploration in Latin America and Africa in using the IAA network.

The cosmic study will engage selected international experts to suggest a global space planetology sciences education and public outreach (EPO) model that: (1) strengthens Latin America's and Africa's future space exploration workforce; and (2) promotes science, technology, engineering, and mathematics (STEM) education and public engagement to communicate the benefits of space for understanding our planet and living in Latin America and Africa; and (3) underlining the importance for involving countries, organizations and individuals who can provide new contributions to the Robotic and Human Exploration endeavor.

A review of on-going study Terrestrial Analogues should be duly taken into account and will represent the starting point of this activity.

### **Intermediate Goals:**

To organize an IAA conference in Latin America or/and in Africa to identify interested partners.  
To provide the individual contributions necessary to enable the compilation of the Final Report.

### **Methodology:**

*(Email works, workshops, stand alone conferences, interim publications, etc.)*

The cosmic study will be conducted in two phases,

A first step with recommendations length of minimum of 5 to a maximum of 10 pages, in time for the January Heads of Space agencies Summit

A second step conducted in 2014 will aim at building a database of capabilities and more detailed investigations

### **Time Line:**

*(Cannot exceed three years)*

Deadline for preliminary draft: October 31, 2013.

Full study December 2014.

**Final Product (Report, Publication, etc.):**

Preliminary report to be published on the occasion of the 2<sup>nd</sup> IAA Head of Space Agencies Summit to be held in January 2014.

Final report available in end of 2014

**Target Community:**

Geologist community, members and non-members of the Academy.  
Remote sensing community, scientists, engineers,  
Space Agencies from Africa and Latin America in first priority  
Other space agencies for support

**Support Needed:**

Space Agencies  
Science Exhibitions and permanent interactive venues, sciences and technology museums.

**Potential Sponsors:**

Universities, Labs

To be returned to the IAA Secretary General Paris

by fax: 33 1 47 23 82 16 or  
by email: [sgeneral@iaamail.org](mailto:sgeneral@iaamail.org)

**Date: 06/19/2013**

(No Signature required if document authenticated).

**Follow-up Section for IAA use only**

**Initial Phase**

**Application received:**

**Commission Approved:**

**SAC Approved:**

**Web Site Section opened:**

**Members Formally Appointed by IAA:**

**Final Phase**

**Peer Review by Commission Completed:**

**Recommended by the Commission:**

**Final Report Received:**

**SAC Approved:**

**BOT Accepted:**

**Publisher Selected:**

**Study Published:**