



International Short Course on Medical Geology

Health and Earth - Building a Safer Environment

Bari, Italy – 19-20 September 2011

This Short Course is under the auspices of:

4th International Conference on Medical Geology (GEOMED-2011)

International Medical Geology Association (IMGA)

International Union of Geological Sciences – Commission on Geoscience for Environmental Management (IUGS-GEM)

Speakers:

Jose A. Centeno, Chairman, IMGA, Washington, DC, USA

Olle Selinus, Co-Chairman (for Geosciences), IMGA, Sweden

Robert B. Finkelman, Chair, IMGA, Education Committee, University of Texas at Dallas, USA

Mark Lyles, IMGA, US Navy, USA

Mark Cave, IMGA, British Geological Survey, UK

Wen-An Chiou, The University of Maryland, USA

Abstract:

Emerging diseases commonly present the medical community with many difficult problems. In addition, emerging disciplines may offer the medical community new opportunities to address a range of health problems. One such emerging discipline is Medical Geology.¹⁻⁵ Medical Geology is an emerging field dealing with the impacts of the natural geologic materials and processes (that is, the natural environment) on the incidence and spatial/temporal distributions of human (and other animal) diseases. As one of the selected topics highlighted during the International Year of Planet Earth (2007-2009), medical geology is aimed at improving interdisciplinary interactions among earth and public health scientists, providing the basis for innovative and exciting research that can lead to new discoveries and greater knowledge. Among the environmental health problems that medical scientists are working with the geosciences community are: exposure to toxic levels of trace elements such as arsenic, cadmium, mercury and uranium; trace element deficiencies; exposure to natural dusts and to radioactivity, and naturally occurring organic compounds in drinking water.

Analytical characterization of naturally-occurring trace elements and toxic organic compounds in ground water is helping to explain patterns of diseases such as arseniasis, fluorosis, and Balkan Endemic Nephropathy – a condition leading to end-stage kidney failure. Satellites and geographic information systems are being used to monitor the movement of large dust clouds moving across oceans carrying toxic metals and pathogenic microbes that may kill coral and may cause asthma.⁶ Regionally, dust exposure can affect broad regions such as the dust stirred up by earthquakes in the arid regions of the southwestern U.S. and northern Mexico. This dust carries spores of a fungus (*coccidiomycosis immetus*) that cause Valley Fever, a potentially fatal respiratory condition. Although the consequences of this type of exposure are not fully understood, modern medical and environmental techniques offer promise



of developing innovative solutions to prevent or minimize exposure to potentially deleterious natural environmental pollutants and processes.

The scope of this International Short Course on Medical Geology is to share the most recent information on the relationship between impacts of toxic metals, trace elements, natural dust, on environmental quality and public health. The scientific topics include areas in environmental toxicology, environmental pathology, epidemiology, geochemistry, as well as the extent, patterns and consequences of exposures to toxic metal ions and deficiency of trace elements in the natural environment. Emphasis will be placed on describing the geochemistry, toxicology and health effects of natural geogenic dust (particulate matter), risk assessment studies, and modern analytical trends of particular application to medical geology.

The Short Course is intended for geologists, geochemists, ecologists, chemists, biologists, occupational and environmental scientists, medical professionals, toxicologists, epidemiologists, environmental pathologists, bio-statisticians and any other health, environmental and geo-sciences professional with interest on Medical Geology issues, particular interest on the effect of toxic metal ion species on environmental and human health. An important aim of the Course is to provide the opportunity for forming contacts and networks between professionals working in different areas of environmental and human health.

Suggested Reading:

1. **Centeno JA.** Natural disasters and their long-term impacts on the health of communities. *J Environ Monit* 2008;10:266.
2. **Centeno JA.** Impacts of the natural environment on human health. *Interciencia* 2008;33(3)169-171.
3. Bunnell JE, Finkelman RB, **Centeno JA**, Selinus O. Medical Geology – A Discipline Emerging Globally. *Geological Acta* 2007;5(3):273-281.
4. Selinus O, Finkelman RB, **Centeno JA.** The Medical Geology Revolution. *Geosciences* 2007;5:108-109.
5. Selinus O, Alloway B, **Centeno JA.** Essentials of Medical Geology – Impact of the Natural Environment on Human Health. Elsevier and Academic Press, 2005.
6. Cook AG, Weinstein P, **Centeno JA.** Health Effects of Dust – Role of Trace Elements and Compounds. *Biol Trace Element Research* 2005;103:1-15.

PROGRAM

Monday, September 19

08.00 – 09.00 **Registration**

Introduction

09.00 - 09.30 Welcome Remarks and Course Overview

Jose A. Centeno, IMGGA, USA

Robert B. Finkelman, IMGGA, USA

09.30 – 10.30 The Emergent Discipline of Medical Geology – Past, Present and Future
Olle Selinus – IMGGA, Sweden

10.30 – 11.00 Coffee Break

Environmental Health, Toxicology, and Geochemical Aspects of Medical Geology

11.00 – 12.00 Metals, Metalloids and Trace Elements - A Medical Geology Perspective
Jose A. Centeno, IMGGA, USA

12.00 – 13.00 Natural and Anthropogenic Sources of Trace Elements in the Environment
Robert B. Finkelman, IMGGA, USA

13.00 – 14.30 Lunch (not provided)

14.30 – 15.15 Health Impact of Dust
Jose A. Centeno, IMGGA, USA

15.15 - 16.00 Chemical, Biological and Microbiological Characterization of Desert Dust
Mark B. Lyles, IMGGA, USA

16.00 – 16.45 In-vitro Measurement and Validation of the Human Bioaccessibility of As, Cd,
and Pb in Soils
Mark Cave, IMGGA, UK

16.45 – 17.15 Coffee Break

17.15 – 18.00 Health Impacts of Fossil Fuels
Robert B. Finkelman, IMGGA, USA

18.00 – Discussion

Tuesday, September 20

Registry/Database Information and Analytical Aspects of Medical Geology

- 08.30 – Electron Microscopy in Medical Geology
09.15 *Wen-An Chiou, University of Maryland, USA*
- 09.15 – X-Ray Microscopy in Medical Geology
09.45 *Wen-An Chiou, University of Maryland, USA*
- 09.45 – Biospectroscopy and Trace Metal Analyses
10.30 *Jose A. Centeno, IMGA, USA*
- 10.30 – Coffee/Tea Break
11.00
- 11.00 - Development and Use of International Databases for Medical Geology
11.45 *Olle Selinus, IMGA, Sweden*
- 11.45 – Trace elements in Medical Geology – Se and As
12.15 *Jose A. Centeno, IMGA, USA & Olle Selinus, IMGA, Sweden*
- 12.15 – Geophagy
13.00 *Olle Selinus, IMGA, Sweden*
- 13.00 – Lunch (not provided)
14.30

Emerging and Future Research Issues of Medical Geology

- 14.30 - Soil – The Essence of Medical Geology
15.30 *Robert B. Fnkelman, IMGA, USA*
- 15.00 - Health Benefits of Rocks and Minerals
15.30 *Robert B. Fnkelman, IMGA, USA*
- 15.30 – Integrating Earth Sciences and Public Health – Milestones and Future Developments
16.30 (including Marinduque)
José A. Centeno, IMGA, USA
- 16.30 – Coffee/Tea Break
17.00
- 17.30 - Practical Exercise in Medical Geology
18.00 *All the Speakers*
- 18.00 - Discussion and Course Certificates