The Clay Minerals Society

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THE PRESIDENT'S CORNER

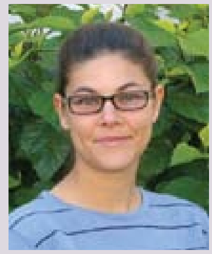
The United Nations declared October 31, 2011, to be the day (+/– about a year) that the Earth's population reached 7 billion. Less well publicized but far more significant is that the projection for peak global population was raised from 9 billion to slightly over 10 billion and will occur somewhere around 2050. This brings me to the critical question, "Will we be able to feed 10 billion people in 2050?" The problem is not so much a growing population as it is a changing of diets. The people of China, India, and other rapidly developing countries are eating more meat and dairy products as their economies grow, and it takes 3 to 10 calories of grain to produce one calorie of meat. Thus global economic growth is accelerating growth in demand for grain far faster than the effect population growth is having on this demand. My children and as yet unborn grandchildren have little risk of facing a food shortage: we live in Iowa, the greatest grain-producing region the world has ever known! For that matter, people living throughout North America, South America, and Europe have little risk of food shortages, as these regions have excess food-production capacity and their populations have either stabilized or are rapidly doing so. The people of China, India, Japan, South Korea, and Southeast Asia are also at low risk of food shortages; populations in these countries are also rapidly stabilizing, and as long as their economies continue to grow they will be able to afford to import the surplus food produced in the Americas. My concern is for the people of sub-Saharan Africa, a region with rapidly growing populations, abysmal economies, and degraded soils.

The poverty and deprivation that grips sub-Saharan Africa is rooted in the mineralogy of their soils. The young loess and glacial till soils of Iowa are dominated by smectites, illites, and randomly interstratified S/I (not really smectite/illite because the layer charge of the "illitic phase" is way too low, but that is another story). These 2:1 phyllosilicate clay minerals hold water and nutrients and help both to form and to stabilize soil organic matter by adsorbing fragments of biopolymers and physically protecting humic substances from rapid microbial decomposition. Soil organic matter in turn stabilizes soil structure and is a reservoir of slowly released nutrients that nourish crop growth. Iowa soils are incredibly productive! The soils of sub-Saharan Africa are dominated by quartz sands and old, highly weathered Fe- and Al-oxyhydroxide clay minerals. Because these minerals have low-activity surfaces, they are not effective at forming and stabilizing soil-enriching humus. Furthermore, the soils of sub-Saharan Africa have little capacity for retaining plant nutrients and are easily leached and/or depleted of nutrients by cropping.

The challenges facing sub-Saharan Africa have many social, political, economic, and historical causes, but the fragility of their soils has been a major factor reinforcing the poverty trap. We are wise to remember the words of Franklin Delano Roosevelt, "A nation that destroys its soils destroys itself." But we must also bear in mind that Iowa was endowed with resilient soils, while Africa was given fragile soils; the difference is in the mineralogy.

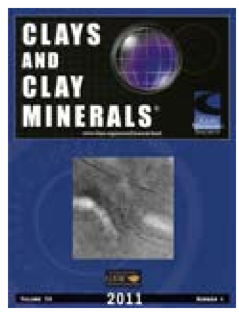
David Laird (dalaird@iastate.edu)
President, The Clay Minerals Society

STUDENT RESEARCH SPOTLIGHT



Congratulations to **Conni De Masi** for winning a CMS Student Research Grant Award. Conni is a graduate student at California State University, Long Beach, where she is working on a master of science degree in biology. In her research, she uses clay mineralogy and stable isotopes to determine the paleoclimate and paleoelevation of Owens Valley, California, and the surrounding mountains.

CLAY AND PHYLLOSILICATE MINERALS IN EXTRATERRESTRIAL MATERIALS



On Earth, many clay minerals and related phyllosilicates form from reactions involving water during weathering, diagenesis, and hydrothermal alteration. Clay and phyllosilicate minerals have been detected by spectroscopy on the surface of Mars and in some classes of meteorites by analyses in terrestrial laboratories. Occurrences of phyllosilicate minerals in extraterrestrial materials are widely understood to indicate the former presence of water on some rocky bodies elsewhere in the Solar System. The landing site for the Mars Science Laboratory (MSL) mission (successfully launched in November 2011 and due to land on Mars in August 2012) was chosen largely because clay-mineral-bearing strata, in their stratigraphic context and in relation to other water-soluble minerals, will be accessible to the ten scientific instruments on MSL rover Curiosity, including the first X-ray diffractometer to be flown to another planet. NASA recently selected a mission to return samples from a primitive asteroid, of a spectroscopic class that may contain phyllosilicates, in the coming decade.

The August 2011 issue of *Clays and Clay Minerals* assembles five papers on clay and phyllosilicate minerals in extraterrestrial materials. Four are case studies of mineral assemblages detected by orbital spectroscopy of the surface materials on Mars; the fifth reviews the occurrence and significance of serpentine-group phyllosilicates in one class of carbonaceous chondrites. This thematic issue embodies the overlapping interests and emerging connections between planetary geologists and clay mineralogists.

Michael Velbel, Michigan State University