J Earth Sci Climate Change 2012, 3:3
http://dx.doi.org/10.4172/2157-7617.S1.007

OMICS Group Conferences
Accelerating Scientific Discovery

International Conference on
Earth Science & Climate Change

August 21-22, 2012 Hilton Chicago/Northbrook, USA

Optimization of thermodynamic data of some calcium silicate hydrates

Thomas Millan, Eric Lécolier and Teddy Parra
IFP Energies nouvelles in Rueil Malmaison, France

Geological storage of CO_2 could be a viable way of limiting the effect of anthropogenic carbon dioxide emissions on the global warming. However, the containment of the gas has to be ensured and the understanding of how CO_2 could leak out of the sequestration formation is of great importance. The loss of the integrity of one or several wells located on the storage site represents the greatest risk of CO_2 leakage. For example, cement carbonation is one of the mechanism which can impair sealing capacity of a well. The knowledge of the long-term evolution of a hardened portland cement exposed to CO_2-rich fluids is therefore a key issue to ensure confidence CO_2 geological storage. Reactive transport modelling appears as the most reliable way to forecast the cement annular at very long term. However, reactive transport codes require reliable input thermodynamic data. A thermodynamic dataset based only on calorimetric data does not guaranty accurate results. Furthermore, a combination of reversal brackets and calorimetry is a way of getting an internally consistent thermodynamic dataset. The existing internally consistent thermodynamic databases include important phases concerning cements as portlandite, calcium carbonates or some calcium silicate hydrates (CSH) that may occur in a hydrated cement paste. The purpose of this study is to obtain new experimental results relative to the stability conditions of gyrolite ($Ca_4Si_6O_{17}H_2$) under well constrained pressure-temperature conditions. These bracketing experiments provide constrains to optimize and estimate thermodynamic data of the studied minerals.

Biography

Thomas Millan is a physico-chemistry PhD student at IFP Energies nouvelles in Rueil Malmaison (France) and in collaboration with the EMSE (Ecole Nationale Supérieure des Mines de Saint Etienne) and the Paris 6 University. His researches focuse on cement behaviour during CO_2 storage under geological conditions and the modelling of long term evolution of the cement mineralogy in CO_2 environment.

thomas.millan@ifpen.fr

Impact of climate change on maize productivity and potential adaptation options for the central rift valley of Ethiopia: The case of Adama district

Ephrem Weledekidane
Haramaya University, Ethiopia

The study involves an assessment of the potential effects of greenhouse gas climate change, as well as the direct fertilization effect of CO_2 on maize crop yield for Adama district, which is located in eastern Showa Zone of the Oromia Regional State of Ethiopia, about 100 Kms east of the capital city, Addis Ababa, geographically with latitude of 8.33°N and longitude of 39.17°E.

To estimate the level of impact of climate change on grain yield of Maize, climate change scenarios of precipitation and temperature were developed for future time period which spans from 2001 until 2099. The outputs of HadCM3 coupled atmosphere-ocean GCM model for the A2 and B2 SRES emission scenarios were used to produce the future scenarios. These outputs were downscaled to the production site scale through the application of the SDSM model.

The methodology involves coupling the transient diagnostics of atmosphere- ocean general circulation model, namely the Hadley Center's Had CM3, to the CropSyst crop model to simulate current and future (2011-2099) maize crop yield for the district. Hence, the downscaled climate scenarios were applied to CropSyst crop simulation model to simulate future grain yield of maize under the assumption of current production practices.

The simulation result revealed that the total average grain yield might decline significantly for both A2a- and B2a-scenarios with yield reduction in the range of 21%-51%. This shows a worsening trend of maize yield reduction which further strains the food security over the area. The simulation results, thus, entails that maize production is likely to decrease in the future and be insufficient to meet future demands for alternative supply of food for the ever increasing population. Some potential adaptation options are suggested to cope up with the possible reduction in maize productivity.

Biography

Ephrem Mamo has completed his B.Sc in Meteorology Science at the age of 22 years from Arbaminch University, Ethiopia and M.Sc in same field of study from the same university by 2009. He has served the National Meteorology Agency of Ethiopia as a Forecast and Analysis Team leader for about four years and then employed as a climate researcher and lecturer at the most renowned agriculture university in the country, the Haramaya University strating from 2009. He is currently involved in several ongoing climate change projects and research works, investigating for a possible and plausiable adaptation and mitigation strategy for Ethiopia.

ephratus@gmail.com