1. Title

Roles of Minerals as Suppliers and Regulators of Plant Nutrients

2. Type

Commission Symposium: Comm. 2.4-Soil Mineralogy

3. Organizer(s) & Convener

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4. Rationale

Apart from N, all essential plant nutrients are ultimately derived from geological minerals. The price of these is rising, and their availability is under pressure. Given the increasing population and the need to improve the efficiency of food production, it is timely to consider novel approaches to mineral supply of nutrient elements, taking advantage of recent developments in mineral weathering and clay science.

5. Objectives

The symposium will address the dynamic processes that affect mineral reactions in soils. It specifically seeks papers that address the rates and mechanisms of mineral reactions within the soil system that control nutrient availability and that might be suitable for exploitation in agriculture.

6. Description

Weathering in soils of silicate minerals, to produce clay minerals, provides nutrients that are vital for plant growth, in all climates. In the case of aluminosilicate minerals, such as feldspars and micas, weathering reactions involve the release of 'structural' and/or 'fixed' K to an exchangeable form bound to clay minerals. Other secondary and trace nutrient elements similarly become more accessible. These reactions potentially happen rapidly on timescales appropriate for plant growth and crop cultivation. Clay minerals are often considered as stable in soils over a century to millennium time scale. However, recent advances in X-ray diffraction analysis, allowing better clay mineral identification and quantification, highlight that changes in clay mineralogy were faster than commonly thought. The importance of processes (and the time-scale) driven by plants, microbes and land uses in mineral weathering has been better realized in therecent past..

Given the high price of conventional fertilisers, especially K, there is considerable incentive to understand the processes involved in mineral weathering and adsorption reactions within the rhizosphere. Changes in clay mineralogy and sorption reactions through time may induce changes in soil properties and soil functions and therefore changes in soil potential for agriculture and ecosystem functioning.