Dec 2015

Présentation of GSE "Geochemistry of Soil Evolution"
Presentation of the INRA team GSE "Geochemistry of Soil Evolution" at Aix-en-Provence.

Keywords: soil evolution, carbon stabilization, isotope approaches, modelling, pedogenesis, heavy metals.

The INRA lab GSE "Geochemistry of Soil Evolution" belongs to OT-Med since its creation. In June 2015, INRA-GSE merged with Cerege. It is now part of the team Geochemistry Geochronology and of the Theme "Sols: fonctionnements naturel et anthropique" of CEREGE. We thereafter call it the "INRA group of CEREGE".

Soils contribute to numerous ecosystem services, among which global food provisioning and greenhouse gas mitigation are acutely on the agenda. Concurrently, soils will be subjected to unprecedented evolutions during the next century, under the increasing pressure of climate change, land use changes and contaminations that may endanger these services. In that frame, the research of the INRA group focuses on the evolution of soils and soil constituents throughout the 21th century under these pressures.
INRA group of CEREGE is part of the Environment and Agronomy division and Centre de Recherche de PACA of INRA.

Its scientific aims are to:

assess medium- to long-term soil evolutions; simulate pedogenesis;
understand and predict soil organic carbon stabilization, notably through organo-mineral interactions;
trace and predict the biogeochemical cycles of major elements, i.e. silicon, aluminium, iron, carbon, nitrogen, hydrogen and the fate of contaminants such as copper and zinc;
The group is skilled in development of approaches based on natural isotope abundances for tracing biogeochemical processes (13C 14C, 2H, 30Si, 56,57Fe, 66Zn 65Cu, cosmogenic and radiogenic isotopes).
A final outcome of its activity is the development of mathematical models that simulate the evolution of soils and their mineral and organic constituents. This modelling approach intends to predict evolution patterns that are still unknown nowadays and is based on mechanistic formalisms.
The INRA group actively contributes to teaching on soils and biogeochemical cycles, and dissemination towards stakeholders, policy makers and general public.
On-going projects coordinated by the INRA group of CEREGE.

AGRIPED: Caractérisation et quantification de l'impact de l'usage des terres sur un processus majeur d'évolution des sols : le lessivage. Développement d'un modèle prédictif
DEDYCAS: Depth-dependent dynamics of carbon in soils : new concepts, measurements and modelling.
Couplage des dynamiques du carbone et de l'azote dans les sols : approche par les isotopes stables
Dynamique de l'hydrogène couplée au carbone dans les matières organiques des sols : expérimentation et modélisation par isotopes stables 13C et 2H.
Implementation of a soil evolution model to provide soil projections at the 2100 horizon
Carbon cycling and biogeochimical cycles at the O3HP (Oak Observatory at O3HP)

These projects are funded by INRA, ADEME, AIEA, AMU, ANDRA. ANR-Generic, EDF, Syrian Government.
GSE was partner of the equipment of excellence "platform of isotopic geochemistry ASTER-Cerege".
People
The INRA group of CEREGE comprises a ten of people (permanent researchers and technicians, PhDs, post-docs)

Principal partnerships (2015)
Tunis University (Tunisia); Skikda University (Algeria); Ghent University (Belgium);
LSCE, CEREGE, IMBE, INRA URSOL Orléans, INRA UMR EMMAH Avignon, INRA UREP Clermont-Ferrand, UMR LOCEAN, UMR GET, CIRAD
EDF, ANDRA, BRGM.
The group is member of the federation de recherche Eccorev.

In the frame of OT-MEd, the group recently co-organized the Journée d'interfaces scientifiques - acteurs socio-économiques sur la thématique " Demain: encore des sols en Méditerranée? " (2015). This day highlighted the urgent need to deploy research on soils in the Mediterranean due to the specific threats they face.

The group contributes to the OT-Med project « Carbon cycle and biodiversity in Mediterranean oak forest: impact of climate change » (PhD student : Susana Da Silva Pereira ; Supervisors: Virginie Baldy, IMBE ; Catherine Fernandez IMBE) and investigates biogeochimical cycles at the O3HP (Oak Observatory at O3HP).

Sample of representative references

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date mise a jour 8 December 2015

Originally published at: http://www.otmed.fr/spip.php?article933