National Centre of Competence in Research North-South

NCCR north south

Joint Areas of Case Studies:

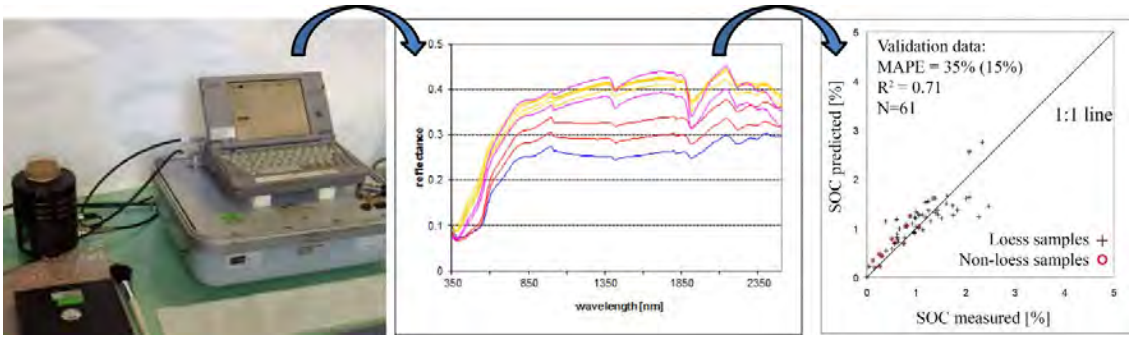
East Africa
Horn of Africa
West Africa
South-East Asia
South Asia
Central Asia
Central America and Caribbean
South America
Switzerland

Measuring soil quality using soil spectroscopy

There is an increasing demand for monitoring and evaluating our environment. Initiatives promoting payments for environmental services and carbon sequestration, for example, depend heavily on accurate assessment and monitoring of the soil, vegetation and water. That in turn calls for efficient methods. Soil, one of the most critical resources, requires special attention and regular auditing. Soil spectroscopy is an ideal tool for this task. Laboratory tests show that it is as accurate as conventional methods, which rely on wet chemistry. If used in combination with global positioning systems and satellite remote sensing, large areas can be monitored at an affordable cost.

How does it work?

The measured reflectance spectra can be calibrated with the results of chemical analysis to build a prediction model. That makes it possible to use just the spectra to analyse other samples.



What are the challenges?

- Direct interpretation of spectra is limited: chemically analyzed samples are needed for statistical calibration
  => buidling up calibration set at the University of Bern soil laboratory
- Large sample sets are needed for establishing local soil spectral libraries
  => using existing soil archives
- The equipment and software are usually expensive
  => there are almost no maintenance cost and no costs for chemicals. It is a robust tool for lab and field measurements.
- There is a lack of generic prediction models
  => script development in open source software R

Further reading

•NCCR North-South Regional Policy Brief: «Measuring soil quality using soil spectroscopy». http://www.nccr-north-south.unibe.ch/publications/Infosystem/On-line%20Dokumente/Upload/Regional_Policy_Brief_04_Central_Asia_Soil_Spectroscopy.pdf

•Amare T, Hergarten Ch, Hurni H, Wolfgramm B, Yitaferu B, and Selassie YG. 2013., "Prediction of Soil Organic Carbon for Ethiopian Highlands Using Soil Spectroscopy," ISRN Soil Science, vol. 2013, Article ID 720589, 11 pages, 2013. doi:10.1155/2013/720589 http://www.hindawi.com/isrn/ss/2013/720589/

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