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Digital Soil Science

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Introduction

An encoded representation based on a finite set of discrete elements (Strasser & Edwards, 2017). Digital convergence is providing us with help to better understand and study the soil. Past 10 years **DIGITAL SOIL MAPPING (DSM)** has risen as a convincible alternative to traditional soil mapping. Scientists explore the ways in which digital science and technology have affected soil science and call it digital soil science. At present digital soil, sensors have been widely accomplished and new tools like mobile phones and apps, or metagenomics techniques are becoming available. Remote soil sensing, digital soil mapping, digital soil

field description, cell phones apps are some kind of tools which are generally using nowadays in soil science.

Analog - Digital Conversion - The major implementation of these technologies came from analogue-to-digital conversion. Maps, imagery, reading forms of spectrometers, and hand drawings were initiated to transform into a digital form with the emerging resources in computing analysis, processing and sharing. This conversion is going on and institutions like *Institut de Recherche pour le Développement* in France, the **ESDAC (EUROPIAN SOIL DATA CENTER)** in Italy or ISRIC – world soil information in the Netherlands are still digitalizing hand-drown soil maps and their collection of analogue soil data.

Remote Soil Sensing- remote sensing has provided a high potential in soil characteristics rescuing in last 3 decades. Soil scientist have been using remote sensing since 1920s to share the soil- landscape into homogeneous areas with aerial photographs. The analysis of vast sector of digital remote sensing data has been simplified by digital

tools and computer processing changed the hand computation of analog images by manually. Many things like depth of band computation, layer stacking of sentinel data, partial least squares regression, variogram analysis are now used by help of digital remote sensing.

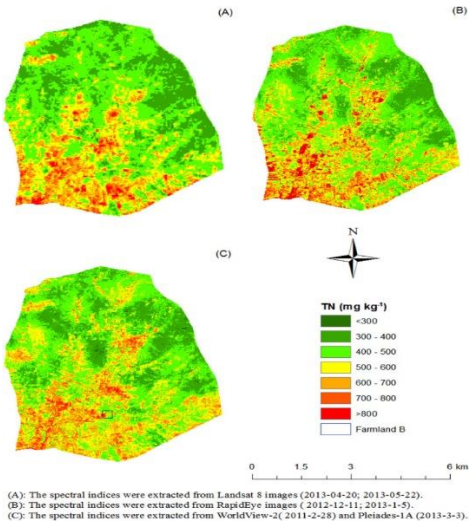

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Table 1. Simple chronology of using different equipment in digital soil science.

Digital Soil Mapping – with the help of computer development and numerical processing the soil maps are represented digitally and accurately. Digital data like remote sensing images and other things are now stored in the Google Earth Engine platform. The pixels in the images are doubling every year which will help to enhance the quality of images of maps means overall soil mapping. With the help of digital tools, digital soil mapping is expanding day by day. To fill the gaps in soil surveys data mining has been using over large areas. Also disaggregating soil map units into soil series, using of multinomial logistic regression, estimation of probability of finding major soil group in map etc. are some other working examples of DSM.

Sr. no	Equipment implemented in digital soil science	Begin of implementation
1.	Article, textbook	1920 – 1925
2.	Punched card	1950 – 1955
3.	Personal computer	1960 – 1965
4.	Remote soil sensing	1970 – 1975
5.	Proximal soil sensing	1980 – 1985
6.	Internet	1990 – 1995
7.	GPS	1994 – 2000
8.	Cell phone	2003 – 2005

Conclusion–Digital technology has improved the old or traditional way of soil science and brought a new version of soil mapping and remote sensing. The major success in digital soil science is proximal soil sensing, digital soil mapping, soil bio-genomics, cell phone apps and others. The future of digital soil science will be ruled by machine learning, IoT, robotic measurement and big data for prosperous soil understanding. In the far future by using digital soil science we can also regenerate soil on the earth, analyze the soils of other planets and create multifunctional soils and so on.

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