

Relevance of pedotopographical indicators in the assessment of spatial distributions of soil depth and soil water resources under forest stands : General Methodology

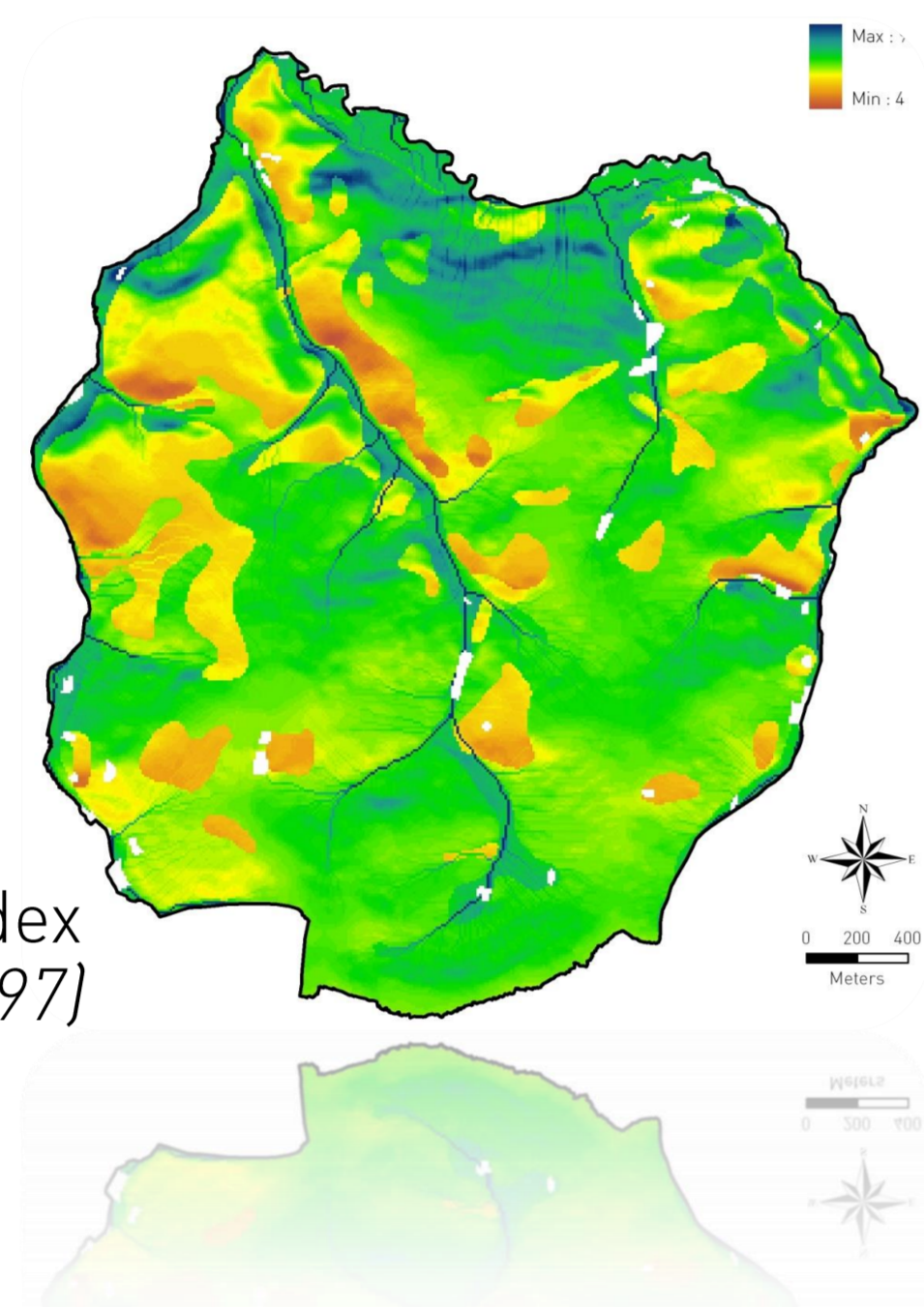
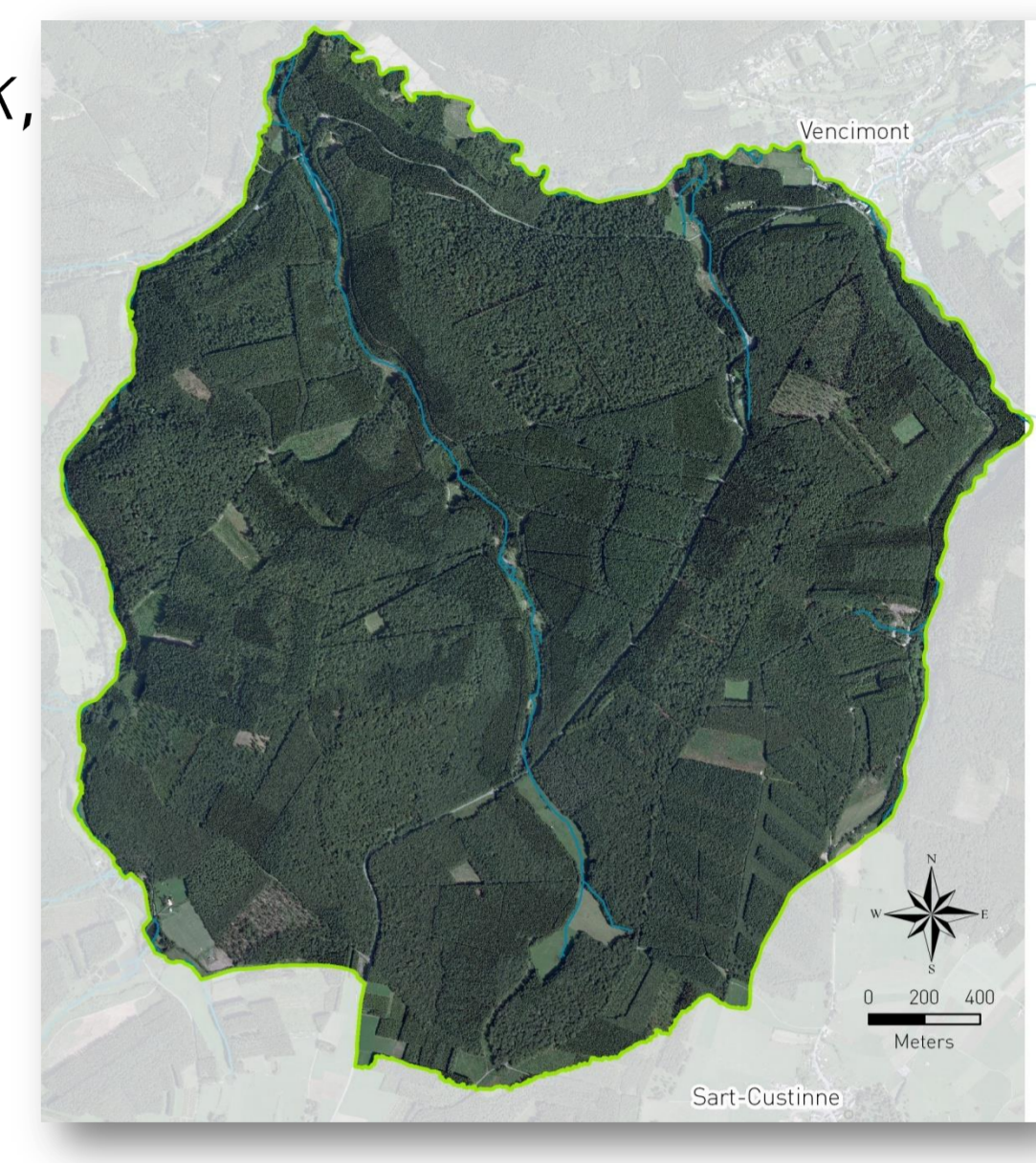
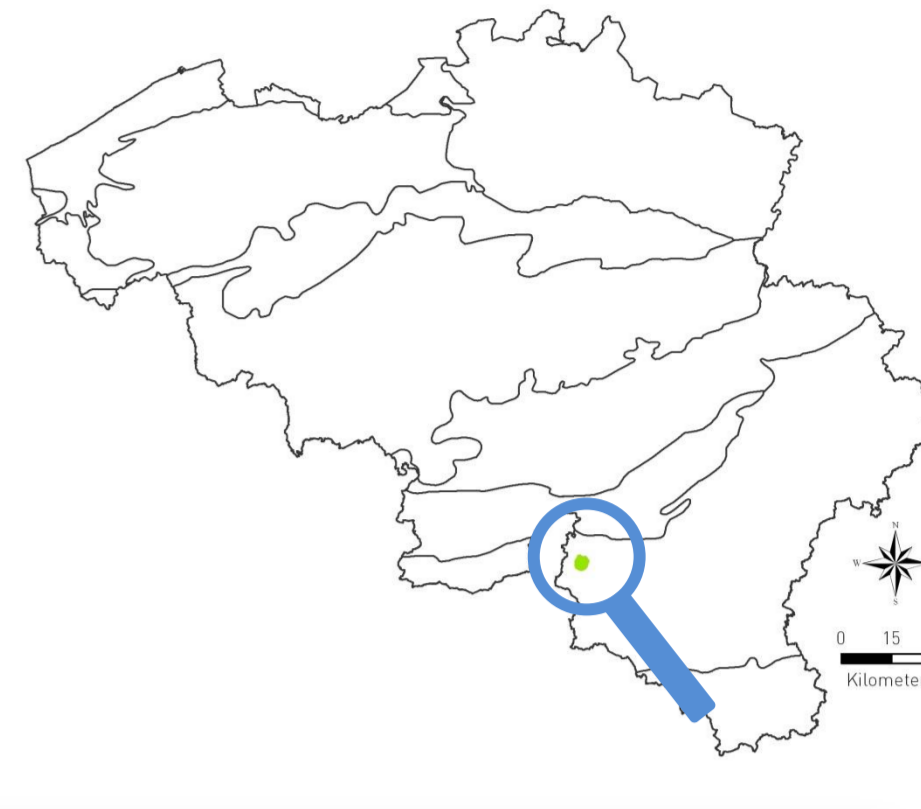
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Study Context

Water resources constitute one of the most decisive factors of the adaptation of forest ecosystems facing climate changes. The assessment of soil water resources should lead a better understanding of forest sites vulnerability to water stress and provide appropriate management recommendations for the choice of trees species and sylvicultural techniques.

Study Area

Shale-slate stones pedological context of the Belgian Ardenne ecoregion
 Constrained relief in the Houille watershed with wide plateau, deep valley, local basin and steep slope
 90 % of forests cover dominated by : Oak, Beech, Norway Spruce and Douglas-Fir



Integrated Moisture Index (Iverson et al. 1997)

GIS Relief Indicators

Identify soil and terrain attributes, able to explain distribution of soil water content and soil depth, derived from :

- ° Digital Elevation Model
 - Different spatial resolutions: Lidar (1 m²), Erruisol DEM (100 m²) & Aster DEM (9.10³m²)
- ° Digital Soil Map of Wallonia
 - Soil information: eg. texture, depth, stones content, soil water capacity

→ Combined indices

Soil Water

Multi-year monitoring of real time soil moisture content using TDR technology to assess spatial and profile distributions of water

Subsurface (15 cm) on a systematic sampling Profile (≤ 70 cm) on 32 local sites

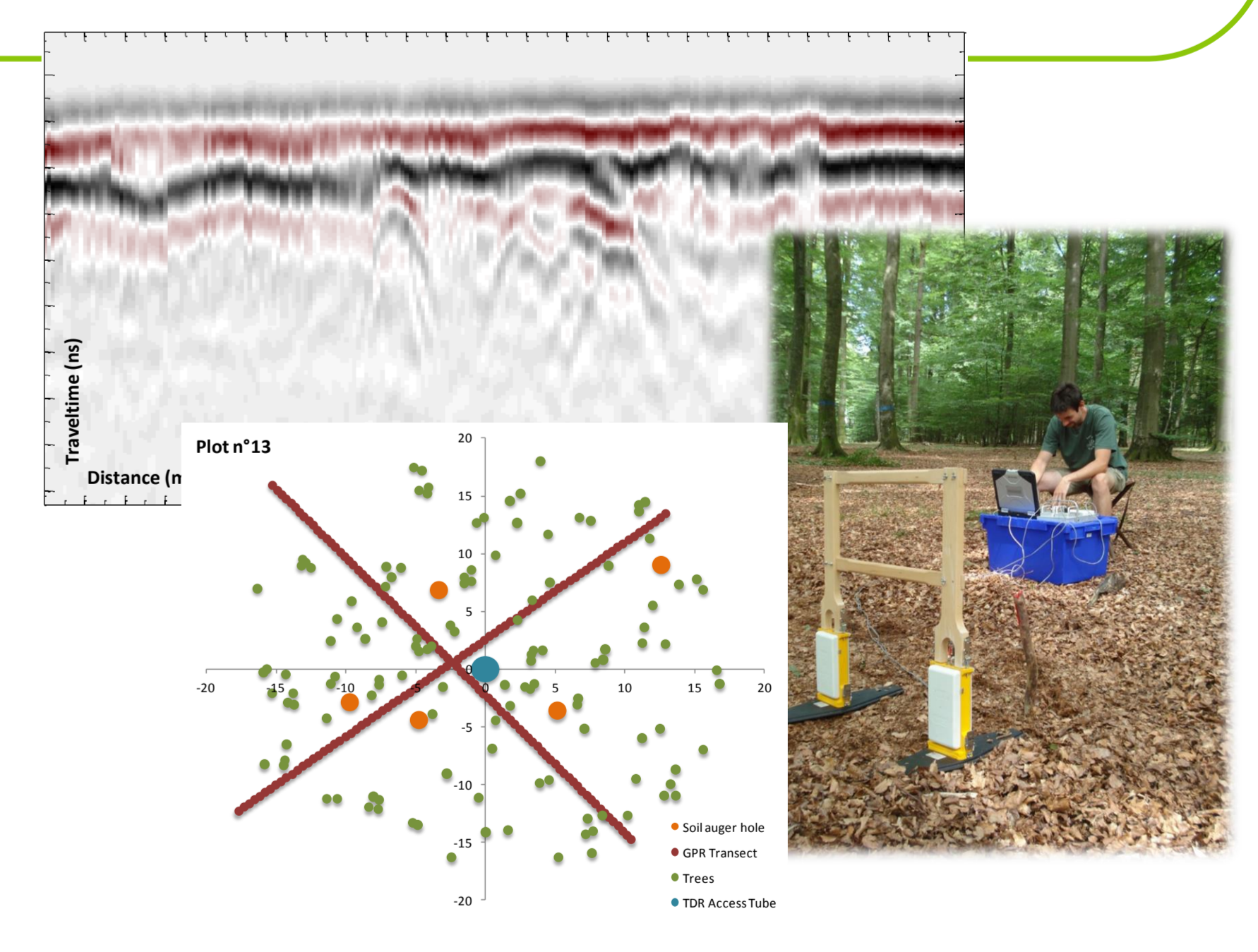
Laboratory analysis of soil properties determining soil water content : texture, organic matter, soil water capacity...



Soil Depth

Directly impacting soil water content, depth and stoniness will be investigated in contrasting topographic conditions by three ways :

- ° 2 traditional and destructive methods :
 - 32 soil pits & 160 holes with auger soil
- ° 1 electromagnetic and non intrusive method :
 - 5120m of Ground Penetrating Radar traces with 200 and 500 MHz antennas



Development of operational tools to ensure the forest site – tree species adequacy in order to increase resilience of forest ecosystems to ecological drifts