The importance of magnetic methods for soil mapping and process modelling. Case study in Ukraine

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**Introduction**

The correct planning of agriculture areas is fundamental for a sustainable future in Ukraine. After the recent political problems in Ukraine, new challenges emerged regarding sustainability questions. Soil mapping, modelling and soil magnetism are intensively developing (Brevik et al., 2016; Pereira et al., 2015; Jordanova et al., 2011).

**Soil magnetism applying:**

- Soil science and Agriculture
- Ecology and sustainable land use management
- Mineral prospecting, oil and gas prospecting and exploration
- Ecosystem services and warfare damage assessment
- Archeology

**MS for soil mapping and process modelling:**

Magnetic susceptibility (MS) methods are low cost and accurate for the developing maps of agricultural areas.

**Soils of Ukraine**

The main soil-climatic zones of Ukraine

Soil types: Albeluvisols (Soddy-podzolic), Phaeozems (Gray forest), Kastanozems (Chestnut), Chernozems (Leached, Typical, Ordinary, Southern, Meadow), Gleysols (Bog soils), Cambisols (Brawn and Mountains soils)

**Study area**

Figure 1. Study area and methods. Poltava region, Konorny

**Soil mapping and process modelling**

Figure 2. The spatial distribution of the Jerusalem artichoke height: H, m

Figure 3. The spatial distribution of the soil magnetic susceptibility: MS, 10⁻⁸ m³/kg

Figure 4. Magnetic susceptibility and Jerusalem artichoke height correlation, K=0.54

**Table 1. Descriptive statistics**

<table>
<thead>
<tr>
<th>Magnetic susceptibility, 10⁻⁸ m³/kg</th>
<th>Jerusalem artichoke height: H, m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>60</td>
</tr>
<tr>
<td>Mean</td>
<td>62.2</td>
</tr>
<tr>
<td>Minimum</td>
<td>81.0</td>
</tr>
<tr>
<td>Maximum</td>
<td>91.5</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.3</td>
</tr>
<tr>
<td>Coef. of Variation</td>
<td>0.15</td>
</tr>
<tr>
<td>Median</td>
<td>90.0</td>
</tr>
<tr>
<td>Correlation</td>
<td>0.54</td>
</tr>
</tbody>
</table>

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