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Taxonomic and environmental soil diversity of marine terraces of Gronfjord (West Spitsbergen island)

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Soil surveys in polar region are faced to problems of soil diagnostics, evolution, geography and pedogenesis with the aim to assess the actual state and future dynamics of soil cover under changing environmental conditions. This investigation is devoted to specification of taxonomic and environmental soil diversity of marine terraces of Gronfjord (Svalbard archipelago, West Spitsbergen Island). It was established 3 key plots (Grendasselva, Aldegonda rivers and marine terrace in surroundings of Barentsburg aerodrome). Soil diagnostics was carried out according to Russian soil classification system and WRB.

Grendasselva river valley is characterized by numerous patterned ground elements combined with lichen-moss and moss-lichen patches with sporadic inclusions of higher plants (mostly Lusula pilosa). Soil cover is represented by Typic Cryosols on elevated sites and Histic Gleysols, Turbic Gleysols and Histosols on well-drained boggy sites. Aldegonda river valley characterizes by predominance of entic soils (soil with non-pronounced profile differentiation) on moraine material (mostly Cryic Leptosols). Vegetation is presented by sporadic plant communities comprised by Lusula pilosa and thin lichen-moss ground layer (developed only in well-moistened micro depression). Marine terrace in surroundings of Barentsburg aerodrome is covered by moss-lichen tundra with sporadic inclusions of Lusula pilosa. On the top of the terrace compressed barren circles are quite abundant. Soil catena has been established within this key plot. Soil types are represented by Typic Cryosols in watershed parts of catena, Gleysols and Histic Gleysols in accumulation positions.

The active layer depths have been distinguished using vertical electrical sounding. They ranged from 80-90 cm at Grendasselva and Aldegonda river key plot to 140-150 cm at marine terrace in surroundings of Barentsburg aerodrome. Regional differences in this indicator may be explained not only by local differences in thermal regime of soil and permafrost layers, but also by different ways of anthropogenic forcing on studied key plots.

Spatial differentiation of soil types within the studied area is caused mainly by relief conditions (since it determines moisture conditions and gleyzation rates especially) and parent materials. Cryogenic mass transfer, cryoturbations and degree of their manifestation in studied soils depend on active layer thickness and also varies significantly.

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