

CLIMATIC CHANGES ON GRASSLAND GROWTH, ITS WATER CONDITIONS AND BIOMASS – FINEGRASS PROJECT

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Abstract

The Project “Effect of climatic changes on grassland growth, its water conditions and biomass” – FINEGRASS, has been realized under the Polish-Norwegian Research Programme and is coordinated by the Institute of Geodesy and Cartography in Warsaw. The Project contributes to two Polish-Norwegian Programme Areas: Climate Change and Environment.

The Project consists of nine complementary Work Packages including : field campaigns, examination of soil moisture in grassland areas based on satellite data, assessment of Vegetation indices and estimates of the influence of grassland growth conditions on biomass, phenology and grassland yield, estimates of climatological trends in identified regions; assessment of carbon exchange in grassland areas. The effect of Project is the assessment of impact of climate change on grassland growth conditions in different habitat types.

The grassland areas in Poland, for which the ground measurements and satellite images analysis have been performed represented the Lowland valley (below 300 m a.s.l), Lowland non–valley and Mountainous. The NIBIO in Norway identified suitable grassland study sites with sufficient size for Landsat monitoring. These sites were located in the Tromsø region, Harstad region and Vesterålen region.

In-situ measurements have been carried out during field campaigns correlated in time with satellite overpasses. Also, meteorological parameters such as air temperature, wind speed, solar and net radiation were measured, at the same time of ground truth measurements and satellites overpasses. For Poland, the Corine Land Cover Grassland Layer was intersected with AVHRR.NOAA data with resolution of 1000 m to create the grassland-mask. The pixels which characterized the grassland area were these, with the minimum of 50% of grassland. Simultaneously, the MODIS.TERRA image with resolution of 250m was also intersected with CLC Grassland Layer to create a second mask with higher spatial resolution. Finally, after processing databases three grassland masks were delivered:

- CLC Grassland Layer (MMU: 25ha)
- Grassland Mask based on AVHRR.NOAA (1000m)
- Grassland Mask based on MODIS.TERRA (250m)

One of the objective of the project was the assessment of vegetation indices derived from satellite data and describe the temporal and spatial variation of these indices. NOAA.AVHRR (since 1997) and Terra.MODIS (since 2000) historical and current images recorded in visible and thermal channels have been used for calculation of vegetation indices. Actually NOAA

AVHRR since 1997 have been processed and 10 day mosaic of NDVI; Ts; VCI and TCI has been elaborated. The pixels which were covered by 50% of grassland areas were considered as grasslands. The grasslands mosaics were overlaid on DTM for the whole country. The vegetation indices were calculated also for NUTS2. The areas of climatic zones for Poland has been established for evaluating the vegetation indices and its changes in time within these zones. The actual to the mean value of each satellite derived index for each 10 day period of the year have been presented for the time of satellite observations. In most of NUTS2 the trend in increase of surface temperature recorded by NOAA AVHRR has been noted for the 11 decade of the year.

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