



PROGRAMUL DE COOPERARE ELVEȚIANO-ROMÂN  
SWISS-ROMANIAN COOPERATION PROGRAMME

## Improved wind energy assessment based on coupled wind, terrain and vegetation modeling (WindLand)

**Starting Date** 01.01.2013.

**Duration** 36 Months

**Discipline** Engineering sciences

### Main Goals

- to develop and to assess a framework that integrates terrain and vegetation modeling concepts and tools in support of accurate wind modeling for wind energy applications over complex terrain;
- to apply the resulting modeling framework to case study areas for which high resolution terrain data is available.

### Activities

- multidisciplinary interactions aiming to integrate discipline-specific elements: Large-Eddy Simulation techniques; high resolution Digital Elevation Models; landscape and vegetation models;
- developing a nonlinear dynamic sub-grid scale model; run simulations at different spatial resolutions in order to assess the resolution sensitivity of the simulation results;
- developing a wavelet-based algorithm aiming to extract detail information from complex terrain data and to produce a hierarchical representation with minimal approximation errors;
- transfer and application of a dynamic model of landscape dynamics in pasture-woodlands from Switzerland to Romanian study areas; assessment and analysis of landscape structure.

### Expected results

- in the presence of wind turbines, the stability of the atmospheric boundary layer is modified, the boundary layer depth is increased and the magnitude of the surface heat flux is slightly reduced;
- a robust feature discrimination heuristic to drive the graph-based lifting scheme and a hierarchical set of difference vectors of increasing average magnitude;
- simulation of land-use scenarios for the demonstration of landscape structural changes; better understanding of tree cover and landscape mosaic as key parameters for airflow roughness.

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