



New tools to study the biosphere/atmosphere CO₂ exchange in Hegyhátsál

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Carbon dioxide fluxes over vegetation have been measured by the eddy-covariance technique in the western part of Hungary. The CO₂ concentration and flux monitoring programs at Hegyhátsál station were started in the framework of a U.S.-Hungarian research co-operation between NOAA and the Hungarian Meteorological Service. The CO₂ concentration at 4 levels and the regional scale Net Ecosystem Exchange (NEE) of the underlying vegetation have been measured continuously since 1994 and 1997, respectively. During well mixed conditions the boundary layer CO₂ concentration can be estimated from the CO₂ mixing ratio data of the highest monitoring level (115 m). This feature makes it possible to challenge the boundary layer (BL) budgeting in the region. The experiment tests the applicability of the method, and gives an independent estimate of NEE for daytime well mixed conditions. The BL budget model requires CO₂ mixing ratio data above the BL which can be estimated using the output of the DEHM model or the marine BL CO₂ data derived from GLOBALVIEW-CO₂ data. Inside the continent it is important to know the origin of the air masses above the BL, therefore the HYSPLIT_4 model was adapted. New tools were added to the PC version of HYSPLIT_4 to calculate large number of trajectories, by means of concentration footprint can be calculated. In the framework of a joint Hungarian-Japanese cooperation direct flux measurements were performed in 1999-2000 over a managed, species-rich, semi-natural grass field, at 3 meter height above the surface. Based on the results of this measurement a process-based biogeochemical model (BIOME-BGC) is tested to simulate the activity of the grassland in Hegyhátsál. In the first tests the model with default ecophysiological constants captured the order of the daily net and gross carbon exchange, which means that the default parameterization is well defined for general purpose modelling of C3 grass.