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Towards process-based estimates of large-scale biogenic isoprenoid emissions

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Inclusion of process-based biogenic volatile organic compound (BVOC) emission algorithms needs the linkage to leaf level carbon assimilation. Synthesis, diffusion and storage of BVOC compounds are affected by environmental changes such as fluctuations in light flux or temperature. Plant reactions to these environmental changes take place in seconds or minutes. Recent dynamic vegetation (DGVM) and carbon cycle models have routines included that are describing the carbon assimilation on a leaf level basis but their time resolution is mostly scaled such that the lowest time steps are on a daily basis.

Facing these fact, we implemented an altered carbon assimilation routine into the Lund University dynamic vegetation model framework LPJ-GUESS that is capable to run with time steps in minutes or hours. Nutritional constraints affecting the carbon assimilation rate due to leaf nitrogen content have been applied as well. Daycourse simulation runs have been conducted and compared to the daily average results gained by the original routine.

Linkage of several emission algorithms allows to compare the emissions that are based on daily average values to those calculated from daycourses. Environmental constraints, mediated by the carbon assimilation, on the BVOC synthesis are investigated as well.