



A Relaxed eddy accumulation system to measure greenhouse gas fluxes from terrestrial ecosystems

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Eddy covariance (EC) systems are currently state-of-the-art in measuring greenhouse gas fluxes from terrestrial ecosystems. Yet, they are limited to a few trace gases due to the lack of fast response analysers. High financial costs and high power consumption may further restrict their applicability. An alternative to EC systems is the relaxed eddy accumulation (REA) technique. REA avoids the need for a fast response analyser by collecting air from up-drafts and down-drafts into separate reservoirs (Businger and Oncley, 1990). After collecting the air over a predefined time period, trace gas concentrations in the reservoirs are analysed by a slow response analyser and the average fluxes can be calculated.

We developed and tested a REA system that is capable of measuring CO₂, CH₄, N₂O and H₂O fluxes simultaneously with only one gas analyser (Picarro G2805). This system is compatible with virtually any gas analyser and thus supports the flux analysis of a wide range of other air constituents like isotopes, aerosols and volatile organic compounds. Furthermore, the modular design and rugged casing makes the sampling system very robust and portable, and its 12 V DC operation makes it suitable for a wide range of field campaigns. The performance of the REA system was tested during the growing season of 2018 on a grassland on organic soil in central Sweden. And the results were compared with an established EC system for CO₂ and H₂O fluxes.