Assessment of greenhouse gases fluxes and carbon pools from ecosystems and their relation with environmental parameters

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The feedback between climate and ecosystems can be assessed directly by quantification of specific indicators and/or by modeling of involved phenomena. The greenhouse gases (GHG) are the triggers in the climate-ecosystems feedback loops, their changes affecting the systems in positive or negative way. A better understanding of the greenhouse gases exchanges between atmosphere and ecosystems can contribute to reduce the uncertainties in GHG's land use inventories, to discriminate between natural and anthropogenic sources of GHG's and with the aim to apply the proper measures in order to contribute to the climate changes mitigation efforts. One of the proven method used for the assessment of GHG's exchanges between atmosphere and terrestrial/aquatic ecosystems, with high accuracy at local level, are relying on in-situ measurements by chamber methods. This method was used to measure the fluxes of GHG at soil and water surface from crop lands, forest and respectively from rivers, wetlands and reservoirs. The environmental parameters involved in the processes of GHG dynamics were also recorded: air, water and soil temperatures, humidity of soil and air, chemical parameters of water and soil, biomass quantity and quality (by in-situ observations and quantification, laboratory quantification of litter decomposition or remote sensing with multispectral sensors by drones or satellite data). The database was completed with indicators recorded in relevant time and space dimensions with the aim to capture the important changes of parameters which could influence the dynamics of GHG's along the yearly seasons. The results were analyzed statistically to determine the correlation between the GHG's fluxes and environmental parameters. Also, the database can be use as input and calibration/validation for software as The Denitrification-Decomposition (DNDC) which use biogeochemical processes modelling to analyze the carbon and nitrogen in agricultural ecosystems. It can be use to forecast changes in carbon pools or fluxes in relation with environmental parameters as climate change and variability or management practices. Another way to asses the influence of environmental parameters on GHG's fluxes and pools is by laboratory incubations (microcosms) using probes collected from monitored sites. The probes were introduced in containers and different temperature, water content and application of nutrients or other amendments as biochar were tested in relation with GHG fluxes. Automated chambers were used simultaneous in parallel, being connected at a gas analyzer by a multiplexer. The use of different methods to analyze GHG's pools and fluxes from ecosystems as those presented in this work (in-situ measurements, remote sensing, laboratory incubations, statistical analysis and biogeochemical modelling) can be integrated to perform assessments at proper spatial and temporal scale, in order to reduce de uncertainties for the proper application of measures in climate change conditions.