Assess greenhouse gas emissions in agricultural lands using the DNDC model: A case study in the farm of the Faculty of Agricultural Sciences, Sabaragamuwa University of Sri Lanka

Human activities trigger greenhouse gas emissions as a result of different agricultural activities. DeNitrification DeComposition (DNDC) model is a tool used for simulating complex environment interactions with climate, soil, and plants. In the study of greenhouse gas emissions in a different land, uses were predicted using the DNDC model. The farm of the Faculty of Agriculture Sciences, the Sabaragamuwa University of Sri Lanka along with three home gardens and three paddy fields adjacent to the faculty farm were selected as the study area. Maximum and minimum temperature and precipitation data were acquired from the NASA POWER database for the 2017 to 2021 period. Atmospheric CO2 concentrations (402ppm) were obtained from the Giovanni NASA Earth database. Nitrogen concentrations in the rainfall of 0.61mg N/l were calculated based on the nitrogen deposition value for Sri Lanka and annual rainfall in the intermediate zone. Soil data for different land uses were obtained from the Nationwide open 3D soil database for Sri Lanka and recommended management practices were used for selected crop types for model simulation. The highest emissions of soil CO2 emission predicted in the faculty farm was 9343.73 kg C/ha/yr in 2018. The highest emissions of N2O predicted in 2017 was 60.35 kg N/ha/yr in the farm of the Faculty of Agriculture Sciences, Sabaragamuwa University of Sri Lanka. Predicted CH4 emissions in all land use ranged from – 0.35 kg C/ha/yr to 0 throughout all years (2017-2021). These elevated values of greenhouse gas emissions are related to climate, soil conditions, land use with higher usage of fertilizer, and other management practices.