Long-term timescale for implementation 4per1000 initiative: Russian experience

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RothC model was used for simulation soil organic carbon (SOC) stocks in 7 Russian long-term experiments with fertilizers founded in 1933-1980 on podzol, albeluvisols and chernozem with mineral and organic fertilization. Crop sequences include alternation of cereals, row crops and grasses, four experiments have crop rotations with bare fallow field. The model outputs demonstrate possibility of long-term SOC accumulation more than 4 ‰ of total SOC stocks annually if SOC stock was less than 80 t ha-1. Average long-term annual SOC accumulation in the treatments with the highest C input on podzol was 18.2 ‰ 4.8-13.8 ‰ on albeluvisols and 1 ‰ on chernozem. In favourable climatic years SOC gain demonstrate twofold increase, the highest values are expected for treatments with mineral or organic fertilization. At the same time in the extreme years, with 25% decline below average annual C input, the same treatments demonstrate losses of existing SOC stocks. Change of one-two favorable to extreme years in 25-year period is enough for tracing long-term changes of SOC stocks in topsoil.