Project abstracts – First internal call

CM2 Carboseq: Carbon sequestration in soils is a negative emission technology that can contribute to mitigate climate change. However, for European soils, a comprehensive assessment is missing on how much soil organic carbon (SOC) can be sequestered with different management options using also national data on agricultural management. The aim of *CarboSeq* is thus to estimate the feasible SOC-sequestration potential taking into account technical and socio-economic constraints. The project will align with the current FAO activity for a global SOC-sequestration potential map (GSOCseq). The key for SOC-sequestration is an enhanced input of biomass (e.g. crop residues) to the soil. for which a new database will be built to facilitate model runs with RothC and other soil SOC models for different management scenarios. The potential area of implementation will be developed together with all partners of *CarboSeq* and the national expert hubs. All partners will run RothC at national levels. The SOC-sequestration potential maps for different management options will guide policy makers regional specific to the most efficient agricultural management options to sequester SOC for climate mitigation.

CM8 SOMMIT: The SOMMIT project will evaluate trade-offs and synergies between soil C sequestration, nitrous oxide, methane and nitrate losses as affected by soil management options aimed at increasing soil C storage. The integrated and interdisciplinary approach will address the main pedo-climatic conditions and farming systems in Europe, through 1) synthesis and meta-analysis of available literature and data; 2) targeted, novel measurements on key long-term experiments; and 3) simulation of long-term agro-ecological system responses to contrasting management options. Moreover, obtained data will be synthesized through a fuzzy-expert system which will allow for 4) evidence-based identification of optimal strategies for mitigation of trade-offs, and 5) effective stakeholders' involvement.

CM8 TRACE-Soils: Soil C sequestration in agroecosystems can promote soil quality and biodiversity, but come at a cost of increased nutrient losses and greenhouse gas emissions. Aiming to increase the predictability of such synergies and trade-offs, we will study their underlying mechanisms by reviewing literature that quantifies them under different agricultural systems and management practices. We will identify soil abiotic and biotic predictors of trade-off magnitudes, and test them in long-term experiments across a NE-SW pedoclimatic gradient in Europe. Modelling scenarios will be posed to scale-up trade-off analysis to the provincial level. Outputs of reviews, experiments and models will serve to propose a ranked list of climate-zone specific indicators and measures to assess and mitigate trade-offs.

CM8 INSURE: Wet management with raised ground water table and flood-tolerant crops is an option to reduce peat decomposition and the related greenhouse gas emissions and water contamination from cultivated peatlands while still providing income for the farmers. However, there are sites with the risk of tradeoffs like high methane or phosphorus emissions diminishing the environmental benefits. Measurable indicators used in the selection of sites would increase the success rate of rewetting and thus the acceptability of wet agricultural management of peat soils. Experimental work together with modelling and advanced analysis of peat composition in INSURE project aims at improved understanding of controls of element cycling in rewetted ecosystems and to finding robust indicators for the tradeoffs of wet management.

MT1 STEROPES: Conventional high-detail soil maps are static and often based on obsolete data in relation to the time of use. STEROPES intends to overcome these limitations putting the use of satellite time series forward, to test their potential to predict cropland soil organic carbon content over various pedoclimatic conditions and cropping systems across Europe. First, models will be constructed from the reflectance image spectra of optical satellite series, notably Sentinel-2 (ESA), based on a number of diversified areas for which soil organic carbon samples are already available. The second phase of the project will be dedicated to analysing the influence of various factors on SOC prediction performance: soil moisture, texture, dry vegetation due to management practices, salinity. Then, for the sites where satellite information may not enable to derive acceptable predictions, other ancillary data will be considered at a more detailed scale, using geophysical proxies to reduce the uncertainty associated with these predictions.

MT1 SensRes: Soil maps for large areas often fail to account for local variation in soil properties, due to their coarse resolutions. However, remote and proximal sensors can provide highly detailed soil information at a local level. We therefore propose a method to downscale large-extent soil maps using sensor data. We will test the method for agricultural fields in seven European countries, using proximal sensors, drone images and satellite images. The mapped soil properties will include soil organic carbon, soil texture and locally important soil properties. We will test drone and satellite images of bare soils and vegetated fields, and we will test the effect of fusion data from different sensors. We will also test the potential for using the downscaled soil maps in practical applications.

SR5 SCALE: SCALE is a consortium of 13 research institutes from 9 EU-countries that aims to improve the management of sediment connectivity in diverse agricultural landscapes. It composes i) current state-of-the-art of connectivity principles in modelling and legal standards, ii) data set harmonisation, iii) harmonisation of up- and downscaling methods, iv) evaluation of on- and off-site measures and connectivity elements in common modelling approaches, v) development of frameworks with mitigation measures and best management practices for stakeholders and vi) the communication of the project's output. SCALE will significantly improve the harmonisation of data sets, observation and modelling techniques in connectivity research and bridge the gap between different spatial and administrative scales.

FS2/MT4 i-SoMPE: Innovative soil management practices (SMP) and agricultural systems are promoted to enhance ecosystem services in order to minimise soil threats and sustain agriculture in a climate change context. A comprehensive stocktake of SMPs and their ability to succeed on multiple goals, agricultural production, ecosystem services, biogeochemical cycles, is missing. By using a surveying approach, i-SoMPE will aim to documents these innovative farming practice. The data gathered will be synthesized considering technical and ecological constrains and socio-economic barriers. Contextspecific thematic maps will be provided to guide policy makers to the most efficient innovative SMPs as climate-smart sustainable tools.

ES1/ES2 SIREN: The SIREN project will make an inventory of indicator systems for assessing soil quality and ecosystem services, as currently used by Member States associated in the EJP SOIL and beyond. SIREN will identify and review the national frameworks and chains from soil properties via soil functions to soil ecosystem services and the indicators of soil quality state and functions plus their reference values across pedo-climatic conditions for the main agricultural production systems in the EU. Also, SIREN will identify if these have been translated into policy options and implementation, and into directions and guidance on land management. SIREN will particularly stocktake the array of

reference values for SOC, soil quality, soil biodiversity and degradation risk, the associated target values of indicators, and identify knowledge gaps and development needs.

CA1 CLIMASOMA: Soil management and cropping systems to enhance soil quality are often proposed as a key way to support the sustainable adaptation of EU agriculture to climate change. Many long-term field trials quantified the impact of specific management practices on soil quality and crop performance. However, the data gathered there has not yet been sufficiently synthesized so that practitioners and policy-makers can draw quantitative and context-specific conclusions concerning the efficacy of management practices as climate adaptation tools. CLIMASOMA will directly contribute to an alignment of research strategies connecting agricultural management, soil quality and climate adaptation potential through its summary of the literature, its meta-analysis and its identification of knowledge gaps.

Project contacts:

CM2: CarboSeq
Axel Don (axel.don@thuenen.de)

CM8: INSURE
Kristiina Regina (kristiina.regina@luke.fi)

CM8: SOMMIT
Alessandra Lagomarsino (alessandra.lagomarsino@crea.gov.it)

CM8: TRACE-Soil
Marta Goberna (marta.goberna@inia.es)

MT1: STEROPES
Emmanuelle VAUDOUR (emmanuelle.vaudour@agroparistech.fr) and Johanna Wetterlind (Johanna.Wetterlind@slu.se)

MT1: SensRes
Mogens Humlekrog Greve (greve@agro.au.dk); I suggest sending in copy to Anders Bjørn Møller (anbm@agro.au.dk) who assists Mogens

SR5: SCALE
Elmar Schmaltz (elmar.schmaltz@baw.at); I suggest sending in copy to Eva Ecker (eva.ecker@boku.ac.at) who manages contribution of the Austrian partners

FS2/MT4: i-SoMPE
Frederic Vanwindekens (f.vanwindekens@cra.wallonie.be)

ES1/ES2: SIREN
Jack Faber (jack.faber@wur.nl)

CA1: CLIMASOMA
Sarah Garre (sarah.garre@ilvo.vlaanderen.be)