Advanced Course:

GREENHOUSE GAS ASSESSMENT AND MITIGATION IN AGRICULTURE: CONCEPTS, METHODS AND SIMULATION TOOLS

Zaragoza (Spain), 30 November - 4 December 2026

PROGRAMME

0. Opening (1 hour)

1. Context (2 hours) ***L. Schietecatte***
- 1.1. The role of agriculture in climate change
- 1.2. Main processes underlying emissions of CO_2, N_2O, CH_4
- 1.3. The importance of the National GHG Inventories

2. Measuring agricultural GHG emissions and soil carbon changes (2 hours) ***K. Klumpp***
- 2.1. Methodological challenges: spatial/temporal variability, sampling issues, etc.
- 2.2. Overview of field and laboratory methods: limitations and opportunities
- 2.3. Low-cost procedures and new developments

3. GHG mitigation options for cropping systems (4.5 hours)
- 3.1. Direct and indirect GHG emissions: general concepts (3.1 and 3.5, 1 hour) ***A. Sanz-Cobeña***
- 3.2. Options for reducing direct N_2O and CH_4 emissions (3.2 and 3.3, 2 hours) ***A. Sanz-Cobeña***
- 3.3. Options for reducing indirect GHG emissions: N leaching and atmospheric reactive N ***A. Sanz-Cobeña***
- 3.4. Options for enhancing CO_2 removal (1.5 hour) ***J. Álvaro-Fuentes***
- 3.5. Barriers and opportunities for GHG mitigation in agriculture ***A. Sanz-Cobeña***

4. National GHG inventories (3 hours + 3 hours practical work)
- 4.1. IPCC-based methods (4.1-4.2, 3 hours) ***R. Oliveri***
- 4.2. Overcoming drawbacks, limitations and uncertainties in different national conditions ***R. Oliveri***
- *4.3. Practical work on GHG NI based on a case study (3 hours)* ***J. Álvaro-Fuentes, A. del Prado & R. Oliveri***

5. GHG estimation tools (6 hours + 7.5 hours practical work)
- 5.1. Process-based models (4 hours)
  - 5.1.1. Overview, data requirements, limitations and opportunities, applications (1 hour) ***J. Álvaro-Fuentes, A. del Prado***
  - 5.1.2. Field-scale models for GHG estimation (1 hour) ***J. Álvaro-Fuentes & A. del Prado***
  - 5.1.3. Regional and global models (1 hour) ***T. Viskari***
  - 5.1.4. Challenges of scaling up (or down) (1 hour) ***T. Viskari***
- 5.2. Life cycle analysis (LCA) (2 hours) (***A. Jebari***)
- *5.3. Practical work*
  - 5.3.1. Field-scale process-based models (3.5 hours) ***J. Álvaro-Fuentes, T. Viskari & A. del Prado,***
  - *5.3.2.* LCA (4 hours) ***A. Jebari and A. del Prado***

6. **Decision-making oriented tools (3 hours)** ***E. Milne***
- 6.1. Decision support systems
- 6.2. User-friendly tools
- 6.3. Open-access databases

7. Priorities on GHG research (2 hours)
Round table discussion: ***J. Álvaro-Fuentes, E. Milne, A. del Prado and T. Viskari***

8. Closing session (0.5 hours)