1. Introduction

- Context:
  - Within the context of climate change, agricultural soils have been less investigated so far, despite their considerable importance through the world.
  - Despite the numerous Soil Organic Matter (SOM) decomposition models that work at different spatial and temporal scales, there is still a lack of understanding of the mechanisms which control SOM decomposition.

- Objectives:
  - To model soil respiration in agricultural soils:
    - at an annual timescale with a daily time resolution
    - at the ecosystem scale (field)
  - The present results focus on heterotrophic respiration.

2. Model description

- Soil heterotrophic respiration model:
  - Derived from CENTURY (Parton et al., 1987).
  - 3 layers containing 3 to 5 carbon pools each (Fig.1).

3. Site description

4. Parameterization

- Site parameters: based on site data.
- Biochemical parameters: based on a literature survey:

5. Calibration

- Aim: To fix the two parameters of the temperature response.
  - Procedure: Model run on a 30-cycle loop with a local mean climatic year.
  - Minimization of difference between computed and measured SOC

6. Initialization

- Aim: Distribute SOC between pools.
  - Procedure: Model run on a 30-cycle loop with a local mean climatic year.
  - SOC initial distribution: 3% active, 40% slow and 57% passive (Parton et al., 1987).

7. Preliminary results: comparison with experimental data

- All soil respiration flux measurements were performed in 2007 using the dynamic closed chamber method.

8. Conclusions and perspectives

- Comments on Fig. 2, 3 and 4:
  - At each site, soil temperature is the soil respiration main driver.
  - Differences between sites may be driven by SOC.
  - Overall good agreement between modelled and measured fluxes in Lonzée, except for the extreme values.
  - Large model overestimation in Auradé and Lamasquère.
  - Impact of soil moisture?
  - In Lamasquère, overestimation of total SOC?

- The present results focus on heterotrophic respiration.

- To go further:
  - The results at LON suggest that the model may potentially be a good soil respiration predictive tool.
  - The discrepancies at AUR and LAM indicate that some adjustments have to be made, probably regarding the SOC content, its distribution between pools, and the temperature and humidity responses.
  - To validate the model with other site-year soil respiration data.
  - To investigate the possible link between SOC content and soil respiration fluxes through a field experiment.

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