

SOIL NITROGEN MODELLING IN GRASSLANDS OF THE NORTH OF SPAIN UNDER CONVENTIONAL AND ROTATIONAL GRAZING SCENARIOS

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INTRODUCTION

Grassland soils are a large soil carbon pool that can be at risk of being lost under inadequate management. If management practices are promoted to increase soil C storage, grasslands have the potential to help alleviate greenhouse gases emission. Previous studies have reached different types of conclusions about rotational grazing, either increasing soil nitrogen stocks (Mosier *et al.*, 2020) or observing higher N₂O emissions (Jackson *et al.*, 2015).

Objective

We compared mowing (M), conventional grazing (CG) and rotational grazing (RG) systems in relation N₂O emissions in grassland soil.

MATERIALS and METHODS



Mowing system
(Doblas-Rodrigo *et al.*, 2022)

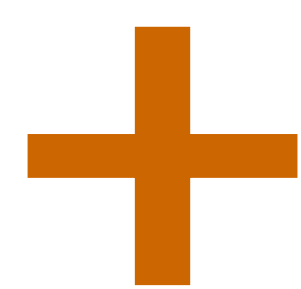
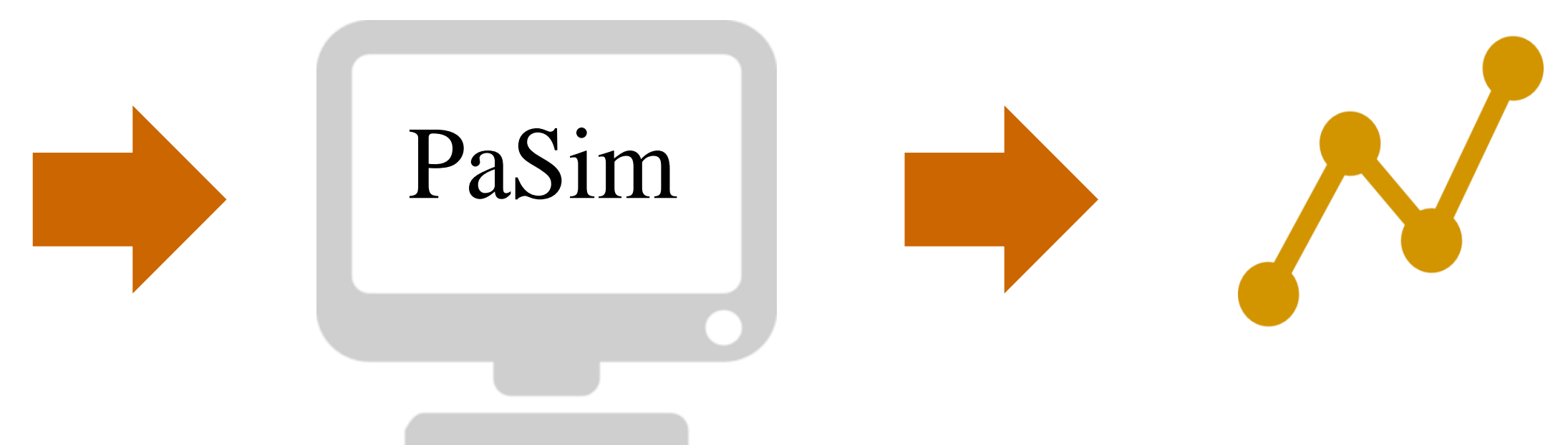


Table 1. Characteristics of the scenarios of conventional and rotational grazing

	Conventional grazing	Rotational grazing
Animals	100	100
Grazing paddocks (ha)	30	2.8
Stocking rate (animal ha ⁻¹)	3.3	35.7
Grazing days	221	20.6
Rest period (days)	0	32



RESULTS

The results showed that both grazing systems emitted 3.44 Kg N-N₂O ha⁻¹ year⁻¹ less than mowing management. Between grazing systems, RG emitted 0.36 Kg N-N₂O ha⁻¹ year⁻¹ more than CG.

Table 1. N₂O emissions under mowing, conventional and rotational grazing after 26 years

Management	Average of N ₂ O emissions (Kg N ha ⁻¹ year ⁻¹)
Mowing	12.72
Conventional	9.10
Rotational	9.46

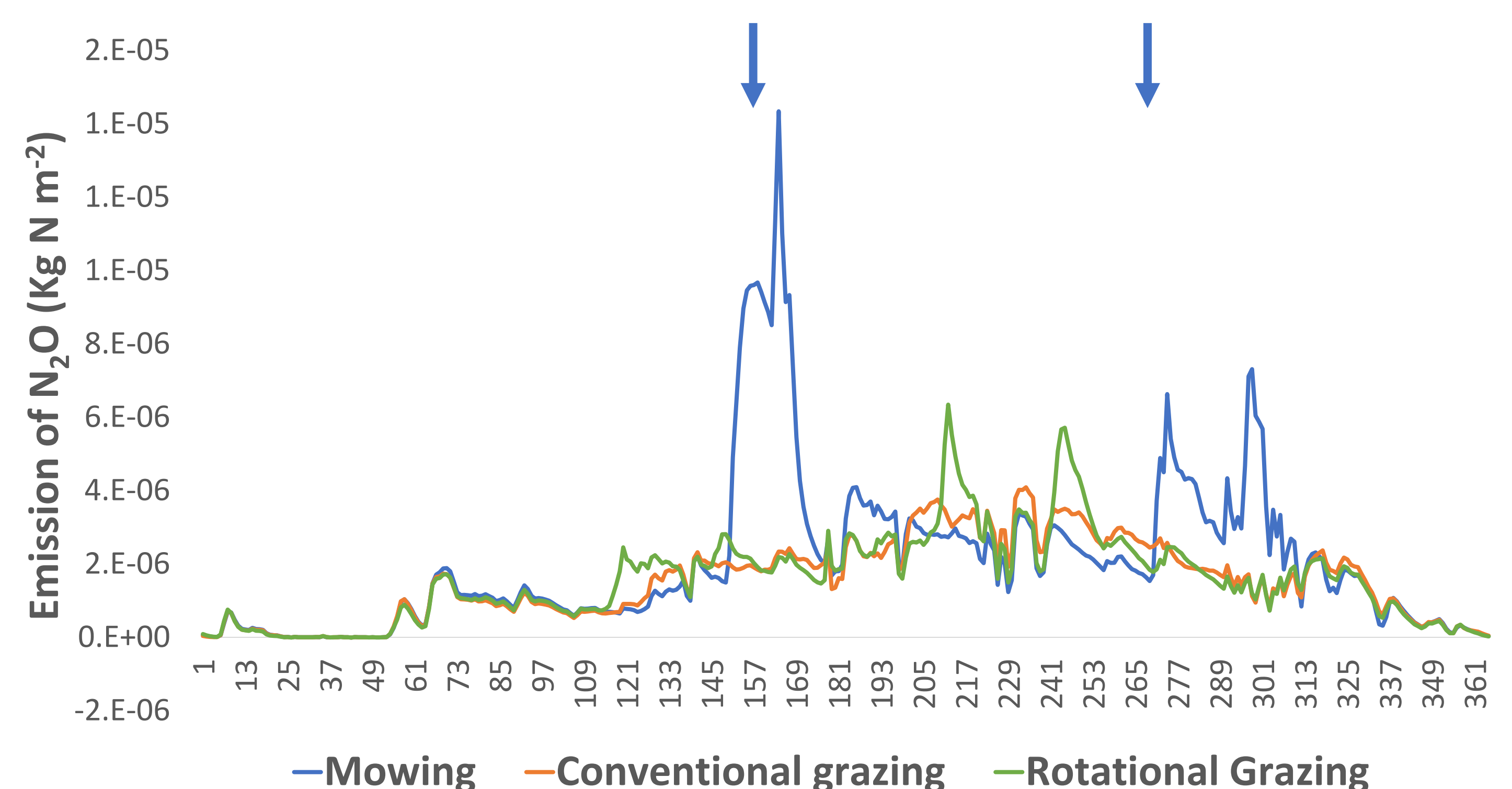


Figure 1. Pattern of N₂O annual emission in mowing, conventional and rotational grazing. Arrows indicate fertilization applications time in mowing.

CONCLUSION

In general, similar N₂O emissions were found in CG and RG system. However, short lived peaks associated to warm temperatures and the start of grazing periods in RG, led to higher N₂O losses.

References

Jackson, R.D., Oates, L.G., Schacht, W.H., Klopfenstein, T.J., Undersander, D.J., Greenquist, M.A., Bell, M.M., Gratton, C., 2015. Nitrous oxide emissions from cool-season pastures under managed grazing. *Nutrient Cycling in Agroecosystems* 101, 365–376.

Mosier, S., Apfelbaum, S., Byck, P., Calderon, F., Teague, R., Thompson, R., Cotrufo, M.F., 2021. Adaptive multi-paddock grazing enhances soil carbon and nitrogen stocks and stabilization through mineral association in southeastern U.S. grazing lands. *Journal of Environmental Management* 288, 112409.

