

32º CONGRESSO BRASILEIRO DE MICROBIOLOGIA

FOZ DO IGUAÇU / PR | 18 A 22 DE OUTUBRO DE 2023

METHANE METABOLISM ASSOCIATED GENES AND THEIR MICROBIAL SPECIES IN ANAEROBIC INCUBATED AMAZONIAN FLOODPLAIN SOILS WITH FOUR DIFFERENT CARBON SOURCES

MONTEIRO, G. G. T. N.^{1*}; BARROS, D. J.²; PELLEGRINETTI, T. A.¹; NEU, V. 3; TSAI, S. M.¹; NAVARRETE, A. A.⁴

¹Center for Nuclear Energy in Agriculture - CENA, University of São Paulo, Piracicaba - SP.

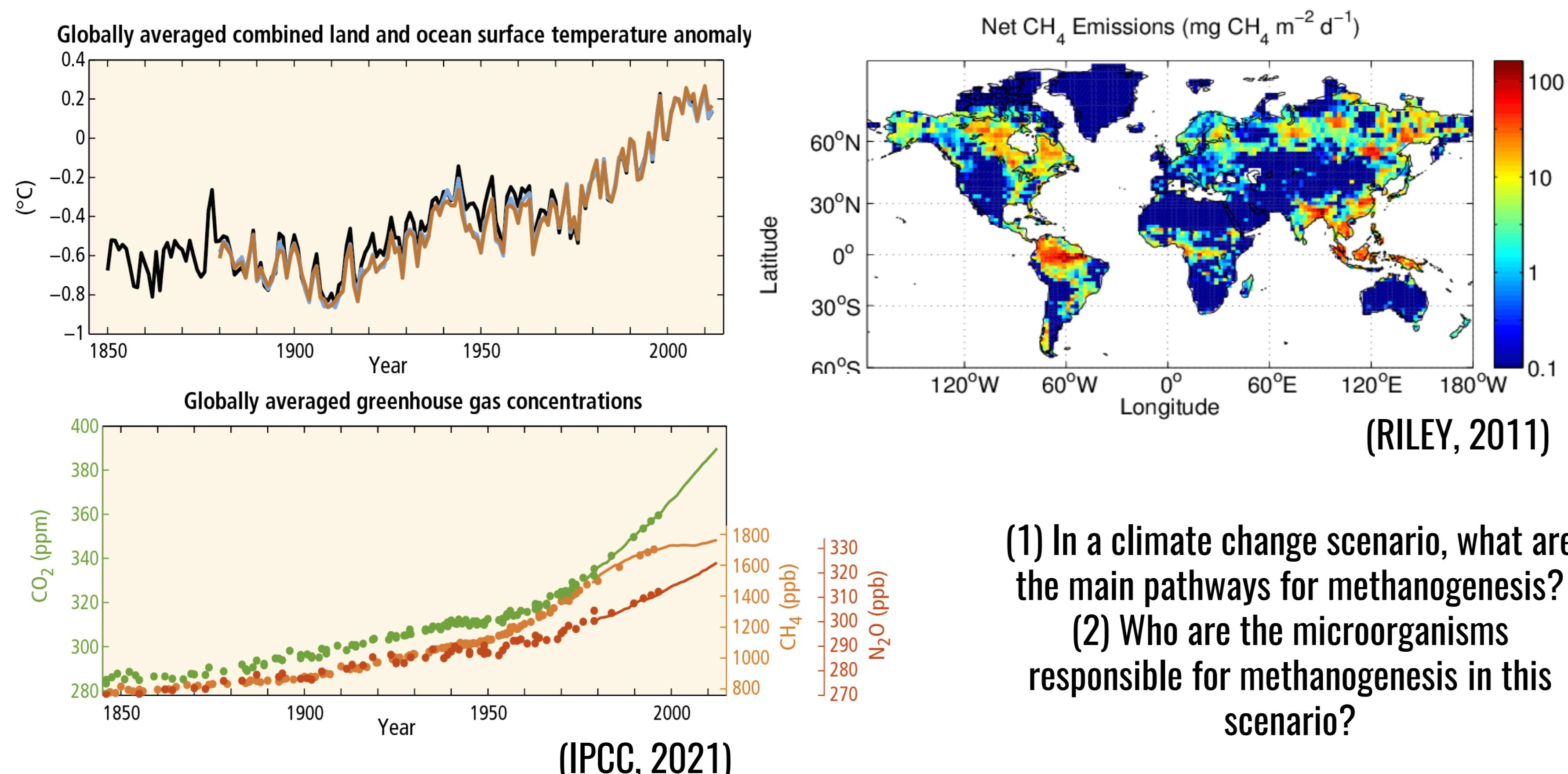
²Federal University of Tocantins – UFTO, Palmas – TO.

³Federal Rural University of the Amazon – UFRA, Belem - PA

⁴University Brazil – UB, Fernandópolis – SP.

*E-mail: guto.motneiro@usp.br

INTRODUCTION



- (1) In a climate change scenario, what are the main pathways for methanogenesis?
- (2) Who are the microorganisms responsible for methanogenesis in this scenario?

RESULTS AND DISCUSSION

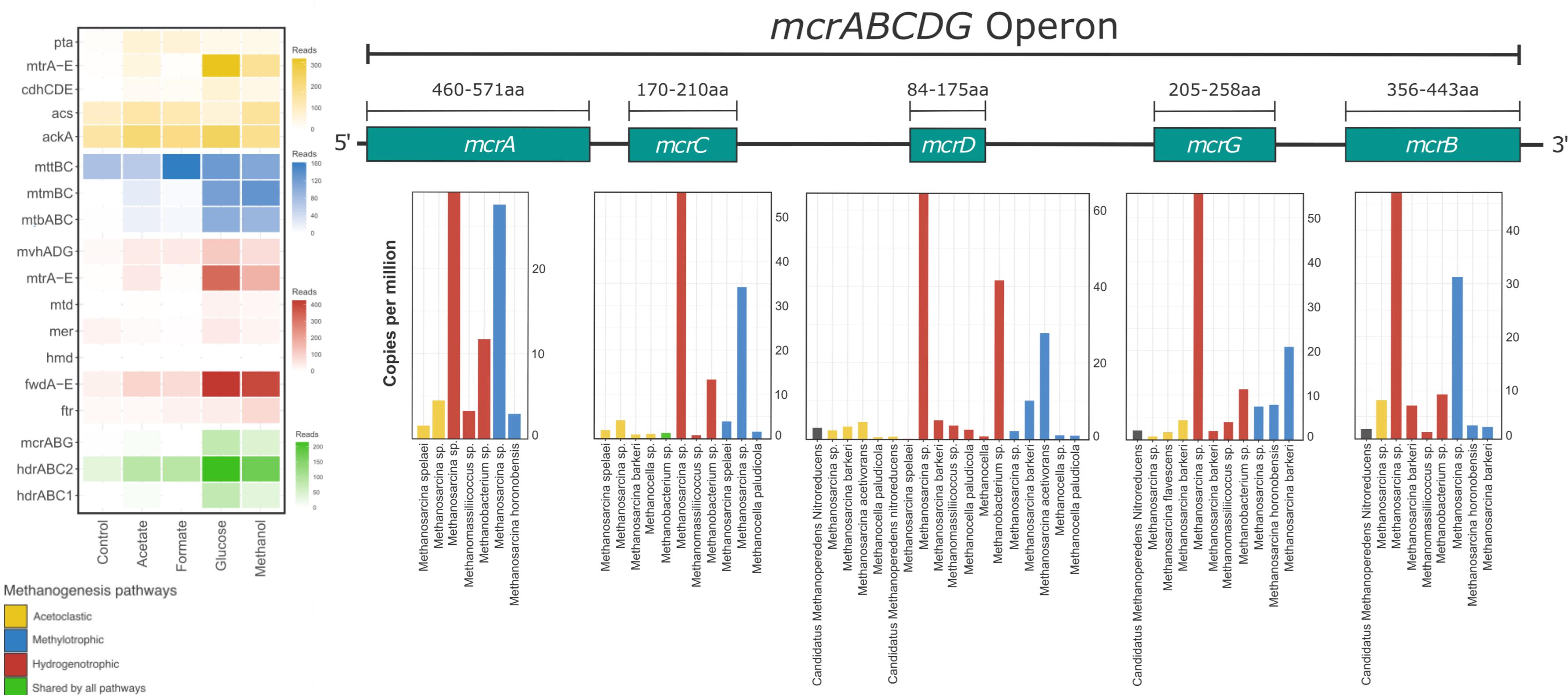


Figure 3. Read-based analysis of the normalized abundance of genes related to the acetoclastic, methylotrophic, and hydrogenotrophic methanogenesis pathways followed by the taxonomic classification of assembled contigs belonging to the *mcrABCDG* operon.

This specific metagenome assembled genome presented all three pathways for methanogenesis and its genome indicate a possible new species as its ANI is 0.81.

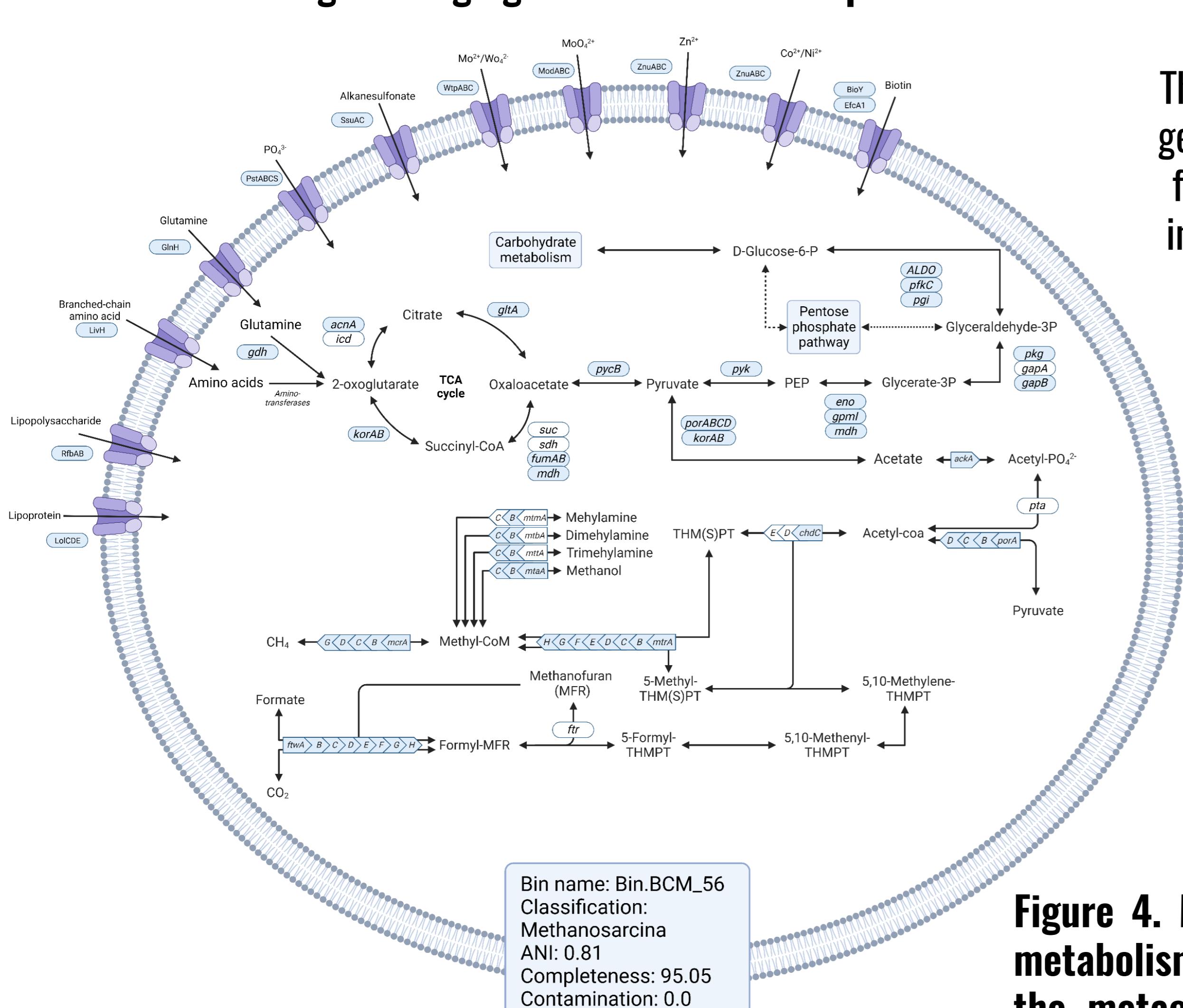


Figure 4. Model prediction for the central metabolism based on the genes present on the metagenome-assembled genome from bin.BCM_56.

METHODOLOGY

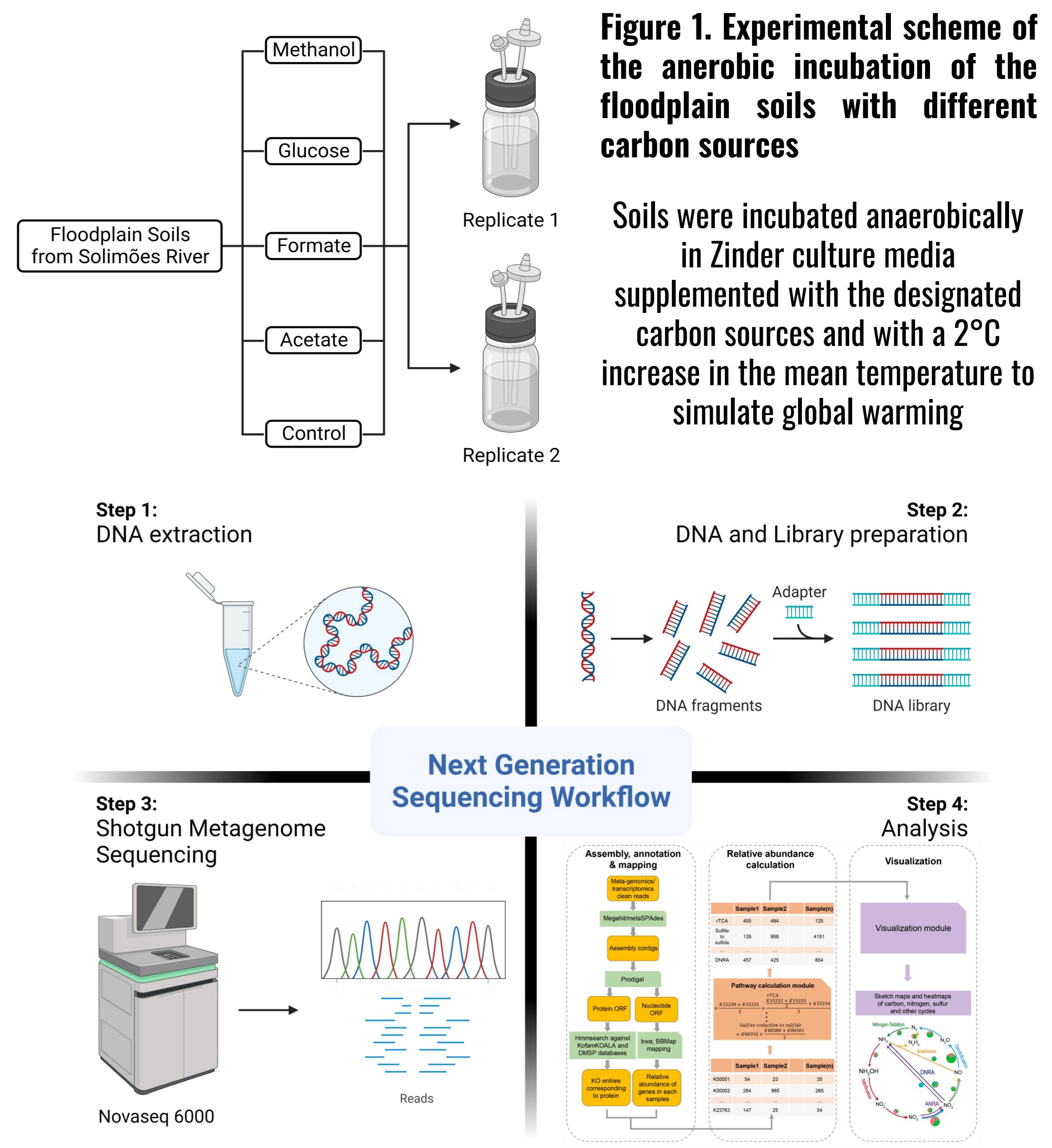


Figure 2. Molecular biology workflow for DNA extraction and shotgun metagenome sequencing, followed by data processing and bioinformatic workflow

CONCLUSION

- The analysis of both reads and contigs from the anaerobic reactor highlighted the role of different members of the *Methanosaerica* genus in the methanogenesis of the floodplain soils of the Solimões river. As global warming increases the mean global temperature, it is estimated that all methanogenesis pathways will increase as the production of these substrates can fuel all three pathways of CH_4 production.

REFERENCES

- IPCC, 2021: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekiç, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, In press.

- Riley, W. J., Subin, Z. M., Lawrence, D. M., Swenson, S. C., Torn, M. S., Meng, L., Mahowald, N. M., & Hess, P. (2011). Barriers to predicting changes in global terrestrial methane fluxes: Analyses using CLM4Me, a methane biogeochemistry model integrated in CESM. *Biogeosciences*, 8(7), 1925–1953.

ACKNOWLEDGEMENTS