# **Diego Grados**

As a bioscience engineer, agroecologist and applied statistician, my work centers on solving sustainable development challenges in agriculture. I use interdisciplinary approaches focusing on the basic and applied aspects of soil-plant-water-atmosphere interactions, agroecosystem analysis, process-based models and remote sensing. My experimental work spans tropical, semi-arid and temperate regions, targeting nitrogen and water cycling to improve agronomic practices. I am skilled in programming for data processing and process-based models, and I'm enthusiastic about creating integrated assessments that use novel data methods to transform information into knowledge.

### Personal Data

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## **Professional Experience**

#### OCT 2024 -Present

Marie Skłodowska-Curie Postdoctoral Researcher - MASSACHUSETTS INSTITUTE OF TECHNOLOGY (Climate, Environment and Life Science - Civil and Environmental Engineering Department), Massachusetts

- United States of America

**Assistant Professor** (non-tenure track) - AARHUS UNIVERSITY (Climate and Water - Agroecology Department - Faculty of Technical Sciences), Aarhus - Denmark

- Study the drivers of greenhouse gas emissions and mitigation practices for agroecosystems using multi-source data and multi-target methods from regional to global scale.
- Dissemination of results in seminars, peer-reviewed journals and international conferences.

Reference: Prof. César TERRER, Prof. Diego ABALOS

#### SEP 2020 -SEP 2024

#### Postdoctoral Researcher - AARHUS UNIVERSITY, Aarhus - Denmark

Climate and Water - Agroecology Department - Faculty of Technical Sciences

- Studied mitigation practices for greenhouse gas emissions and adaptation practices to climate change for agroecosystems using multi-source data and multi-target methods from field to regional scale.
- Participated in international and national projects on experimentation, quantification and reduction of greenhouse gas emissions: PROENV, MACSUR SciPol, ZERO.
- Dissemination of results in seminars, peer-reviewed journals and international conferences.
- (Co-)supervision of 1 MSc and 3 PhD thesis students.
- Wrote 2 international project proposals.

Reference: Prof. Diego ABALOS, Prof. Jørgen Eivind OLESEN

### JUL 2023 -AGO 2023

**Visiting Researcher** - MASSACHUSETTS INSTITUTE OF TECHNOLOGY (Faculty of Climate, Environment and Life Science) and BOSTON COLLEGE (Faculty of Earth and Environmental Sciences), Massachusetts - United States of America

- Collaborated on machine-learning methods and terrestrial biosphere model (*Dynamic Land Ecosystem Model*) to assess nitrogen cycling, greenhouse gas emissions and crop production at regional and global scale.

Reference: Prof. César TERRER, Prof. Hangin TIAN

#### Nov 2021 -DEC 2021

**Visiting Researcher** - Karlsruhe Institute of Technology, Garmisch-Partenkirchen - Germany Institute of Meteorology and Climate Research, Atmospheric Environmental Research

- Collaborated on *LandscapeDNDC* terrestrial ecosystem model to simulate greenhouse gas emissions and crop production at field and regional scale.

Reference: Prof. Klaus BUTTERBACH-BAHL, Senior. Res. Edwin HAAS

### APR 2020 -

### 2020 - Unemployed

AGO 2020

- Pursued research job opportunities while navigating the challenges of the COVID-19 global pandemic.

Jan 2020 -

Researcher - KU LEUVEN, Leuven - Belgium

MAR 2020

Biostatistics and Sustainability Groups - Biosystems Department - Faculty of Bioscience Engineering

APR 2016 -

PhD Researcher - KU LEUVEN, Leuven - Belgium

**DEC 2019** 

Biostatistics and Sustainability Groups - Biosystems Department - Faculty of Bioscience Engineering

- Developed multi-target field and system modeling methodologies for the agroecosystems' sustainability assessment.
- Dissemination of results in seminars, workshops, peer-reviewed journals and international conferences.
- (Co-)supervision of 3 BSc and 4 MSc thesis students in Peru (UNALM and UNCP) and Belgium (KU Leuven).
- Wrote 1 international project proposal.

Reference: Prof. Eddie Schrevens

Nov 2014 -Apr 2019 Research Officer - UNALM-VLIRUOS PROJECT, Lima - Peru

Strengthening of Smallholder Horticultural Systems Subproject

- Led a study on soil-plant-atmosphere interactions in semiarid regions exploring management optimization options.
- Designed, installed, sampled and analyzed agricultural experiments under drip fertigation systems.
- Installed and monitored soil, climate and irrigation equipment.

Reference: Prof. Eddie Schrevens, Prof. Jan Diels

SEP 2013 -DEC 2018 Research Officer - UNALM-VLIRUOS PROJECT, Junin - Peru

Sustainable Agriculture in the Central Peruvian Andes Subproject

- Led agricultural experiments' design, installation, sampling and evaluation under rainfed smallholder conditions.
- Consolidated databases, developed process-based models and statistical methods to assess ecosystem functioning.
- Performed analysis using participatory approaches and biophysical techniques to quantify ecosystems services.

Reference: Prof. Eddie Schrevens, Prof. Sady García

FEB 2013 -APR 2019 Research Officer - UNALM-VLIRUOS PROJECT, Junin | Lima - Peru

O19 Drone Technology in Agriculture Subproject

- Led the feasibility study for uses of drone technology and multispectral images in ecosystems.
- Planned and (co-)executed drone missions in mountainous, semi-arid and tropical forest regions.
- Developed mathematical-statistical frameworks for land use classification and the evaluation of field experiments.

Reference: Prof. Eddie Schrevens, Senior R&D Dries RAYMAEKERS

JAN 2012 -

Research Officer - UNALM-VLIRUOS PROJECT, Junin - Peru

DEC 2018 Watersheds Management Subproject

- Led a study on soil-plant-atmosphere interactions and hydrology in mountainous regions.
- Installed and monitored soil, climatological and hydrometric equipment.
- Implemented databases, applied hydrological models and assessed rainfall-runoff relations.

Reference: Prof. Eduardo Chávarri, Prof. Guido Wyseure

### Education

APR 2016 - PhD in Bioscience Engineering, Biostatistics and Sustainability - KU Leuven, Belgium

DEC 2019 Thesis Title: "Multi-target methodologies for the improvement of agricultural systems research

- Study cases at system and field level". | Advisor: Prof. Eddie Schrevens

MAR 2007 -DEC 2011 BSc in Agricultural Engineering, Water Resources - Agrarian National University La Molina, Peru

Thesis Title: "Analysis of flood peaks in small Andean watersheds, Junin Department,

Peru (2011-2012 Period)". | Advisor: Prof. Eduardo Chávarri

### **Publications**

- 13. **Grados, D.**, Einarsson, R., Sanz Cobeña, A., Olesen, J.E., Børsting, C.F., Abalos, D. (2025). Quantification and comparison of national and subnational agricultural nitrogen flows in Denmark and Sweden. *Environmental Research Letters*, 20(5), 054041. https://doi.org/10.1088/1748-9326/adca4a.
- 12. Vallicrosa, H., Fleischer, K., Baquerizo, M.D., Fernandez-Martinez, M., Černý, J., Tian, D., Kourmouli, A., Mayoral, C., **Grados, D.**, Lu, M., & Terrer, C. (2025). Nitrogen deposition and climate drive plant nitrogen uptake in terrestrial ecosystems. *Earth System Dynamics*, *16* (4), 1183–1196. https://doi.org/10.5194/esd-16-1183-2025.
- 11. Michailidis, V., Lugato, E., Panagos, P., **Grados, D.**, Freund, F., Jones, A., & Abalos, D. (2025). How do diet shifts affect the greenhouse gas balance of agricultural soils? Denmark as a case study. *Agricultural Systems*, 224, 104263. https://doi.org/10.1016/j.agsy.2025.104263.
- 10. **Grados, D.**, Kraus, D., Haas, E., Butterbach-Bahl, K., Olesen, J.E., & Abalos, D. (2024). Common agronomic adaptation strategies to climate change may increase soil greenhouse gas emission in Northern Europe. *Agricultural and Forest Meteorology*, 349, 109966. https://doi.org/10.1016/j.agrformet.2024.109966.
- g. Rahimi, J., Haas, E., Clemens, S., Grados, D., Abalos, D., Ojo Aderele, M., Blicher-Mathiesen, G., & Butterbach-Bahl, K. (2024). Aggregation of activity data on crop management can induce large uncertainties in estimates of regional nitrogen budgets. npj Sustainable Agriculture, 2, 7. https://doi.org/10.1038/544264-024-00015-3.
- 8. Gutierrez, S., **Grados, D.**, Møller, A.B., de Carvalho Gomes, L., Beucher, A.M., Giannini Kurina, F., de Jonge, L.W., & Greve, M.H. (2023). Unleashing the sequestration potential of soil organic carbon under climate and land use change scenarios in Danish agroecosystems. *Science of The Total Environment*, *905*, 166921. https://doi.org/10.1016/j.scitotenv.2023.166921.

- 7. Siddique, I.A., **Grados, D.**, Chen, J., Lærke, P.E., & Jørgensen, U. (2023). Soil organic carbon stock change following perennialization: A meta-analysis. *Agronomy for Sustainable Development*, 43(5), 58. https://doi.org/10.1007/s13593-023-00912-w.
- Grados, D., Butterbach-Bahl, K., Chen, J., Van Groenigen, K.J., Olesen, J.E., Van Groenigen, J.W., & Abalos, D. (2022). Synthesizing the evidence of nitrous oxide mitigation practices in agroecosystems. *Environmental Research Letters*, 17(11), 114024. https://doi.org/10.1088/1748-9326/acgb50.
- Garcia-Garcia, D., Reynafarje, X., Grados, D., & Schrevens, E. (2021). Linear mixed model analysis of NDVI-based canopy coverage, extracted from sequential UAV multispectral imagery of an open field tomato irrigation experiment. *Computers and Electronics in Agriculture*, 189, 106399. https://doi.org/10.1016/j.compag.2021.106399.
- 4. **Grados, D.,** & Schrevens, E. (2020). Cassava NDVI analysis: A nonlinear mixed model approach based on UAV-imagery. *PFG Journal of Photogrammetry, Remote Sensing and Geoinformation Science, 88*(3), 337–347. http://doi.org/10.1007/s41064-020-00116-x.
- 3. **Grados, D.**, García, S., & Schrevens, E. (2020). Assessing the potato yield gap in the Peruvian Central Andes. *Agricultural Systems*, *181*, 102817. http://doi.org/10.1016/j.agsy.2020.102817.
- 2. **Grados, D.**, Reynafarje, X., & Schrevens, E. (2020). A methodological approach to assess canopy NDVI-based tomato dynamics under irrigation treatments. *Agricultural Water Management*, 240, 106208. http://doi.org/10.1016/j.agwat.2020.106208.
- 1. **Grados, D.,** & Schrevens, E. (2019). Multidimensional analysis of environmental impacts from potato agricultural production in the Peruvian Central Andes. *Science of The Total Environment*, 663, 927–934. http://doi.org/10.1016/j.scitotenv.2019.01.414.

# Conference Proceedings [PEER-REVIEWED]

- Grados, D., Heuts, R., García, S., & Schrevens, E. (2021). Exploring biophysical components in rain-fed potato systems in the Peruvian Central Andes. Acta Horticulturae, 1326, 247-254. South-Eastern Europe Symposium on Vegetables & Potatoes, Maribor Slovenia, Jun 2017. https://doi.org/10.17660/actahortic.2021.1326.33.
- 5. Schrevens, E., Heuts, R., Reynafarje, X., Grados, D., & Diels, J. (2019). Potential strategies to reduce nitrogen emissions to the environment in an intensive cauliflower-leek rotation system: A modelling approach. Acta Horticulturae (1253, 269–278). International Symposium on Water and Nutrient Relations and Management of Horticultural Crops, Istanbul Turkey, Aug 2018. http://doi.org/10.17660/actahortic.2019.1253.36.
- 4. **Grados, D.**, García, S., & Schrevens, E. (2019). Nitrogen and water use efficiency under rain-fed potato agriculture: An experimental study. *Acta Horticulturae* (1253, 243–252). *International Symposium on Water and Nutrient Relations and Management of Horticultural Crops*, Istanbul Turkey, Aug 2018. http://doi.org/10.17660/actahortic.2019.1253.33.
- 3. Reynafarje, X., **Grados, D.**, Casas, A. &, Schrevens, E. (2019). Effect of water stress after flowering stage on tomato crop yield and soil water content in the semi-arid Peruvian coastline. *Acta Horticulturae* (1253, 279–286). *International Symposium on Water and Nutrient Relations and Management of Horticultural Crops*, Istanbul Turkey, Aug 2018. http://doi.org/10.17660/actahortic.2019.1253.37.
- 2. **Grados, D.**, Vetters, E., Heuts, R., & Schrevens, E. (2017). A model based technical sustainability analysis of potato production systems in the Mantaro Valley, Central Highlands, Peru. *Acta Horticulturae* (1154, 155-152). Symposium on Applications of Modelling as an Innovative Technology in the Horticultural Supply Chain, Wageningen The Netherlands, Oct 2015. http://doi.org/10.1766o/actahortic.2017.1154.20.
- 1. **Grados, D.**, Vera, J., & Schrevens, E. (2016). Corn-faba bean associations in the Peruvian Central Andes. *Acta Horticulturae (1128, 79-88)*. *International Symposium on Horticulture in Developing Countries and World Food Production*, Brisbane Australia, Aug 2014. http://doi.org/10.17660/actahortic.2016.1128.11.

### Conference Abstracts - Oral Presentations

9. **Grados, D.**, Einarsson, R., Sanz Cobeña, A., & Abalos, D. (2024). Development and evaluation of agricultural nitrogen budgets in Denmark and Sweden. *International Nitrogen Workshop*. Aarhus - Denmark, Jun 2024.

- 8. Michailidis, V., Lugato, E., Panagos, P., **Grados, D.**, Freund, F., Jones, A., & Abalos, D. (2024). How do diet shifts affect the greenhouse gas balance of agricultural soils? Denmark as a case study. *International Nitrogen Workshop*. Aarhus Denmark, Jun 2024.
- Grados, D., Butterbach-Bahl, K., Chen, J., Van Groenigen, K.J., Olesen, J.E., Van Groenigen, J.W., & Abalos, D. (2023). Synthesizing the evidence of nitrous oxide mitigation practices in agroecosystems. *International Symposium on Non-CO<sub>2</sub> Greenhouse Gases*. Amsterdam the Netherlands, Jun 2023.
- Grados, D., Butterbach-Bahl, K., Chen, J., Van Groenigen, K.J., Olesen, J.E., Van Groenigen, J.W., & Abalos, D. (2022). Synthesizing the evidence of nitrous oxide mitigation practices in agroecosystems. Zero Greenhouse Gas Emission in High Productive Agriculture. Copenhagen Denmark, May 2022.
- 5. **Grados, D.**, Gil, R., Raymaekers, D., & Schrevens, E. (2017). Developing of an automated UAV-based RGB imagery workflow analysis for land use evaluation. *European Federation for Information Technology in Agriculture, Food and the Environment*. Montpellier France, Jul. 2017.
- 4. **Grados, D.**, Heuts, R., García, S., & Schrevens, E. (2017). Exploring biophysical components in rain-fed potato systems in the Peruvian Central Andes. *South-Eastern Europe Symposium on Vegetables & Potatoes*. Maribor Slovenia, Jun 2017.
- Reynafarje, X., Grados, D., Casas, A., & Schrevens, E. (2017). Effect of deficit irrigation and soil water content on tomato yield in the Peruvian Semi-arid Coastline. South-Eastern Europe Symposium on Vegetables & Potatoes. Maribor Slovenia, Jun 2017.
- 2. **Grados, D.,** Raymaekers, D., Biesemans, J., & Schrevens, E. (2016). Use of UAV-based RGB imagery in agroecosystems research: a first approach towards land use classification. *National Symposium on Applied Biological Sciences*. Antwerp Belgium, Feb 2016.
- 1. **Grados, D.**, Raymaekers, D., Biesemans, J., & Schrevens, E. (2015). Land use evaluation based on Unmanned Aerial Vehicles (UAV, DRONE) data: clustering superpixels for orthophoto segmentation. *European Network for Business and Industrial Statistics Spring Meeting*. Barcelona Spain, Jun 2015.

### Conference Abstracts - Poster Presentations

- Abalos, D., Butterbach-Bahl, K., Rahimi, J., Haas, E., Kraus, D., Grados, D., Beucher, A.M., & Olesen, J.E. (2024). Towards a Tier 3 inventory for soil N<sub>2</sub>O emissions in Denmark. *American Geophysical Union*. Washington D.C. United States, Dec 2024.
- 5. Siddique, I.A., **Grados, D.**, Chen, J., Lærke, P.E., & Jørgensen, U. (2024). Soil organic carbon stock change following perennialization: a meta-analysis. *International Symposium on Soil Carbon in the Ecological Transition*. Paris France, Jan 2024.
- 4. Schrevens, E., Garcia-Garcia, D., Reynafarje, X., & **Grados, D.** (2022). Linear mixed model analysis of NDVI-based canopy coverage, extracted from sequential UAV multispectral imagery of an open field tomato irrigation experiment. *International Symposium on Innovative Technologies and Production Strategies for Sustainable Controlled Environment Horticulture*. Angers France, Ago 2022.
- 3. **Grados, D.**, Olesen, J.E., & Abalos, D. (2021). Developing a data and modelling framework for assessing greenhouse gas mitigation strategies. *National Seminar on Technologies for a Danish Zero Greenhouse Gas Emission Agriculture*. Middelfart Denmark, Jun 2021.
- 2. **Grados, D.**, Reynafarje, X., Vera, J., & Schrevens, E. (2014). Soil water balance modeling in the Peruvian Central Andes: a first approach. *Latin American Soil Science Congress*. Cusco Peru, Nov 2014.
- Reynafarje, X., Grados, D., Vera, J., Vetters, E., & Schrevens, E. (2014). Optimal fertilization to improve potato production in the Peruvian Central Andes. *Latin American Soil Science Congress*. Cusco - Peru, Nov 2014.

# **Teaching Experience**

- 2021 2024 Carbon Cycling and Climate Change (10 ECTS) Master in Agrobiology, Aarhus University

  Teaching Assistant: Lectured on soil nitrogen and carbon cycling, and greenhouse gas emissions.

  I guided students during the discussion and practical sessions to assess natural and managed ecosystems.

  Supported them in the development of their final research papers. [20 students]
- Applied Multivariate Statistical Analysis (5 ECTS) Master in Bioscience Engineering, **KU Leuven**Teaching Assistant: Taught students how to analyze their databases using statistical software by leading
  R-tutorials. I was responsible for the practical sessions on data wrangling and visualization, matrix algebra,
  R-programming and advanced multivariate techniques. [80 students]
  - 2019 Biological Production Systems (6 ECTS) Bachelor in Bioscience Engineering, **KU Leuven Teaching Assistant**: Guided students during discussions and practical sessions to assess agroecosystems. I taught them the essentials of process-based ecosystem modeling and supported them in developing their final research papers. [25 students]
  - 2016 Ecosystems Modelling (5 ECTS) Master in Bioscience Engineering, **KU Leuven Teaching Assistant**: Taught students how to develop and use ecosystem models at diverse scales by leading R-tutorials. I guided the practical sessions on mathematical and statistical concepts, data wrangling and visualization, and R-programming. Taught them the fundamental topics of process-based ecosystem modeling: identification, implementation, calibration and validation. [10 students]

# (Co-)supervision of Students

- 4 PhD Theses: Vasilis Michailidis (2024), Imran Siddique (2023) and Sebastian Gutierrez (2023) in Aarhus University | Ximena Reynafarje (2021) in KU Leuven.
- 5 MSc Theses: Jenar Ahmad (2021) in Aarhus University | Noémie Hisette (2016), Eline Vetters (2014) and Geerard De Clerck (2014) in KU Leuven | Jesús Vera (2018) and Francisco Mosquera (2017) in Agrarian National University La Molina.
- 3 BSc Theses: David Vilcahuaman (2019) and Rusbel Gutierrez (2015) in National University of the Center of Peru | Anthony Camones (2015) in Agrarian National University La Molina.

# Fellowships and Grants

- Marie Skłodowska-Curie Postdoctoral Fellowship at Massachusetts Institute of Technology,
  Boston College and Aarhus University (310,000€)
- Novo Nordisk Foundation Postdoctoral Fellowship at Massachusetts Institute of Technology and Aarhus University (402,000€- declined)
- 2023 Land-CRAFT Grant at Massachusetts Institute of Technology and Boston College (6,000€)
- 2022 **Travel Conference Grant,** Aarhus University (400€)
- 2021 iClimate Grant at Karlsruhe Institute of Technology (3,600€)
- o20 FONDECYT-CONCYTEC Grant at KU Leuven (5,500€)
- 2016 2019 VLIRUOS PhD Fellowship at KU Leuven (82,000€)
- 2013 | 2014 | 2015 VLIRUOS International Scholar Fellowships at KU Leuven (67,000€)

### Ad-Hoc Reviewer

Agriculture, Ecosystems & Environment, Agricultural Systems, Agronomy for Sustainable Development, Biogeosciences, European Journal of Agronomy, European Journal of Soil Science, Field Crops Research, Geoderma, Global Change Biology, Journal of Cleaner Production, Journal of Environmental Management, One Earth, Plant and Soil, Soil Use and Management, and Theoretical and Applied Climatology.

### International Lectures

- **Instructor** of PhD Course on *Nitrogen cycling*. Agroecology Department Aarhus University, Foulum Denmark, 11-15 Nov 2024.
- **Speaker** of Workshop on *Tackling emissions of nitrous oxide from agroecosystems*. SustES Bořetice meeting. Bořetice Czech Republic, 25-27 Apr 2022.
- Instructor and Co-organizer of Workshop on *Statistical Research Planning*. National Agrarian University La Molina | North-South VLIR-IUC Cooperation, Lima Peru, Mar 2015.
- Instructor and Co-organizer of Workshop on Introduction to Experimental Design Analysis. Faculty of Agricultural Science University of Cuenca | North-South-South VLIR-IUC Cooperation, Cuenca Ecuador, Sep 2014.

### Outreach

- Enhanced global quantification and understanding of nitrous oxide emissions from agricultural soils. Schiller Institute for Integrated Science and Society of Boston College, Massachusetts, United States, May 2023. Invited speaker.
- 5. Common agronomic adaptation strategies to climate change may increase soil greenhouse gas emission in Northern Europe. Faculty of Technical Sciences of Aarhus University, Aarhus, Denmark, May 2024. *Invited speaker*.
- 4. Practices to mitigate nitrous oxide emissions from agroecosystems. Klimatorium, Viborg Denmark, Ago 2023. *Invited speaker*.
- 3. Measures for reducing nitrous oxide from agricultural soils. Farmbrella, Viborg Denmark, Nov 2022. *Invited speaker*.
- 2. Multi-target methodologies for agroecosystems research. Postgraduate School of Agrarian National University La Molina. Online, Feb 2021. *Invited speaker*.
- 1. Farming systems research in Peru VLIRUOS Collaboration. Bozar, Brussels Belgium, Dec 2018. *Invited speaker*.

### Languages

English: Full professional proficiency

Dutch: Elementary working proficiency

French: Limited working proficiency Spanish: Native

### Technical Skills

Programming: R, Python, MATLAB, FORTRAN
Markup: Markdown, ŁTFX, MS Office

Other: High-Performance Computing, RStudio, Jupyter, QGIS, ArcGIS, Pix4D, Git, GitHub, HTML,

CSS, Open Science Framework, Adobe Ilustrator