# 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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| Email: | diegogb@mit.edu \| diegogradosb@agro.au.dk | ResearchID: | GYR-1584-2022 |
| Web: | https://diegogradosb.github.io | ORCID: | 0000-0001-5548-3204 |

## 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 - Aug 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. Hanqin 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 - Aug 2020**

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

**Jan 2020 - Mar 2020**

**Researcher** - *KU Leuven*, Leuven - Belgium
*Biostatistics and Sustainability Groups - Biosystems Department - Faculty of Bioscience Engineering*

**Apr 2016 - Dec 2019**

**PhD Researcher** - *KU Leuven*, Leuven - Belgium
*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

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| Nov 2014 - Apr 2019 | **Research Officer** - *UNALM-VLIRUOS Project*, Lima - Peru<br>*Strengthening of Smallholder Horticultural Systems Subproject*<br>- Led a study on soil-plant-atmosphere interactions in semiarid regions exploring management optimization options.<br>- Designed, installed, sampled and analyzed agricultural experiments under drip fertigation systems.<br>- Installed and monitored soil, climate and irrigation equipment.<br>Reference: Prof. Jan Diels, Prof. Eddie Schrevens |
| Sep 2013 - Dec 2018 | **Research Officer** - *UNALM-VLIRUOS Project*, Junin - Peru<br>*Sustainable Agriculture in the Central Peruvian Andes Subproject*<br>- Led agricultural experiments' design, installation, sampling and evaluation under rainfed smallholder conditions.<br>- Consolidated databases, developed process-based models and statistical methods to assess ecosystem functioning.<br>- Performed analysis using participatory approaches and biophysical techniques to quantify ecosystems services.<br>Reference: Prof. Sady García, Prof. Eddie Schrevens |
| Feb 2013 - Apr 2019 | **Research Officer** - *UNALM-VLIRUOS Project*, Junin \| Lima - Peru<br>*Drone Technology in Agriculture Subproject*<br>- Led the feasibility study for uses of drone technology and multispectral images in ecosystems.<br>- Planned and (co-)executed drone missions in mountainous, semi-arid and tropical forest regions.<br>- Developed mathematical-statistical frameworks for land use classification and the evaluation of field experiments.<br>Reference: Prof. Eddie Schrevens, Senior R&D Dries Raymaekers |
| Jan 2012 - Dec 2018 | **Research Officer** - *UNALM-VLIRUOS Project*, Junin - Peru<br>*Watersheds Management Subproject*<br>- Led a study on soil-plant-atmosphere interactions and hydrology in mountainous regions.<br>- Installed and monitored soil, climatological and hydrometric equipment.<br>- Implemented databases, applied hydrological models and assessed rainfall-runoff relations.<br>Reference: Prof. Eduardo Chávarri, Prof. Guido Wyseure |

## Education

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| Apr 2016 - Dec 2019 | **PhD** in **Bioscience Engineering**, *Biostatistics and Sustainability* - KU Leuven, Belgium<br>Thesis Title: "Multi-target methodologies for the improvement of agricultural systems research<br>- *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<br>Thesis Title: "Analysis of flood peaks in small Andean watersheds, Junin Department,<br>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.

9. 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/s44264-024-00015-3.

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.

6. **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/ac9b50.

5. 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]

6. **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/10.17660/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.

7. **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$_2$ Greenhouse Gases*. Amsterdam - the Netherlands, Jun 2023.

6. **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.

3. 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

6. 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$_2$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, Aug 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.

1. 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]

**2017 - 2020**    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 lea-
ding 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

- **PhD Theses**: Vasilis Michailidis (2024), Imran Siddique (2023) and Sebastian Gutierrez (2023) in Aarhus University | Ximena Reynafarje (2021) in KU Leuven.

- **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.

- **BSc Theses**: David Vilcahuaman (2019) and Rusbel Gutierrez (2015) in National University of the Center of Peru | Andrés Cervantes (2018) and Anthony Camones (2015) in Agrarian National University La Molina.

## Fellowships and Grants

**2024**    **Marie Skłodowska-Curie Postdoctoral Fellowship** at Massachusetts Institute of Technology, Boston College and Aarhus University (310,000€)

**2024**    **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€)

**2020**    **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*, *Environmental Research Letters*, *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-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

6. 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, Aug 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

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| English: Full professional proficiency | Dutch: Elementary working proficiency |
| French: Limited working proficiency | Spanish: Native |

## Technical Skills

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| Programming: | R, Python, MATLAB, FORTRAN |
| Markup: | Markdown, LaTeX, MS Office |
| Other: | High-Performance Computing, RStudio, Jupyter, QGIS, ArcGIS, Pix4D, Git, GitHub, HTML, CSS, Open Science Framework, Ilustrator |