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. 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 - Ago 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

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
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 - Dec 2018 | **Research Officer** - *UNALM-VLIRUOS Project*, Junin - Peru
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 - Dec 2019 | **PhD** in **Bioscience Engineering**, *Biostatistics and Sustainability* - KU Leuven, Belgium
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.

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_2O 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.

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 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

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*, *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, 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
French: Limited working proficiency
Dutch: Elementary working proficiency
Spanish: Native

Technical Skills

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, Adobe Ilustrator