

# Miguel Espinosa

PHD STUDENT

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My research lies in the intersection of Computer Vision and Earth Observation. Mainly, I am interested in diffusion models for EO. Other topics include: self-supervised methods for data fusion, representation learning, and adapting foundational models for large domain shifts.

## Education

### PhD in Deep Learning for Earth Observation

UNIVERSITY OF EDINBURGH

Edinburgh, UK

October 2022 - present

- *Diffusion Models for Earth Observation* (supervised by Elliot J. Crowley), part of SENSE CDT.

### MSc in Artificial Intelligence

POLYTECHNIC UNIVERSITY OF MADRID · 1ST CLASS HONOURS (~ 93%)

Madrid, Spain

September 2021 - June 2022

- **Research** in *Computer Vision and Aerial Robotics* department: “Facial landmarks detection with deep learning”.

### BSc in Computer Science (Bilingual)

UNIVERSITY CARLOS III OF MADRID · 1ST CLASS HONOURS (~ 87%)

Madrid, Spain

September 2017 - May 2021

- **BSc project:** “Self-awareness in a UAV swarm for the complete coverage of its surroundings” (97%)

## Experience

### European Space Agency, ESA

VISITING RESEARCHER

ESRIN, Rome

January 2025 - April 2025

- *Research on multi-modal generative modelling of Copernicus data*
- Development of COP-GEN Beta, a generative diffusion model for zero-shot translation between optical, radar, and elevation data from the Major TOM dataset. Working on multi-modal representation learning and model evaluation.

### Canon Medical Research Europe Ltd.

AI RESEARCH INTERN

Edinburgh

June 2022 - August 2022

- *Research in NLP for Clinical Temporal Relation Extraction.*
- Data analysis, exploration, design and implementation of ML models for the extraction of temporal relations from non-structured clinical text.

### MeVita

ALGORITHM DEVELOPER INTERN

Oxford (remote)

July 2021 - September 2021

- *Research in ML for natural language (NLP) to solve open-ended problems.*
- Optimisation of the address detection and redaction in the CV pipeline. From research to idea to efficient implementation in C# into production. Received close mentorship from experienced professionals.

### Huawei Technologies R&D (UK) Ltd.

RESEARCH INTERN

Edinburgh Research Center (remote)

June 2020 - September 2020

- *Responsible for analysis of the DL framework built on Julia programming language.*
- Contribution to MindSpore DL framework and its integration with Julia as front-end language. Working on source-to-source code generation for the forward and backwards pass with automatic differentiation.

## Publications

### COP-GEN-Beta: Unified Generative Modelling of COPernicus Imagery Thumbnails

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CVPR MORSE WORKSHOP 2025

Miguel Espinosa\*, Valerio Marsocci, Yuru Jia, Elliot Crowley, Mikolaj Czerkawski

### No time to train! Training-Free Reference-Based Instance Segmentation

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ARXIV PREPRINT

Miguel Espinosa\*, Chenhongyi Yang\*, Linus Ericsson, Steven McDonagh, Elliot J Crowley

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**Other** Git version-control, Latex, Linux OS, HPC slurm