Juan Carlos Montes-Herrera

PhD student - Marine Biologist

Institute for Marine and Antarctic Studies (IMAS) - University of Tasmania (UTAS) - Australia

Info

- Address: 7 Lasswade Avenue, Sandy Bay, Tasmania, Australia
- Phone: +61 04 58 368 069
- Email: juancarlos.montesherrera@utas.edu.au, jcmontesh@gmail.com
- Website: https://github.com/jcmontesherrera

Education

- **Ph.D. student in Biological Sciences** (2019 - Present)
  - *IMAS - University of Tasmania, Australia*
  - **Thesis title**: Proximal Remote Sensing of Seafloor Communities with Underwater Imaging Techniques
  - **Research topics**: underwater optical imaging, structure-from-motion (SfM) photogrammetry, imaging spectroscopy (hyperspectral imaging), remotely operated vehicles, reproducible processing pipelines, photosynthetic pigments, DNA barcoding, coralline algae
- **B. Sci., Marine Biology** (2011 - 2015)
  - *Universidad Autónoma de Baja California Sur, México (Autonomous University of Baja California Sur, Mexico).*
  - **Thesis title**: Structural complexity of benthic ecosystems using structure-from-motion photogrammetry and geographical information systems (GIS) in Bahía de La Paz, Baja California Sur, Mexico.

Publications

Published

- **Montes-Herrera, J.C.**, Hill, N., Cummings, V.J., Johnstone, G., Stark, J.S., Lucieer, V. 2023. Remote sensing of Antarctic polychaete reefs: Reproducible workflows for quantifying benthic structural complexity with action cameras, remotely operated vehicles, and structure-from-motion photogrammetry. *Remote Sensing in Ecology and Conservation*.
- **Montes-Herrera, J. C.**, Cimoli, E., Cummings, V., Hill, N., Lucieer, A., Lucieer, V. 2021. Underwater hyperspectral imaging (UHI): A review of systems and applications for proximal seafloor ecosystem studies. *Remote Sensing*. 13 (17), 3451. https://doi.org/10.3390/rs13173451

In review

- **Montes-Herrera, J. C.**, Cimoli, E., Cummings, V., Nelson, W., D'Archino, R., Lucieer, A., Lucieer, V. (in review). Hyperspectral imaging to quantify thalli R-Phycoerythrin: A case study on two phenotypes of Antarctic crustose coralline algae (*Tethysphytum antarcticum*). *Journal of Phycology*.

In preparation

- **Montes-Herrera, J.C.**, Cummings, V.J., Cimoli, E., Hill, N., Lucieer, A., Lucieer, V. (in prep). Reproducible analysis of underwater hyperspectral imaging: Towards high-throughput acquisition of spectral traits of in vivo coralline algae communities. *PlosOne Computational Biology*

Conference Presentations

- **Oral presentation**: Re-discovering Southern Ocean polychaete reefs: Integrating structural complexity metrics into Antarctic benthic surveys. *Australian Marine Sciences Association* (AMSA) 2022
- **Poster**: Mapping photosynthetic pigments in Antarctic coralline algae (*Tethysphytum antarcticum*) with hyperspectral imaging - *International Seaweed Symposium* (ISS) 2023
- **Poster**: Mapping coral communities using SfM photogrammetry and open access GIS in La Paz Bay, Baja California Sur, Mexico - *Mexican Geophysical Union Congress* (UGM) 2017

Research experience

- **Research assistant - Geospatial data** (2015 - 2017)
  - *Center for Scientific Research and Higher Education of Ensenada (CICESE), Baja California - La Paz Unit, Baja California Sur, Mexico*
  - Description: Responsible for creating standard operating procedures for unmanned aerial vehicles (UAVs) used in marine geo-spatial data collection and processing.
    - Multi rotor and fixed wing UAV survey missions
    - SfM photogrammetry for coastal and benthic ecosystem studies
    - Multi-spectral imagery for mangrove forest studies
    - Ground control point acquisition using post-processed kinematic.
- **Onboard research technician - Zooplankton** (Summer 2014)
  - *National Institute of Fisheries and Aquaculture* (INAPESCA)*, Mexico*
  - Research Vessel: BIPO INAPESCA
  - Duration: 28 days - 4736 miles
  - Description: Independently executed euphotic and superficial zooplankton sample collection, assuming full responsibility for the entire processing, sorting, and preservation process.

Teaching experience

- **IMAS - UTAS Tutor** (Semester 1 - 2022)
  - Weekly 50 min tutorials for the course *KSA102 Introduction to Marine and Antarctic Science* covering various topics, including physical, chemical, and biological oceanography, marine ecosystems, ecosystem services, ecology, and scientific writing fundamentals.
  - Guided discussions and facilitated online and face to face learning for a class of approximately 15 first-year students.
  - Provided guidance and support to students throughout the semester.
  - Participated in marking assignments and assessments as part of the teaching team.
  - Received positive feedback from students for creating an engaging and supportive learning environment.

Certifications and Professional Development

- **Part 107 Small Unmanned Aerial Systems (2019)**
  - Federal Aviation Administration (FAA)
  - ALC-451
- **Python for Data Science: Intermediate** (2018)
  - *DataQuest*
  - Description: Topics covered include data manipulation, exploratory data analysis, data visualization, and statistical analysis using Python libraries such as NumPy, Pandas, Matplotlib, and Seaborn.

- **Monitoring the Oceans from Space** (2017)
  - *European Space Agency (ESA) and European operational satellite agency for monitoring weather, climate and the environment from space (EUMETSAT)*
  - Certificate
  - Description: Introduction to the use of satellite Earth Observation data for monitoring the oceans, including technologies, data types, applications and challenges involved.
- **Disasters and Ecosystems: Resilience in a Changing Climate** (2015)
  - *United Nations Environment Program (UNEP) and Cologne University of Applied Sciences (CUAS)*
  - Description: 10 week advanced course on innovation in disaster risk reduction through ecosystem-based approaches.
- **PADI Open Water Diver** (2011)
  - Certified as an Open Water Diver by the Professional Association of Diving Instructors (PADI).

Beyond academia

- **Laboratorios Cardón** (2017 - 2019)
  - Co-founded and established *Laboratorios Cardón*, a multidisciplinary laboratory focused on collaboration and community training in the use of genomic and remote sensing methodologies for the conservation and management of biodiversity in Mexico.
  - Played a leadership role in the establishment and growth of Laboratorios Cardón, contributing to the company's overall success and impact.
  - Facilitated an interdisciplinary environment within the laboratory, promoting collaboration among experts from diverse fields.
  - Developed training programs and workshops to enhance the technical skills and knowledge of participants in utilizing advanced methodologies for biodiversity conservation and management.
  - Conducted company organisation, negotiations, finances, and legislations aimed at implementing projects for biodiversity assessment methodologies.
  - Collaborated with stakeholders, including government agencies, academic institutions, students, local communities, and conservation organizations, to create partnerships and further the impact of Laboratorios Cardón's initiatives.
- **Python Thursdays!** (2018 - 2019)
  - Community gatherings at Laboratorios Cardón where we learn about computer programming and establish learning objectives for any skill level.

Course development and instruction experience

- **Introduction to Remote Sensing and Drone Mapping** (2018 & 2019)
  - Developed and designed the curriculum for the course "Introduction to Remote Sensing and Drone Mapping."
  - Course taught in Spanish at the community laboratory *Laboratorios Cardón* in La Paz, Baja California Sur, Mexico.
  - Led and instructed the entire course, consisting of 28 hours of instruction and a field component.
  - Taught a diverse range of students, including Bachelor's, Master's, and Doctoral students, as well as professors.
  - Created engaging and interactive learning materials, including presentations, videos, practical exercises, and case studies.
  - Provided hands-on training on the use of remote sensing tools, drone equipment, and data processing software.
  - Covered topics such as international and national regulations for field studies, best practices for drone operation, airspace considerations, aerial photography capture, flight planning, and principles of "Structure-from-Motion" photogrammetry.
  - Guided students in the acquisition and analysis of low-altitude aerial photographs using drones.
  - Demonstrated the process of generating cm-resolution digital terrain models and orthomosaics for environmental and topographic assessments.

Skills

- **Laboratory Techniques**: Experience in laboratory techniques used for specimen phenotyping and remote sensing validation:
  - DNA extraction and PCR
  - Photosynthetic pigment extraction and quantification via spectrophotometry
  - Spectrometry and Microscopy
  - Close-range imagery acquisition.
- **Languages**:
  - Spanish - Native
  - English - Fluent
- **Fieldwork**: Experience in organising and delivering fieldwork campaigns aimed for remote sensing studies or field phenotyping.
  - Sample collection for pigment and DNA studies
  - Intertidal surveying, small boat-based field teams, zooplankton sampling.
  - Remotely operated vehicles
  - Seaweed identification (particularly coralline algae).
- **Data Analysis**: Experience in computer programming in Python for scientific instruments, geospatial analysis, and quantitative data science. General R programming. Particular packages include:
  - Numpy, Pandas, spectral, pysptools, matplotlib
  - ImageJ, exiftool
  - QGIS, gpsbabel
  - Jupyter notebooks, Git, GitHub
- **Communication**: Experience in oral, written, and audiovisual content. General skills with HTML and Markdown. Tools include:
  - Adobe Lightroom, Photoshop, Premiere Pro
  - Final Cut Pro, Da Vinci Resolve, Google Earth Studio
  - Serato DJ Pro, Rekordbox
  - Obsidian