Athina Lange, Ph.D.

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Education

2018 - 2023 **Ph.D., University of California, San Diego** Oceanography.
Scripps Institution of Oceanography | San Diego, CA, USA
Thesis title: *Improved wave runup forecasts using remote observations and numerical models*.
Advisors: Mark Merrifield and Bob Guza

2014 - 2018 **B.Sc., University College Dublin** Theoretical Physics.
Dublin, Ireland

Research Experience

2024 – · · · · **Oceanographer** | USGS Woods Hole Coastal and Marine Science Center

- Improving the USGS Total Water Level and Coastal Change Forecast by understanding the role that sandbars have on wave runup and our ability to generate accurate total water level forecasts, particularly during storm and hurricane conditions
- Led backend operations of CoastCams at Marconi Beach, MA, while actively contributing to fieldwork for comprehensive project execution.
- Developed a semi-automated shoreline tracker for standard ARGUS-style imagery (ShoreScan).

2023 – 2024 **Postdoctoral Scholar** | Scripps Institution of Oceanography

- Developed an innovative automated UAV rectification tool leveraging airborne LiDAR surveys and computer vision algorithms, reducing human oversight and enhancing efficiency in coastal monitoring projects.
- Coordinated a four-month-long field campaign involving cameras, LiDAR, and in-situ surveys to collect a comprehensive dataset of beach evolution during a beach nourishment.

Research Experience (continued)

2019 - 2023 **Graduate Researcher** | Scripps Institution of Oceanography

- Improved wave runup forecasting using a multidisciplinary approach:
  - Utilized nearshore numerical models to investigate the effect of nearshore bathymetry on wave runup for coastal hazard forecasting.
  - Used in-situ observations to better understand and quantify the nearshore wave field and create a more accurate boundary condition for numerical models.
  - Employed UAV remote sensing data to develop a neural network / deep learning to identify wave crests and improve bathymetry estimates.
- Organized a comprehensive four-month-long field campaign, overseeing the deployment and operation of 17 specialized instruments and managing a team of 15 personnel to ensure the successful execution of data collection and multiple research objectives.

Fieldwork Experience

2024-2025 CoastCam Operations | Marconi Beach, MA

- Lead on data processing of the CoastCam at the Cape Cod National Seashore,
- Assisting in deployment, recovery and routine maintenance of the sites.

2020 - 2024 UAV Operations | San Diego County, CA

- Routinely flew hovering UAV missions at various beaches in San Diego County for bathymetry inversion algorithms and wave runup observations (typically coinciding with insitu jetski surveys).

Fall-Spring 2023 Fletcher Cove Experiment | Solana Beach, CA

- Deployed a i2RGUS system at the USACE Solana Beach Nourishment Project and connected it with the USACE CorpsCam service as the first US West Coast camera.

Fieldwork Experience (continued)

Fall-Winter 2021 — RuBy2D Experiment (Lead PI) | Torrey Pines State Beach, CA

- Lead coordinator for planning and operation phases of the field campaign, including 17 instruments and coordinating 15 team members for data acquisition.
- Deployed in-beach PAROS sensors and Nortek Vectors along the 7, 10 and 15m isobaths over a $\sim$ 2000 m domain.
- Installed an i2RGUS camera for continual monitoring of the study site.
- Lead pilot on fortnightly hovering UAV flights, done in conjunction with UAV LiDAR flights.
- Assisted in acquiring ATV-mounted LiDAR and flew UAV SfM flights for observations of the beach topography $\sim$ 3x/week.
- Led data processing of the Nortek Vector data, the i2RGUS imagery and UAV videos.

Fall 2021 — UAV/LiDAR Operations | Monterey and Santa Cruz County, CA

- Project lead and pilot for hovering UAV videos for bathymetry inversions and wave runup and assisted in obtaining LiDAR observations of beach topography and runup at Pajaro Dunes, Twin Lakes State Beach and Carmel River State Beach.

Fall 2020 — CA State Parks Operations | Malibu, CA

- Assisted in deploying a temporary i2RGUS camera station and acquiring LiDAR data of Malibu Lagoon State Beach.

Fall-Winter 2019 — SCARP Experiment | Torrey Pines State Beach, CA

- Assisted in Paros instrument deployment and obtaining LiDAR observations of wave runup.

Fall2019 — IB Wave Runup Experiment | Imperial Beach, CA

- Assisted in obtaining LiDAR observations of wave runup and beach change during a storm event.

Teaching Experience

Fall 2019 — Teaching Assistant
Course: *Mathematics for Engineers* - Mechanical and Aerospace Engineering, UC San Diego

- Led weekly office hours to assist students with questions that arose from lectures.
- Created solutions to the biweekly problem sets with expanded explanations to help with student understanding.
- Graded midterm and final exams for 100+ students.

Research Publications

Journal Articles

1. S. Adusumilli, N. Cirrito, L. Engeman, *et al.*, "Predicting shoreline changes along the california coast using deep learning applied to satellite observations," *Journal of Geophysical Research: Machine Learning and Computation*, vol. 1, 3 2024. DOI: https://doi.org/10.1029/2024JH000172.
2. A. M. Lange, J. W. Fiedler, M. A. Merrifield, and R. Guza, "Free infragravity waves on the inner shelf: Observations and parameterizations at two southern california beaches," *Journal of Geophysical Research: Oceans*, vol. 129, 8 2024. DOI: https://doi.org/10.1029/2023JC020378.
3. A. M. Lange, H. Lange, B. L. Bruder, and J. W. Fiedler, "Coastallens: A matlab uav video stabilization rectification framework," *Journal of Open Source Science*, 2024. DOI: https://doi.org/10.21105/joss.07111.
4. A. M. Lange, J. W. Fiedler, M. A. Merrifield, and R. Guza, "Uav video-based estimates of nearshore bathymetry," *Coastal Engineering*, vol. 185, p. 104 375, 2023, ISSN: 0378-3839. DOI: https://doi.org/10.1016/j.coastaleng.2023.104375.
5. A. M. Lange, J. W. Fiedler, J. M. Becker, M. A. Merrifield, and R. Guza, "Estimating runup with limited bathymetry," *Coastal Engineering*, vol. 172, p. 104 055, 2022, ISSN: 0378-3839. DOI: https://doi.org/10.1016/j.coastaleng.2021.104055.
6. M. Merrifield, M. Johnson, R. Guza, *et al.*, "An early warning system for wave-driven coastal flooding at imperial beach, ca.," *Natural Hazards*, vol. 108, pp. 2591–2612, 2021. DOI: https://doi.org/10.1007/s11069-021-04790-x.

Conferences

1. A. M. Lange, B. L. Bruder, J. Fiedler, M. Merrifield, and R. Guza, "Automated rectification of uav video," in *Ocean Sciences Meeting*, 2024.
2. A. M. Lange, J. Fiedler, M. Merrifield, and R. Guza, "Coastallens - uav stabilization," in *CIRN Workshop*, Invited Speaker, 2024.
3. A. M. Lange, J. Fiedler, M. Merrifield, and R. Guza, "Uav-video based estimates of nearshore bathymetry," in *CIRN Workshop*, 2023.
4. A. M. Lange, J. Fiedler, M. Merrifield, and R. Guza, "Estimating surfzone bathymetry remotely," in *Ocean Sciences Meeting*, 2022.
5. A. M. Lange, J. Becker, M. Merrifield, J. Behrens, and E. Terrill, "Relating offshore wave conditions to incident waves and shoreline water levels at ipan, guam during extreme events.," in *Ocean Sciences Meeting*, 2020.

Skills

Languages	English (native), French (fluent, DALF C1), German (fluent, Abitur)
Coding	MATLAB, Python
Numerical Modeling	SWASH, SWAN, DELFT3D
Instrumentation	UAV, RTK-GNSS Systems, Nortek Vector, i2RGUS camera system, Multibeam Sonar, LiDAR
Certification	**FAA Part 107**. UAV Pilot, **PADI Advanced Open Water Scuba**