UW-MOS

Seafloor mosaicking from optical data

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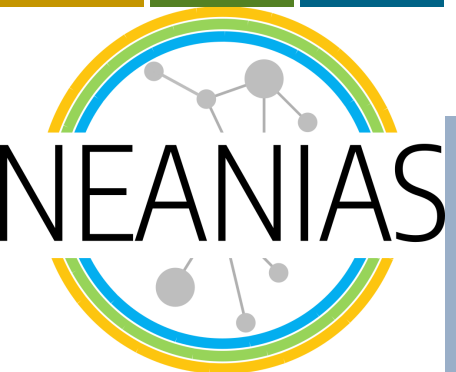

Novel EOSC Services for Emerging Atmosphere, Underwater & Space Challenges

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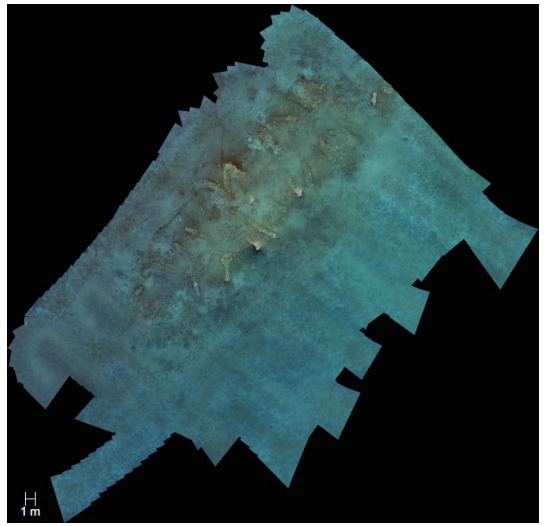
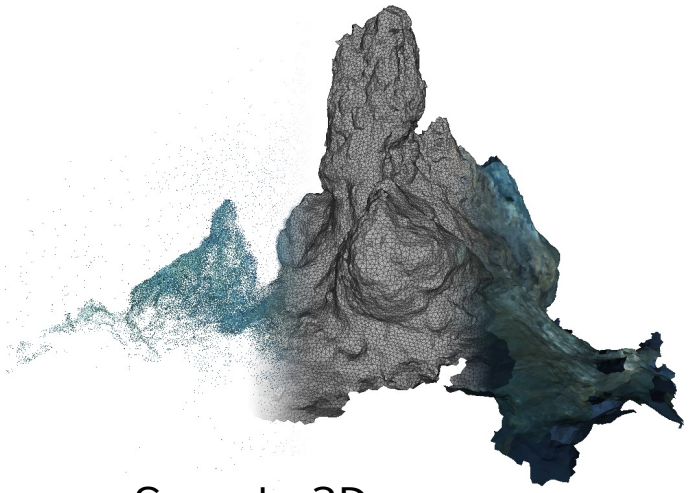
UW-MOS: Purpose and Technology

- Purpose:
  - Create 2D/3D maps from images.
  - Input:
    - Set of images collected during a survey mission.
    - (optional) Navigation data for georeferencing.
  - Output (result type selected by the user):
    - 2D mosaic: a 2D image of the scene.
    - 3D mosaic: textured surface triangle mesh.
- Technology:
  - Based on Coronis in-house solutions and some other commonly used open source libraries from the Computer Vision community (OpenCV, OpenMVG, OpenMVS, …)



Sample 2D mosaic



Sample 3D map

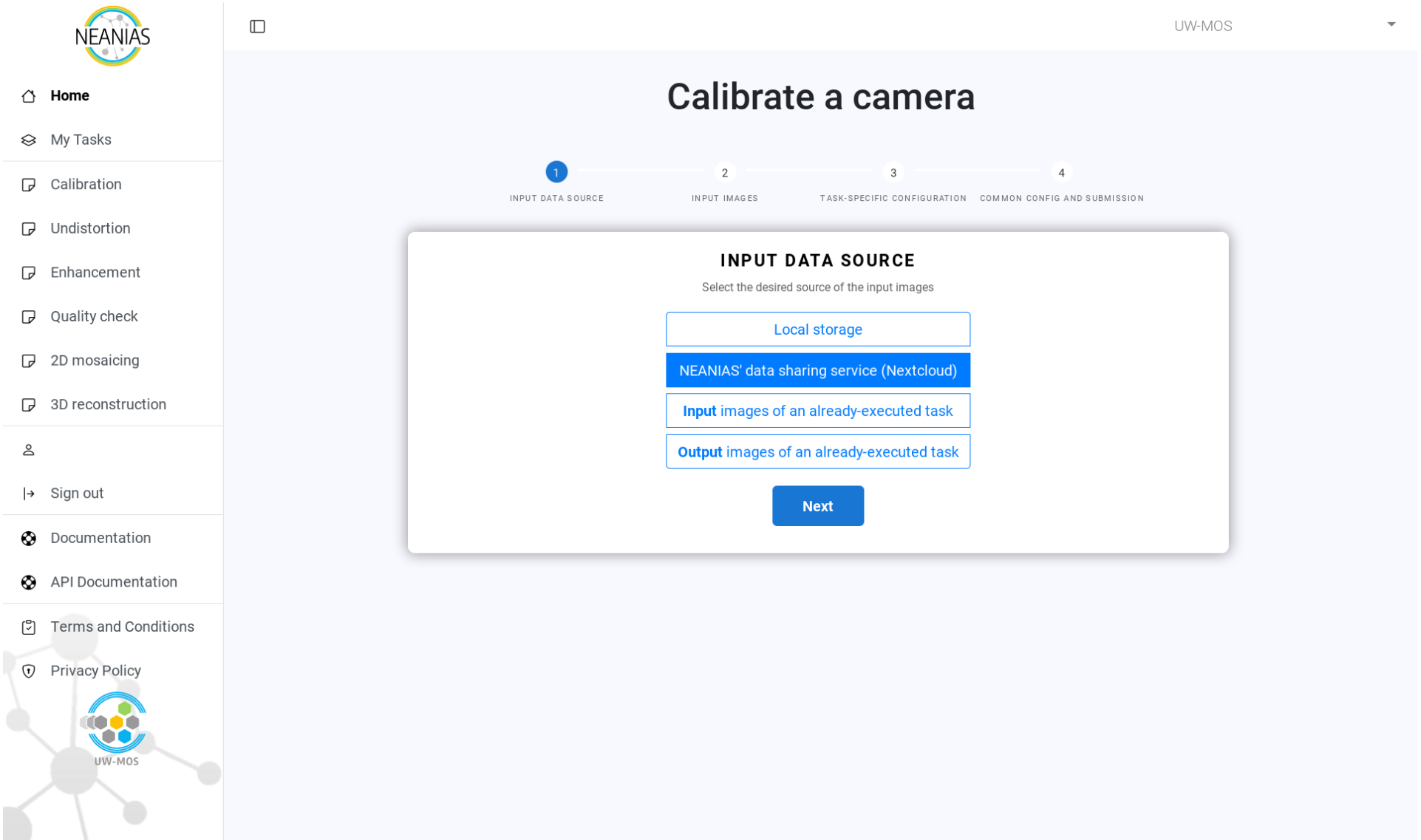
UW-MOS: Current Status (Functionality)

- UW-MOS provides **six sub-services/tasks**:
  - Camera calibration.
  - Image undistortion.
  - Image enhancement.
  - Image data quality check.
  - 2D image mosaicing.
  - 3D reconstruction.
- The user can launch **more than a task at the same time**.
- **Demo data** available for each task, accessible from the web.
- REST **API** available following the OpenAPI v3.0.2 specification.
- Complete **documentation**: https://docs.neanias.eu/projects/u2-service/en/latest/

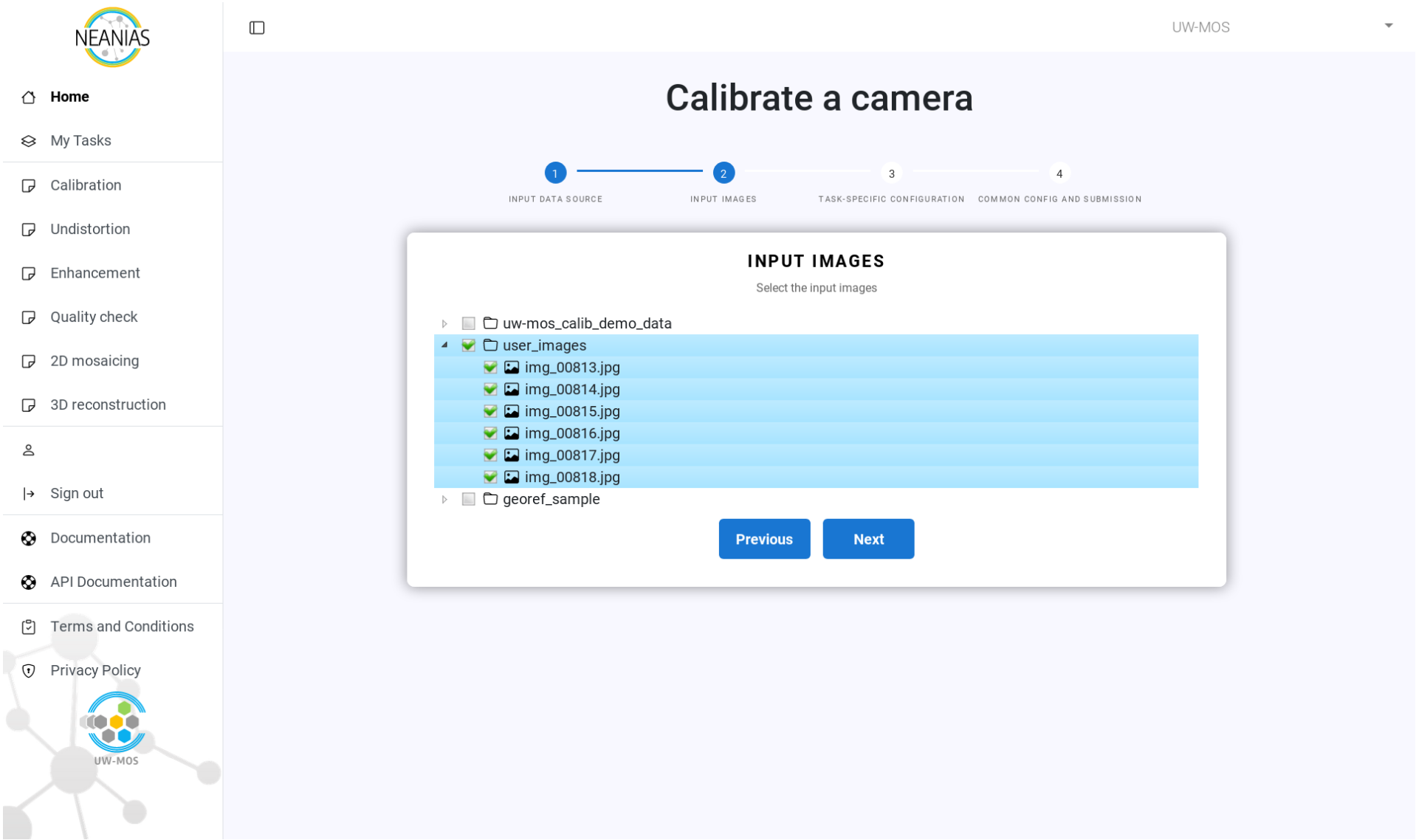
UW-MOS: Current Status (Functionality)

- That UW-MOS provides six tasks **does not mean you need to run them all** to get the final map.
- The service is designed to reach a wide audience, regardless of their experience in photogrammetry.
- Therefore, if you:
  - Have some background in photogrammetry, and you have calibration data for your camera, you can run our *camera calibration task* before trying to run the *2D or 3D mapping tasks*, as results will be more accurate in this case.
  - If you do not have any experience in photogrammetry, and just have a sequence of images observing a scene, you can *go directly to the 2D or 3D mapping tasks*, and we will estimate the camera calibration during the map construction for you.
  - All the other steps (*undistortion, image enhancement, data quality*) are highly recommended, but completely optional!

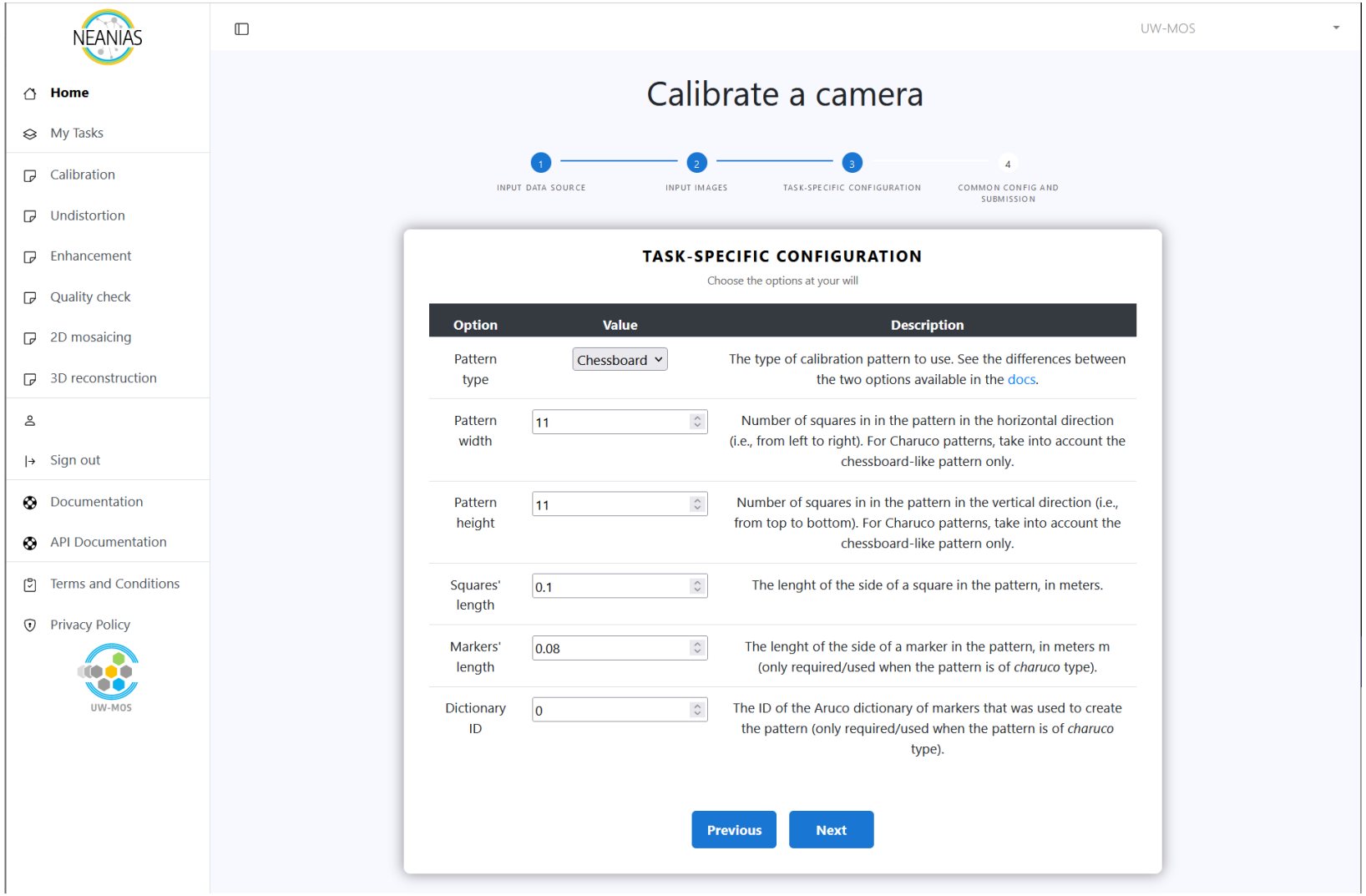
UW-MOS: Task Configuration



UW-MOS: Task Configuration



UW-MOS: Task Configuration



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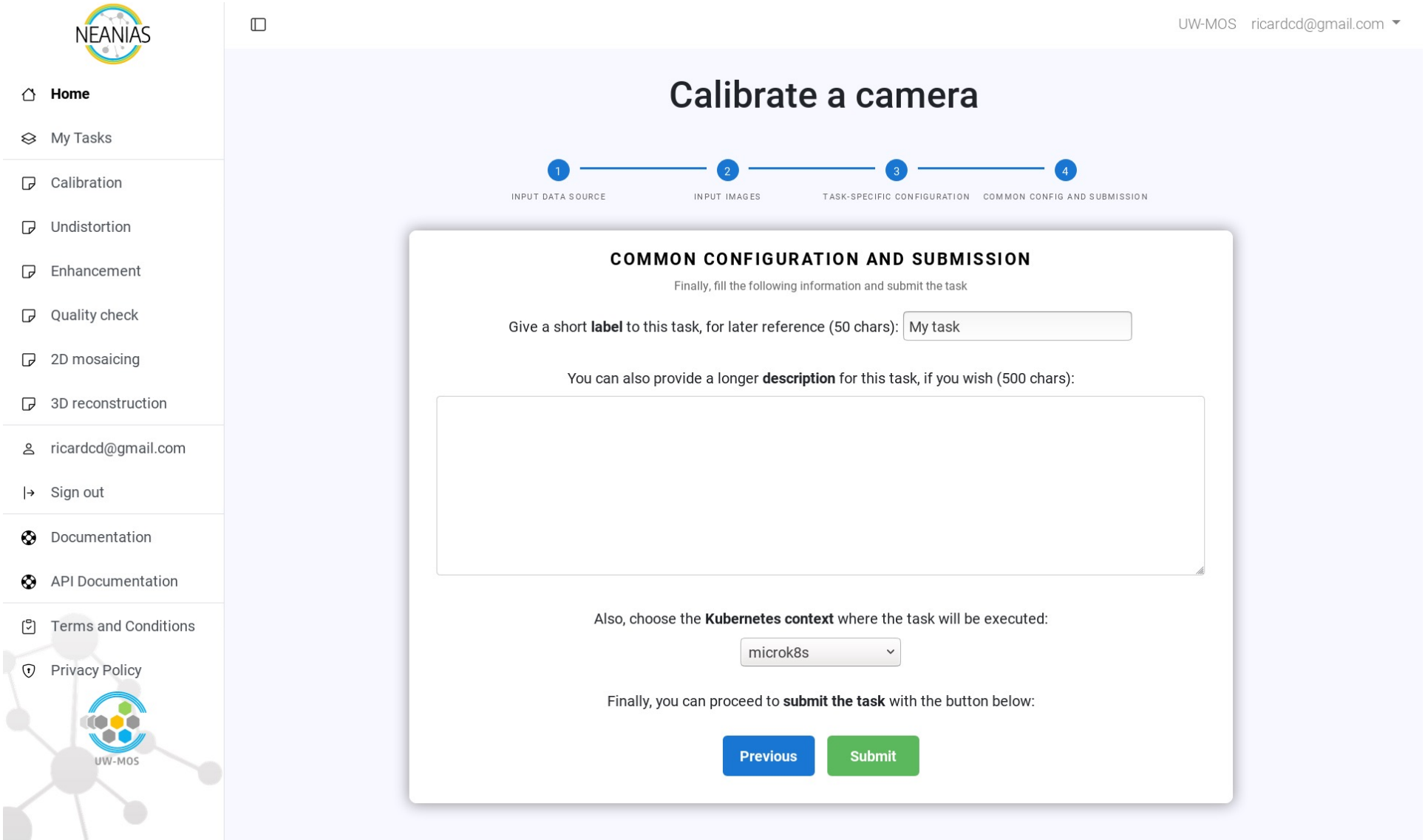
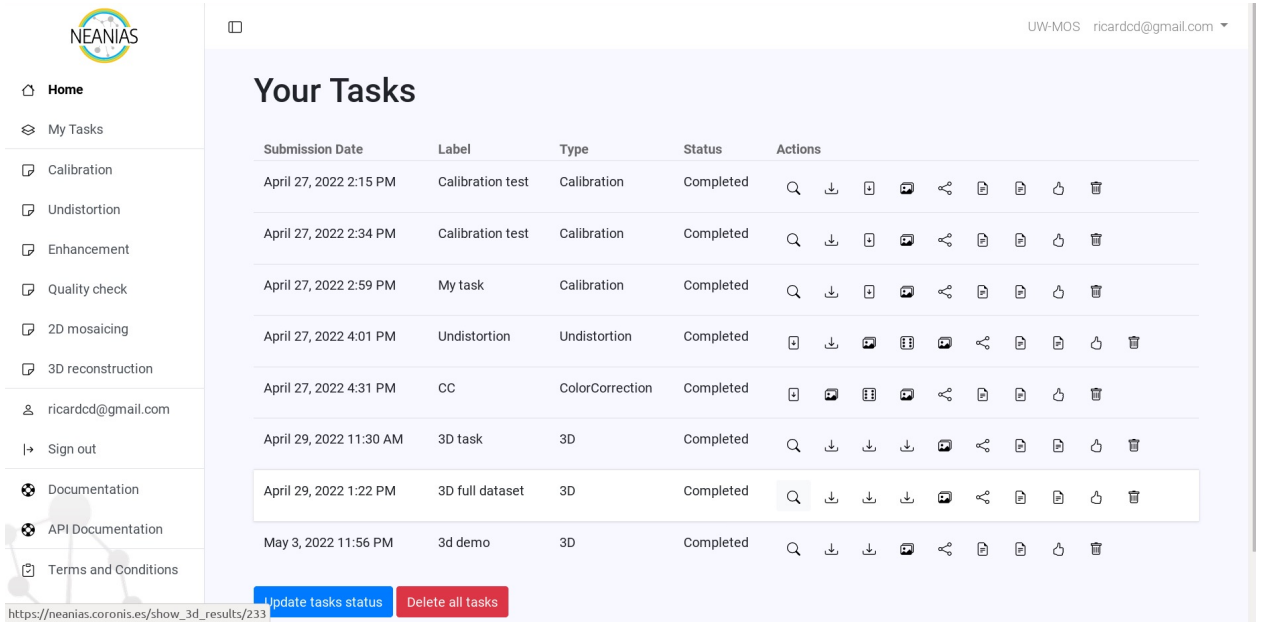


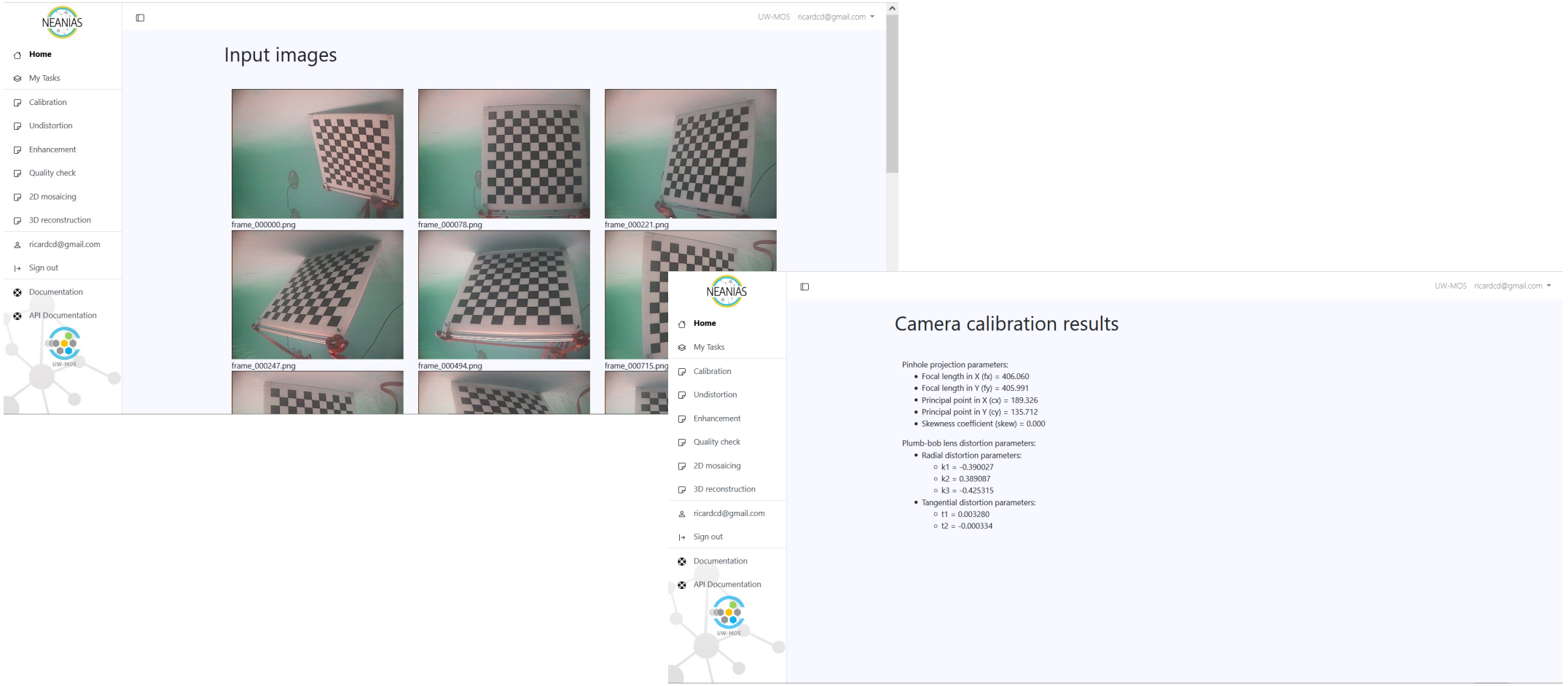
UW-MOS: Tasks List

- View the status of the task (processing, finished, etc.)
- Several actions available for each task:
  - View and/or Download results in different formats.
  - View the input images, processed ones (undistortion and image enhancement) and input/processed side-by-side.
  - Share results back to the user via the NEANIAS Data Sharing service.
  - Get a report with all the steps executed to obtain the results, for reproducibility.
  - User feedback survey (please fill!)
  - Delete the task



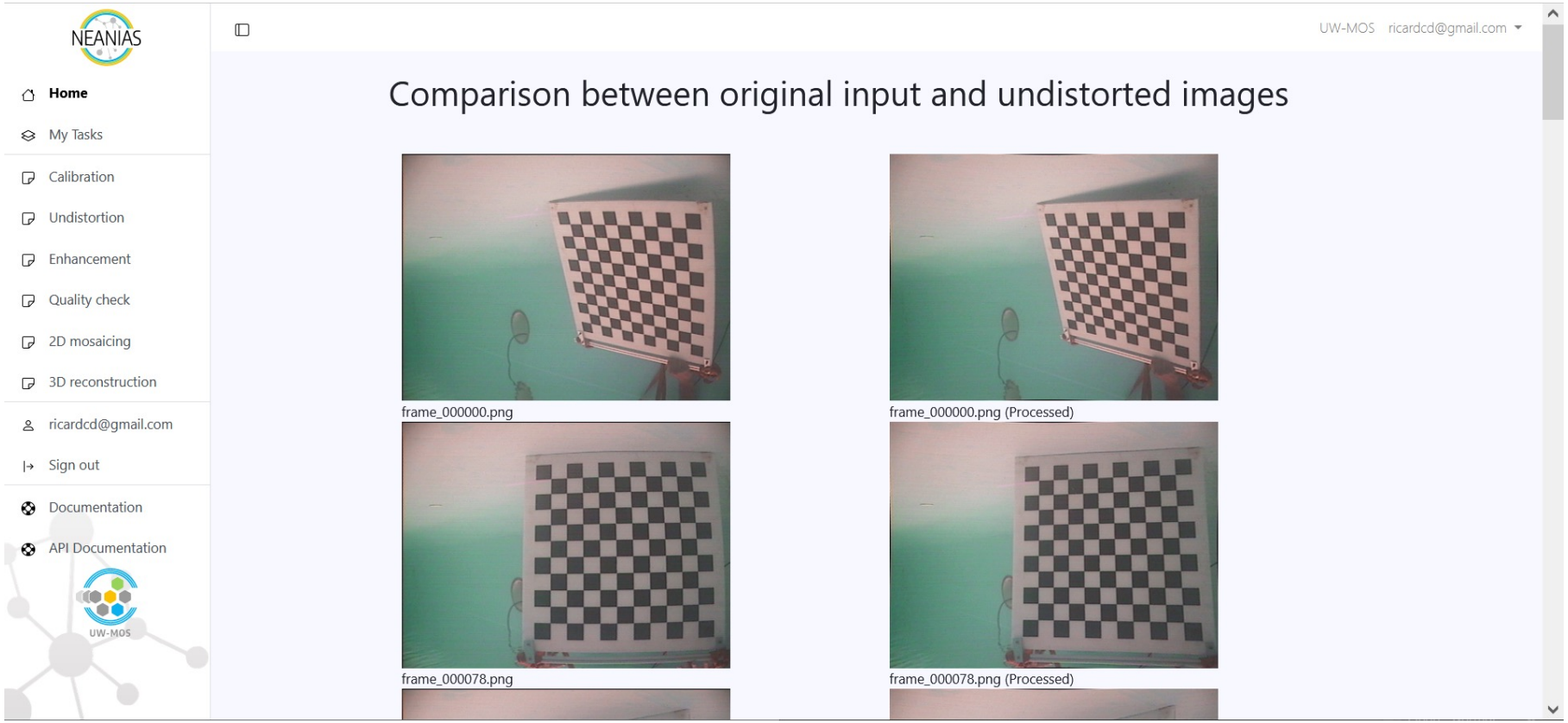
UW-MOS: Camera Calibration Task

› Obtains the intrinsic parameters of a camera given a set of views of a known pattern:



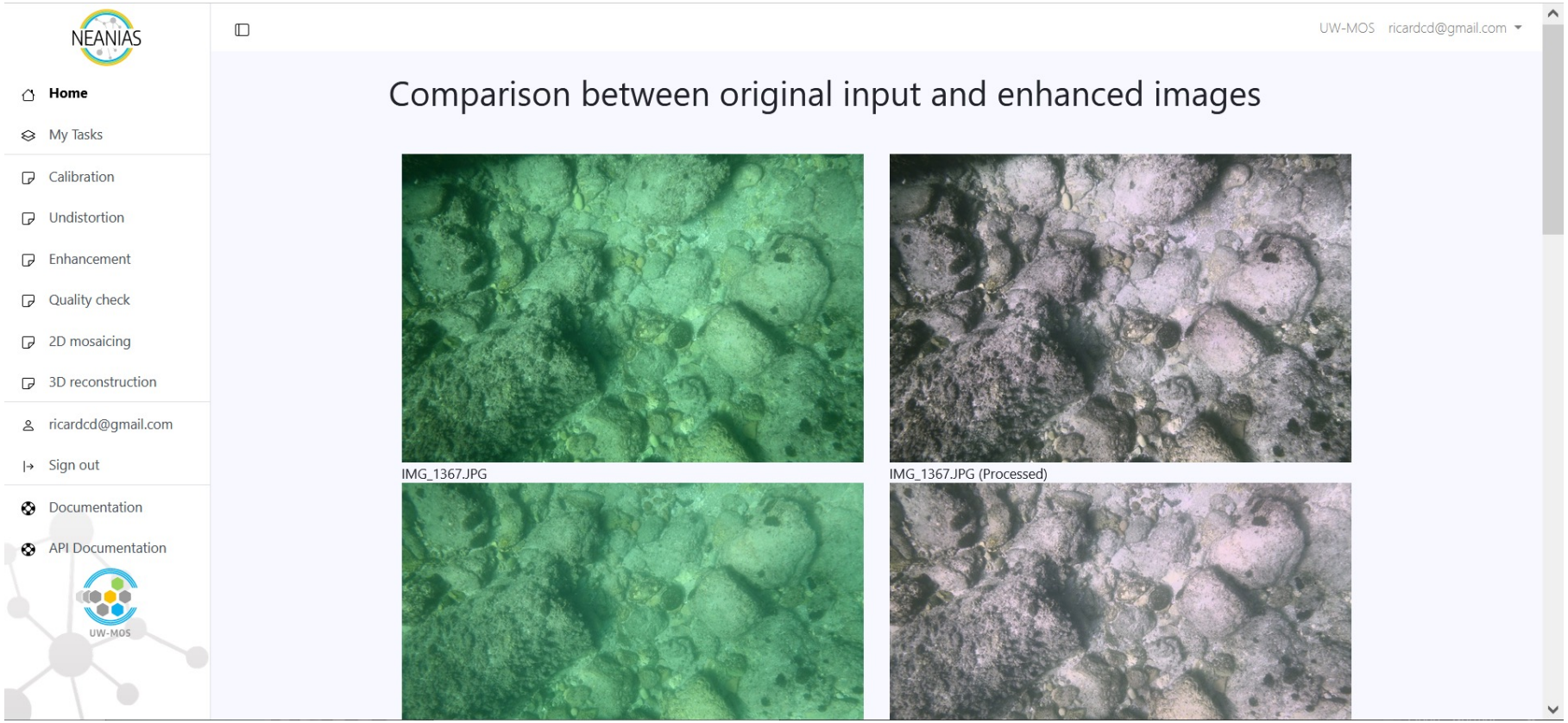
UW-MOS: Image Undistortion Task

› Given the camera parameters obtained in the previous task, removes the distortions of the image caused by the camera lenses:



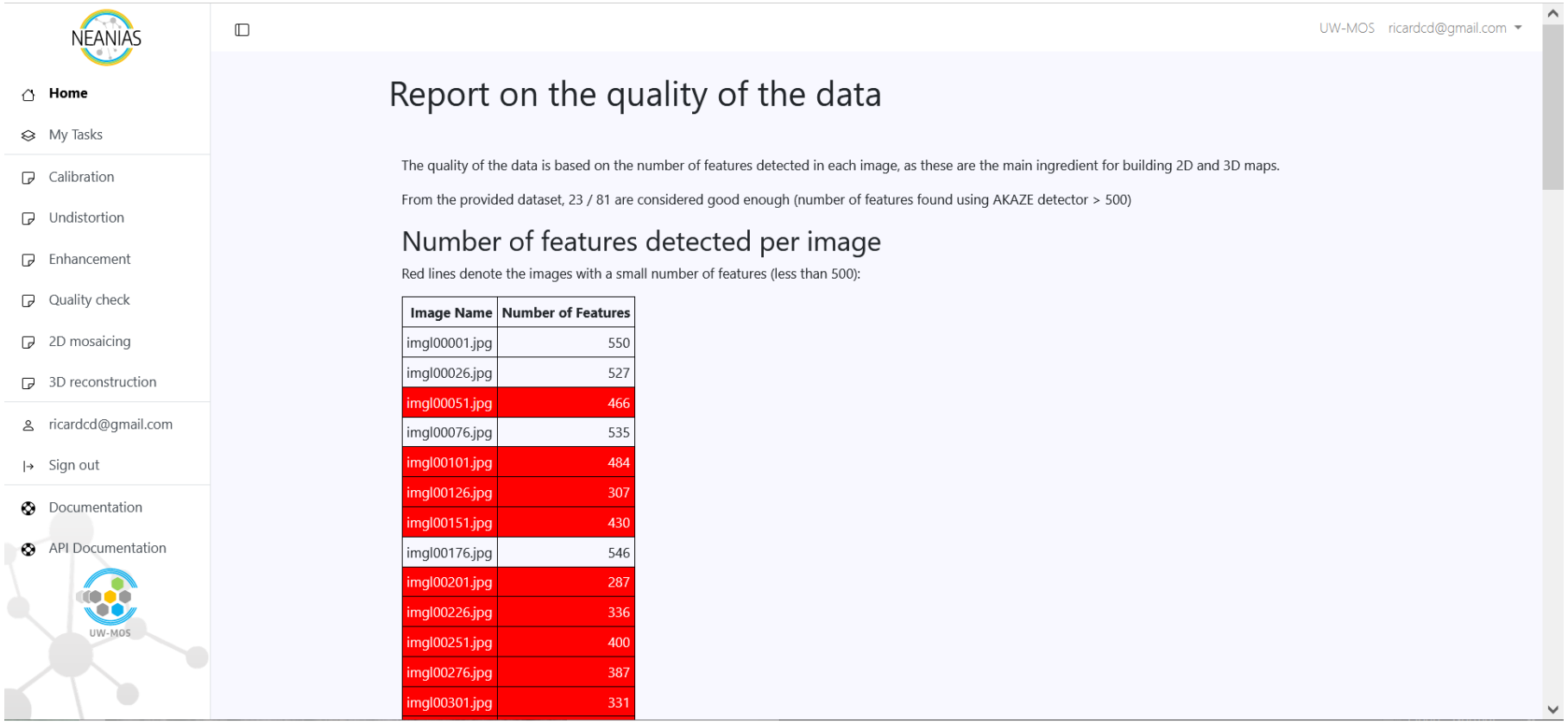
UW-MOS: Image Enhancement Task

› Since underwater images suffer from lack of contrast and color shifting, we provide an image enhancement method suited for underwater data:



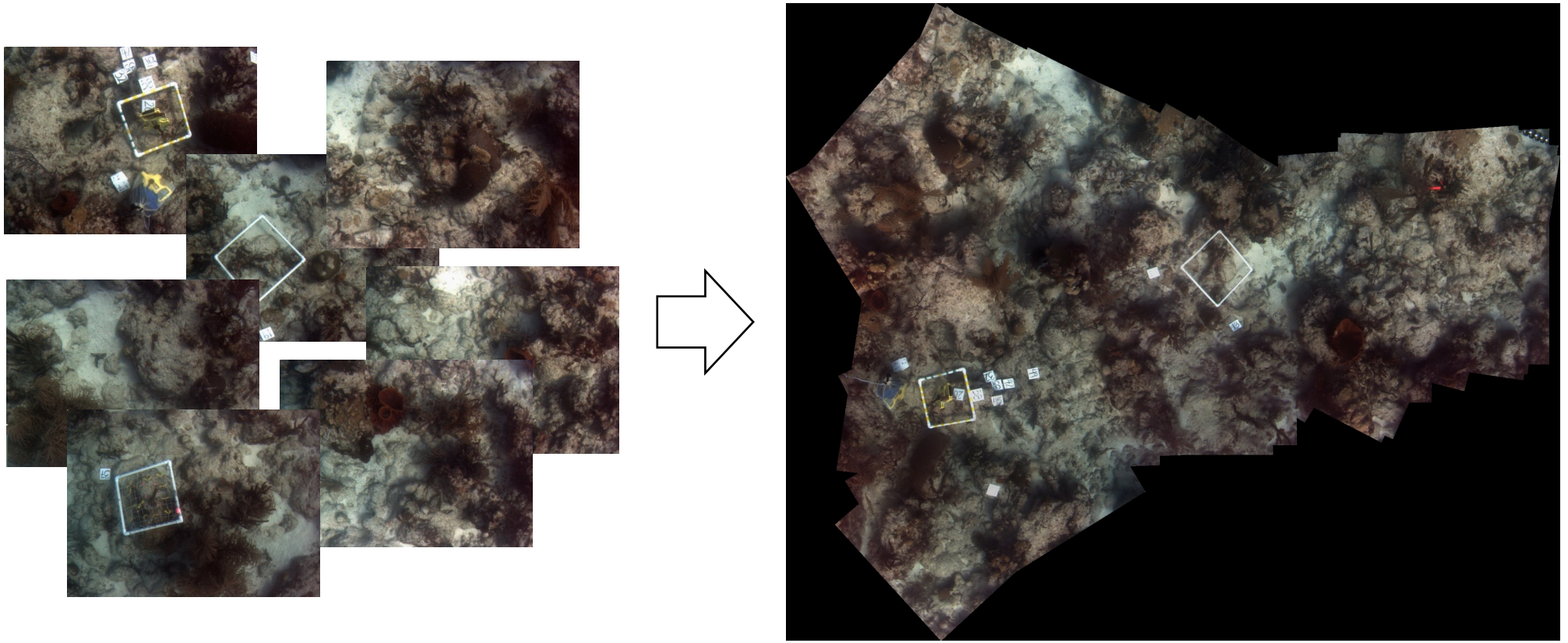
UW-MOS: Data Quality Check Task

› Perform some quick checks to test the suitability of a set of images to be used as input of the 2D or 3D mapping pipelines:



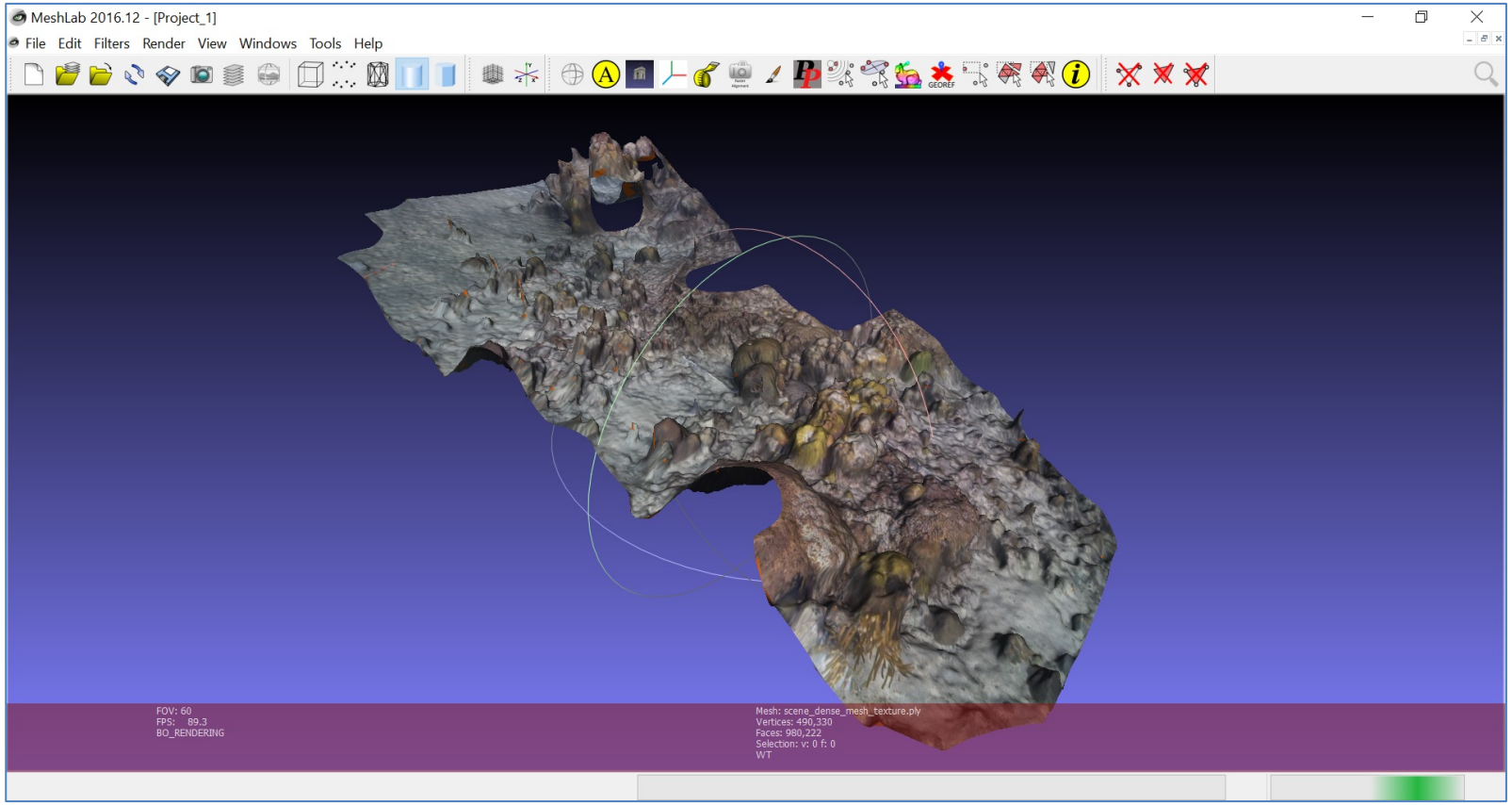
UW-MOS: 2D Mosaicing Task

› Creates a 2D mosaic from a set of images (calibrated or not), the result is a single image composite of the input:



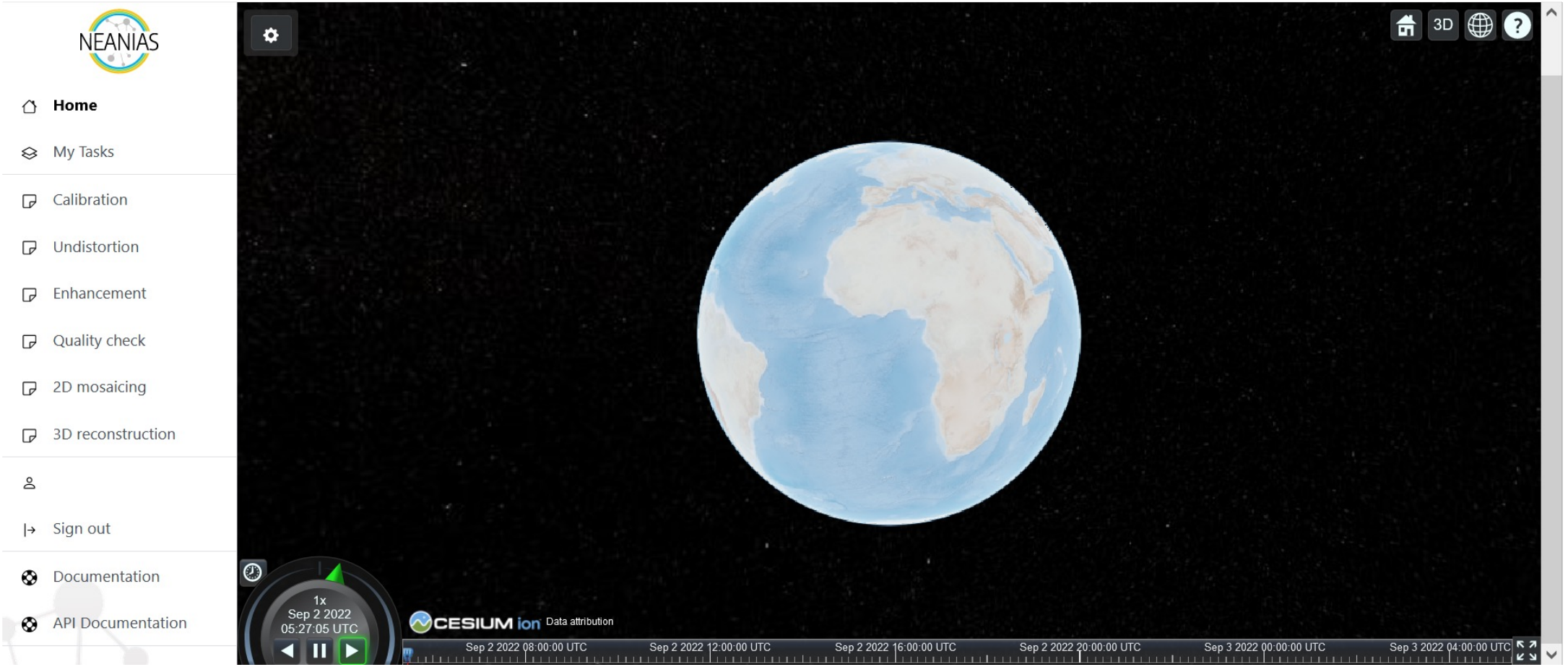
UW-MOS: 3D Reconstruction Task

- Computes a 3D reconstruction of the scene, the result is a textured surface triangle mesh, downloadable in formats amenable to web/desktop 3D viewers
- If georeferencing data is provided per image, the result is a georeferenced map.



UW-MOS: Online 3D Viewer

› Geo-referenced online 3D viewer also provided:



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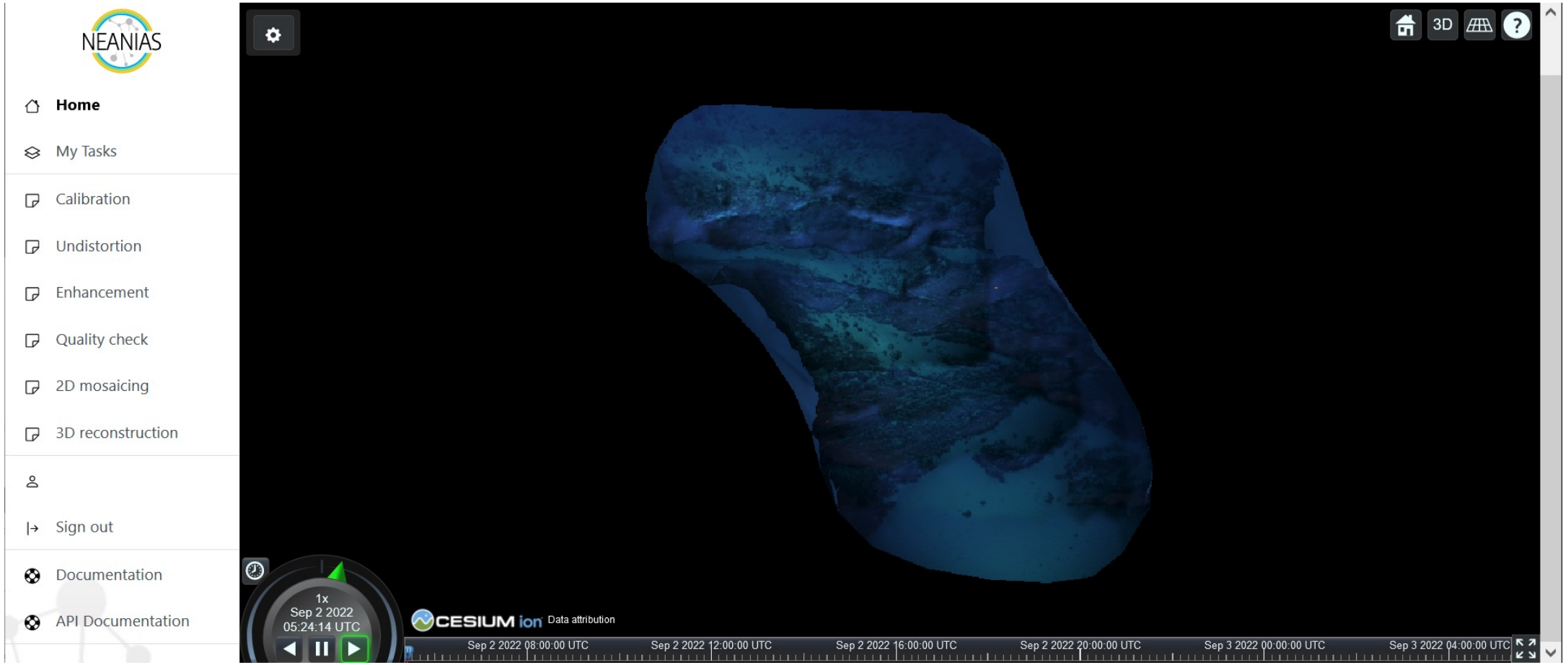

UW-MOS: Summary

- Online photogrammetry service.
- Provides 2D and 3D mapping tasks, among other optional tasks that help improving the results.
- The user can run different tasks at the same time, and inspect the results online or download them in various formats.
- Adapts to the experience of the user:
  - Specific photogrammetry tasks, with several parameters to tune.
  - However, an inexperienced user can run any task with no prior information other than the images and get a nice result.

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