The Evolution of Scientific Observation at Nishinoshima and the Multifaceted Roles of Unmanned Aerial Vehicles (UAVs)

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Since the massive eruption in 2020, the majority of Nishinoshima in the Ogasawara Islands has been designated as a restricted zone. Furthermore, from the perspective of preserving the island’ s pristine volcanic ecosystem and implementing stringent biosecurity measures to prevent the anthropogenic introduction of invasive species, manned on-site investigations have been strictly limited.

Under these constraints, Unmanned Aerial Vehicles (UAVs) have played an indispensable role as the primary platform for scientific observation. Their applications extend beyond conventional remote sensing, such as high-resolution videography and orthomosaic generation. UAVs have successfully executed a wide range of sophisticated missions, including the collection of surface geological samples, the remote deployment and recovery of various observation devices and fixed-point cameras for biological surveys, and the aerial transport and deployment of ground rovers.

In this presentation, we report on the advancement of observation technologies tailored for such extreme environments and the evolution of engineering innovations that have enabled operations in these challenging fields, based on our cumulative observation results.

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