Improving FAIRness of drone data through community effort

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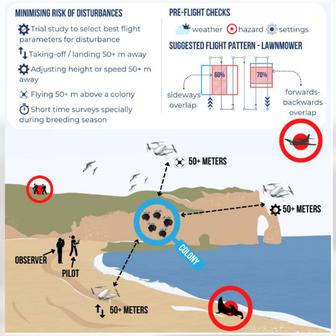
The use of Uncrewed Aerial Vehicles (UAVs), including both autonomous and remotely piloted aerial systems, is increasingly prevalent across various scientific disciplines, enabling the collection of large volumes of data for diverse research applications. However, the volume of data generated and the absence of standardised workflows often complicate data sharing and publication. As part of the Research Data Alliance (RDA) Small Uncrewed Aircraft and Autonomous Platforms Data Working Group, we are developing guidelines on how best improve the Findability, Accessibility, Interoperability and Reusability of these data as well as other considerations such as ethics. Here are our first results.

Ethics

The data collected during UAVs operations requires careful consideration and responsible management.



Edney, A.J.; Hart, T.; Jessopp, M.J.; Banks, A.; Clarke, L.E.; Cugniere, L.; Elliot, K.H.; Martinez, I.J.; Kilcoyne, A.; Murphy, M.; Nagel, R.G.; Ratcliffe, N. ; Thompson, D.L.; Ward, R.M.; Wood, M.J., 2023 Best practices for using drones in seabird monitoring and research. *Marine Ornithology*, 51 (2). 265-280.

General guidance

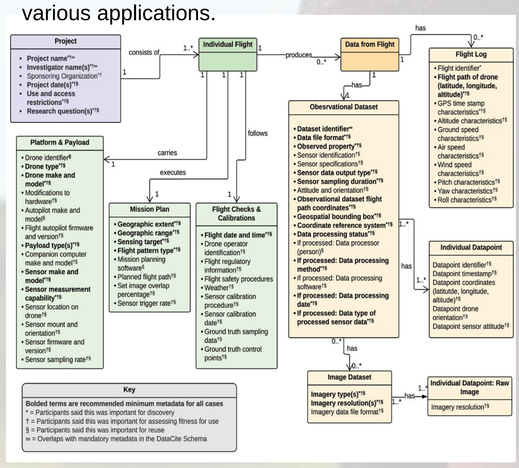
- Adhere to relevant national civil aviation rules
- Adhere to privacy laws and ethical guidelines, particularly regarding sensitive or location-specific data
- Define clear purposes for data collection
- Establish secure storage protocols
- Create procedures for handling accidental captures
- Follow best practices regarding environmental and wildlife protection
- Develop community engagement strategies
- Maintain transparent operations
- Respond promptly to concerns
- Build trust through consistent ethical behaviour
- Apply CARE principles if working with indigenous communities
- Processing might be required to blur or anonymise personal data collected with UAVs
- data should be “as open as possible and as closed as necessary”

Use case compilation: We need your help!

RDA Small Uncrewed Aircraft and Autonomous Platforms Data WG - use case collection

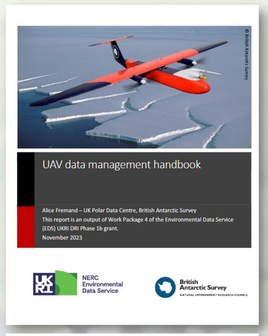
Improve interoperability and reuse of the drone data

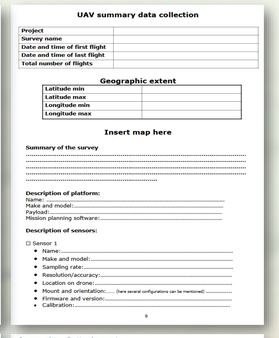
Ensuring the interoperability of UAV data is vital for maximising the reusability and impact of the collected data. The Minimum Information Metadata Model developed by the RDA Small Unmanned Aircraft Systems' Data provides a standardised framework for describing drone data, facilitating seamless data sharing and integration. Utilising Persistent Identifiers for Instruments (PIDINST) ensures accurate referencing and traceability of measuring instruments. Additionally, adopting ontologies like SOSA (Sensor, Observation, Sample, and Actuator) improve data annotation, enhancing the accessibility and reusability of UAV data across various applications.

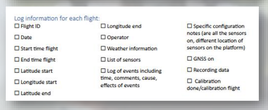


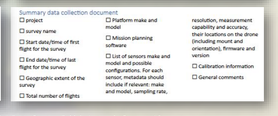
Barbieri, L., Wyngaard, J., Swanz, S., & Thomer, A. K. (2023). Making drone data FAIR through a community-developed information framework. Data Science Journal, 22, 1-1. DOI: 10.5334/dsj-2023-001

The importance of good practices from data collection









Fremand, Alice. 2023 UAV data management handbook. UK Polar Data Centre, British Antarctic Survey, 13pp. https://nora.nerc.ac.uk/id/eprint/536392/

Capturing metadata from data collection is essential to ensure the future reusability of research data. By documenting comprehensive metadata early on, researchers can provide detailed context and enhance data traceability. This proactive approach not only benefits future users but also aids researchers in further processing and analyses of their data, maximising its long-term value and impact. We propose here a checklist that provides a list of required information to record when collecting data derived from drones.

Common challenges managing drone data

DATA STORAGE · IMAGE VS SENSOR DATA · DATA FORMAT · DATA PIPELINE · INTEROPERABILITY AND METADATA · ETHICS AND PRIVACY

Join our working group

RESEARCH DATA ALLIANCE