

EGU24-21117, updated on 16 Mar 2025

<https://doi.org/10.5194/egusphere-egu24-21117>

EGU General Assembly 2024

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Compiling analysis-ready ice data across cryosphere disciplines

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Ice is omnipresent in our Solar System: on Earth, on different planetary bodies, and on moons in the outer Solar System. In the past, terrestrial and extraterrestrial cryosphere science mostly developed as independent research fields whereas synergies may shed light on both fields. In fact, close cooperation across different cryosphere research communities is a necessary prerequisite for designing future planetary exploration missions. An in-depth knowledge of similarities and differences between ice regimes on Earth and beyond paves the way for a mission preparation that optimally orchestrates terrestrial analogue field test, lab experiments, and simulation-based extrapolation to hypothesized ice regimes at the target body.

The authors of this contribution constitute the International Space Science Institute (ISSI) team Bridging the gap: from terrestrial to icy moons cryospheres, which started in 2023 and brings together scientists of different focus in terrestrial and extra-terrestrial cryosphere research. The overall goal of our project is to make knowledge hidden in the vast amounts of existing data from different research groups accessible by consolidating it into a comprehensive meta-data enriched compilation of ice properties including uncertainty margins if available. This extends to relevant physical regimes and different scales on both Earth, and icy moons including data from field campaign measurements, laboratory experiments, and planetary missions. A particular focus of our work will be to increase the analysis readiness of the data for subsequent data-driven or simulation-based analysis. This approach will provide us with the unique opportunity to transfer and extrapolate the information from the Earth to the outer Solar System bodies.

Here, we will introduce the project and its rationale, describe our approach to selecting and compiling the data, as well as how we will make them accessible, and present first results.

