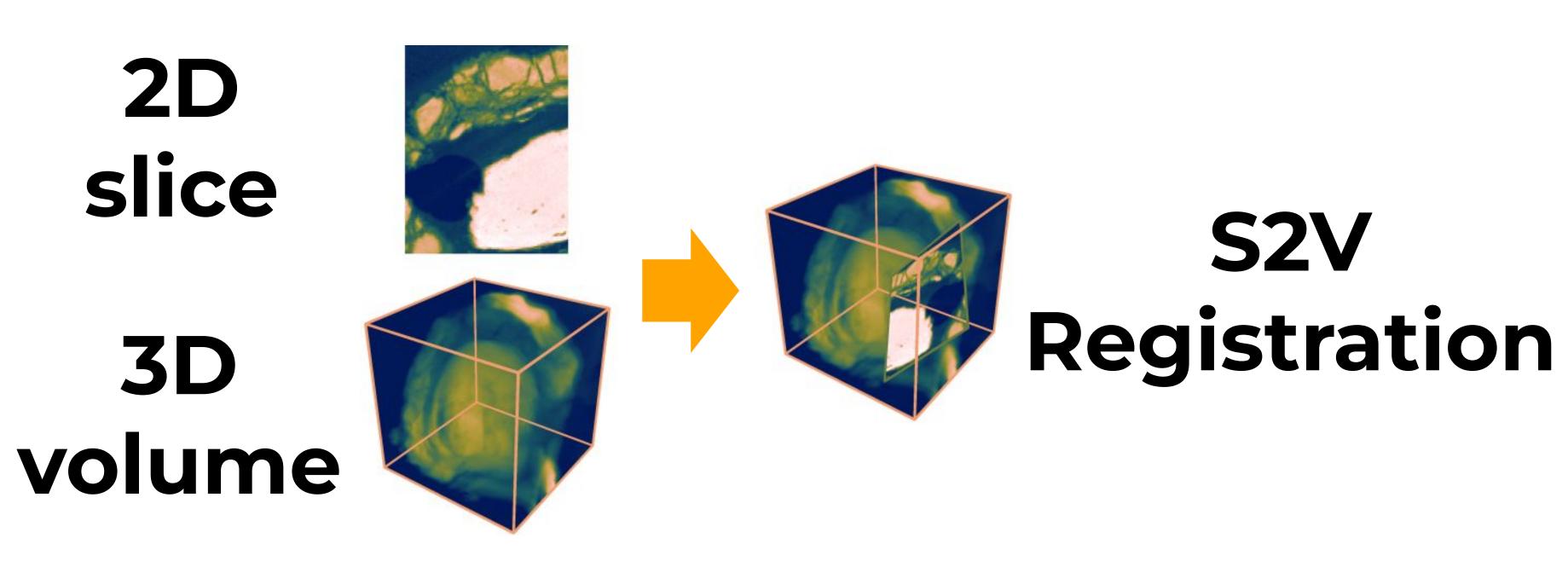


Needles & Haystacks: Dataset and Benchmark for Domain-Agnostic Image-Based Rigid Slice-to-Volume Registration

Anton Frolov, Florian Kleiner, Christiane Rößler, Volker Rodehorst

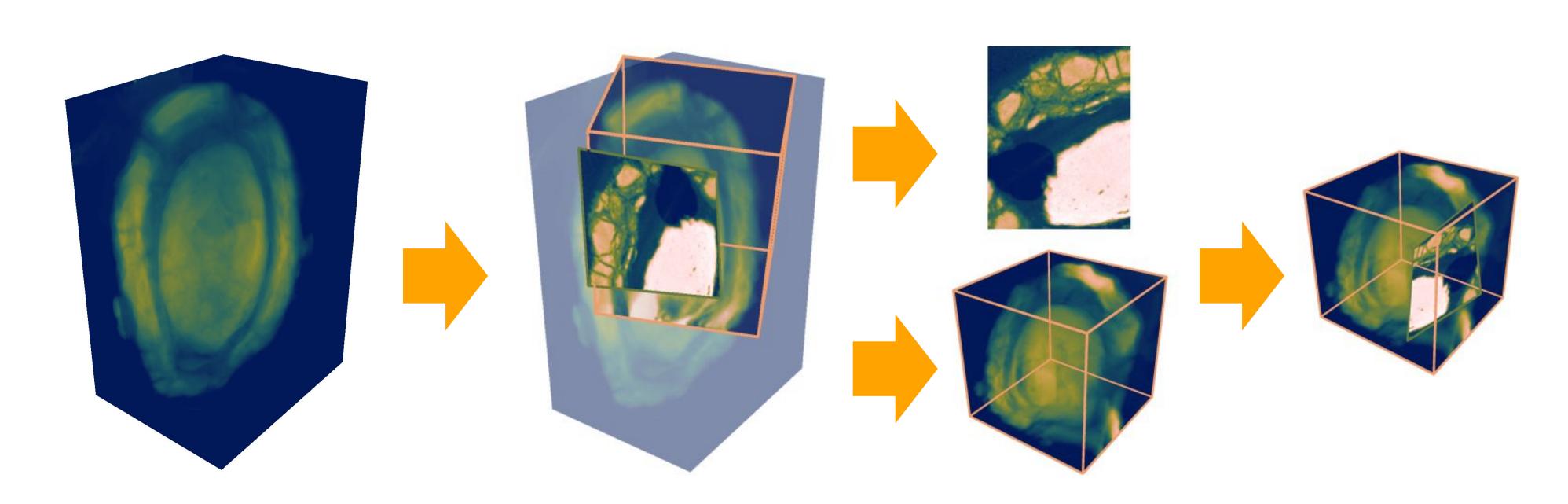


1 Motivation



- Slice-to-Volume (S2V) registration has many high-impact applications, yet no standard datasets or benchmarks
- S2V dataset curation is tough & costly
- Diverse and challenging datasets and benchmarks are needed to develop novel methodologies

2 Idea



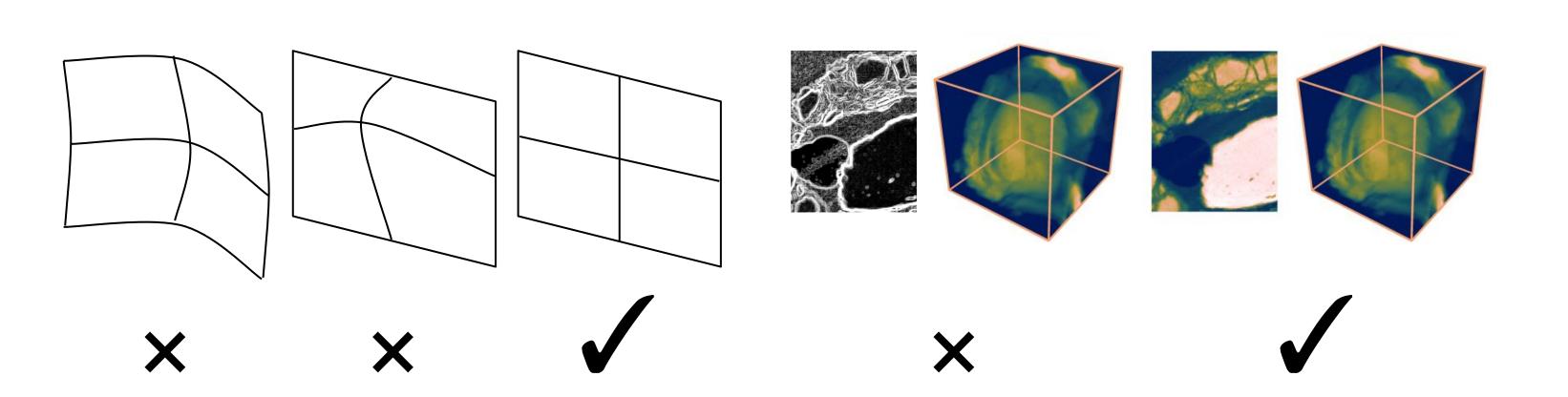
Overcome the burden of dataset curation by synthetically sampling S2V tasks from real-world 3D data

Project page

Paper, code, data, and more!



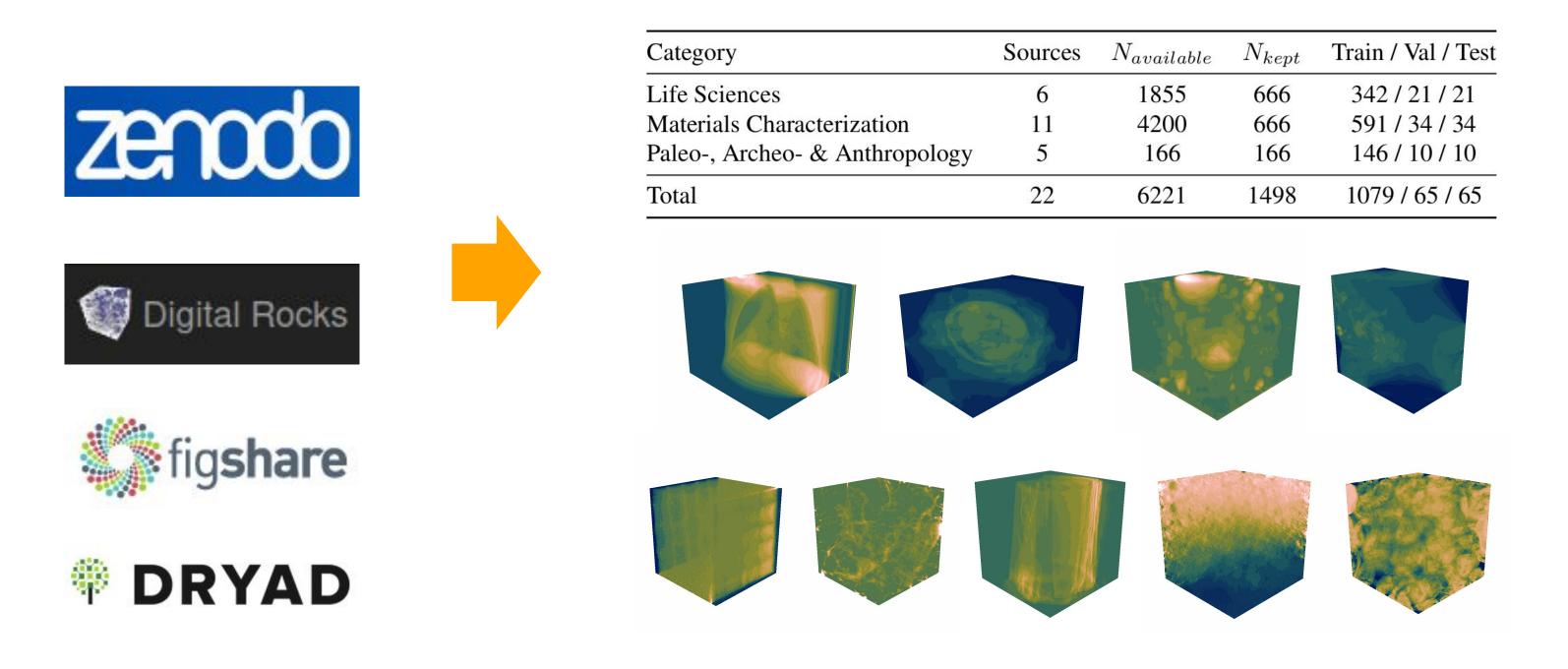
3 Working assumptions



Limit the scope of the paper to rigid and monomodal S2V registration

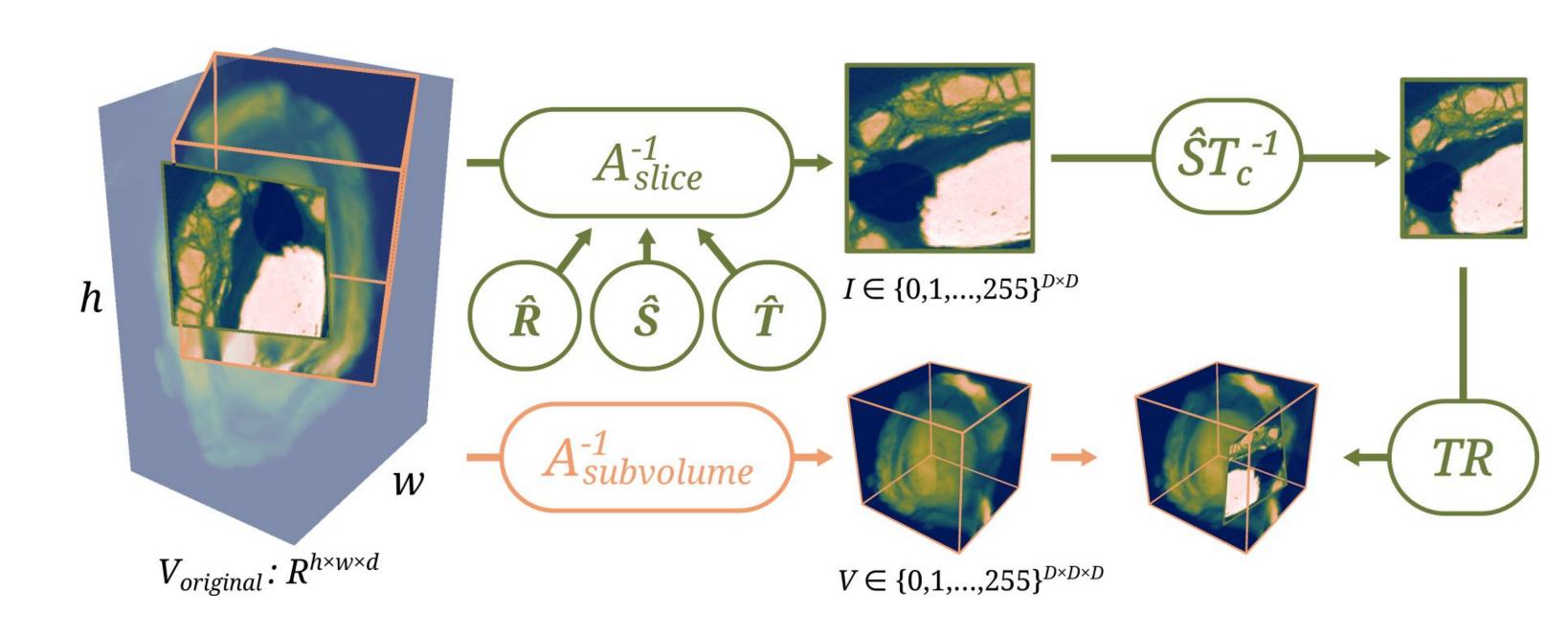
(2D/3D information imbalance is sufficiently hard and unsolved)

4 Data sourcing



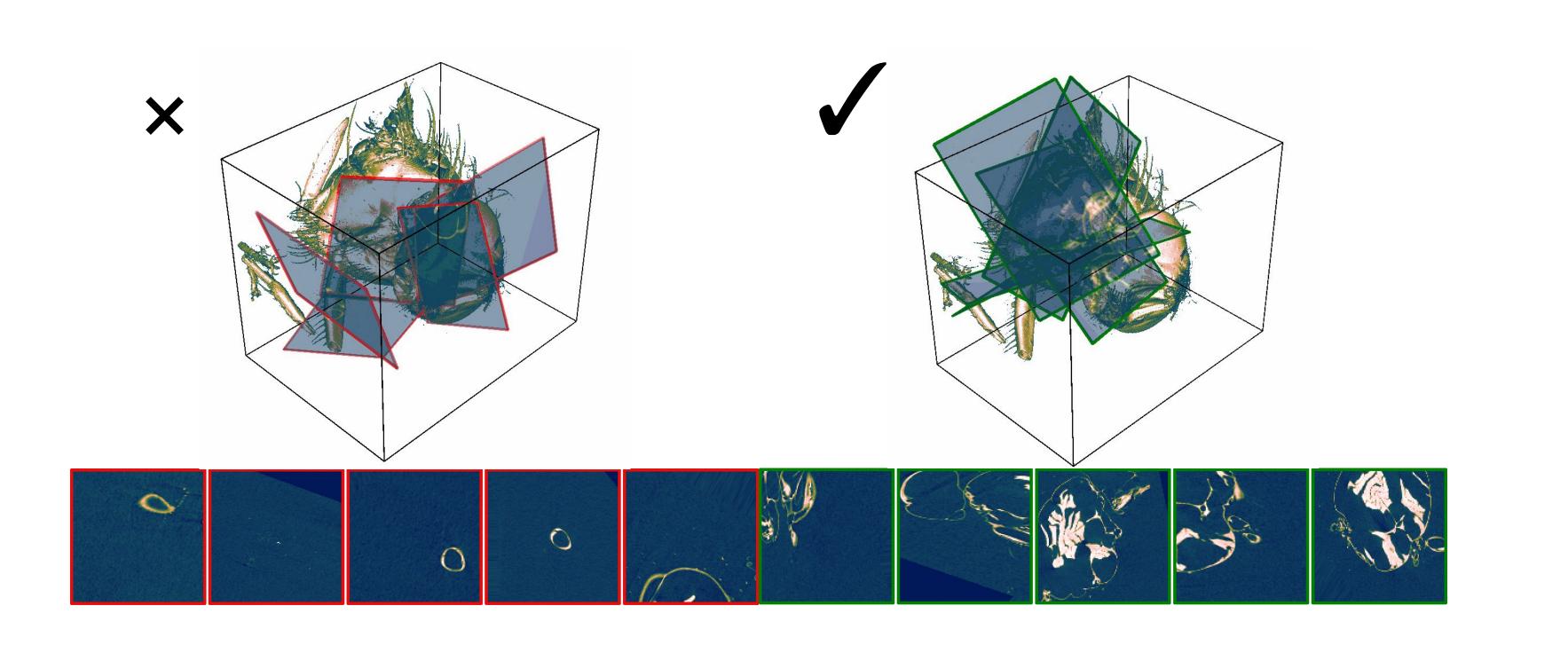
Source 1498 unique, diverse & openly-licensed 3D volumes

5 Sampling approach



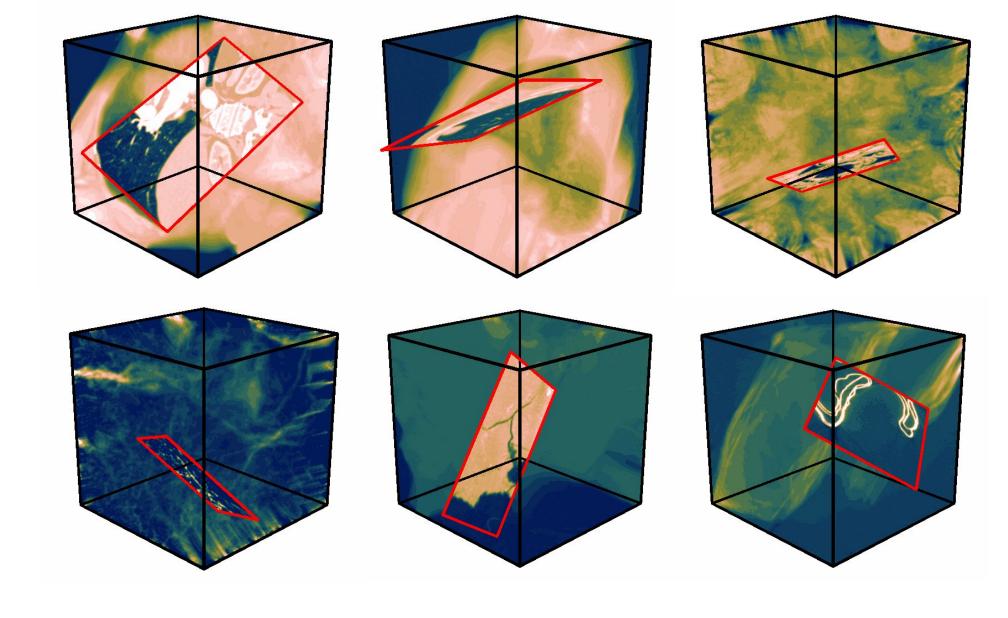
Randomly sample S2V registration tasks

6 Feasibility test



Reject poor / locally ambiguous tasks

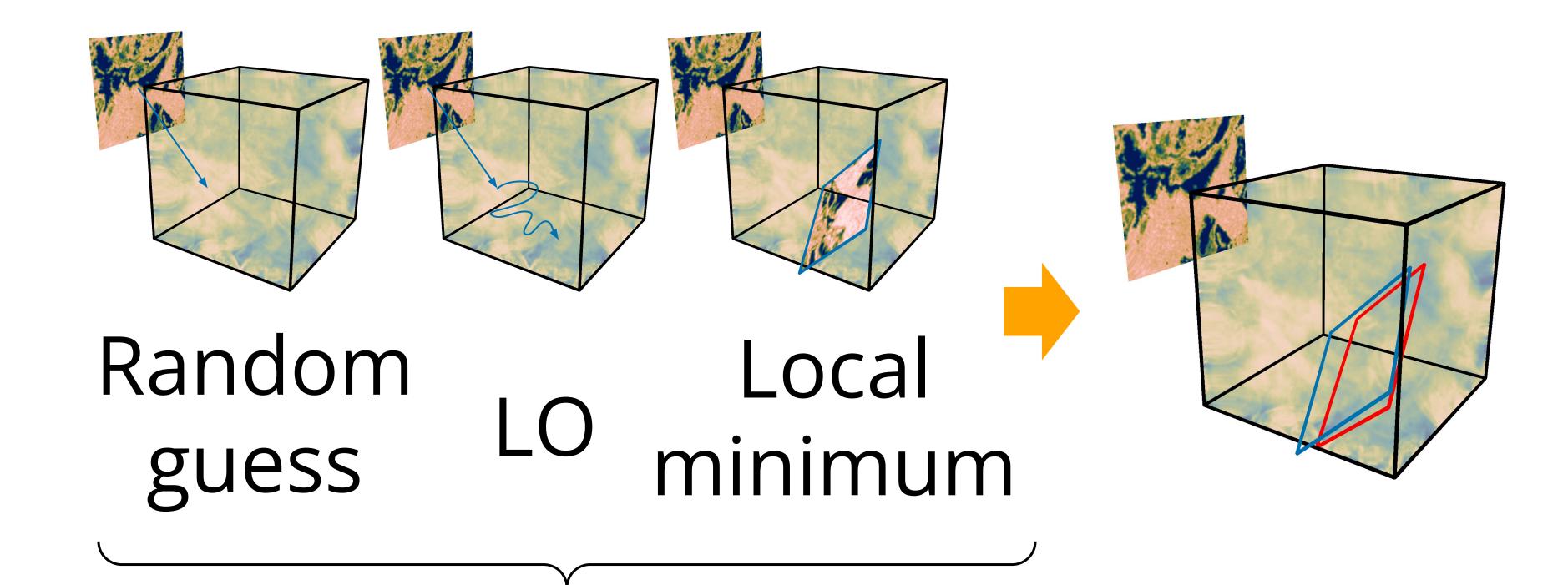
7 Dataset & benchmark



License: CC-BY 4.0

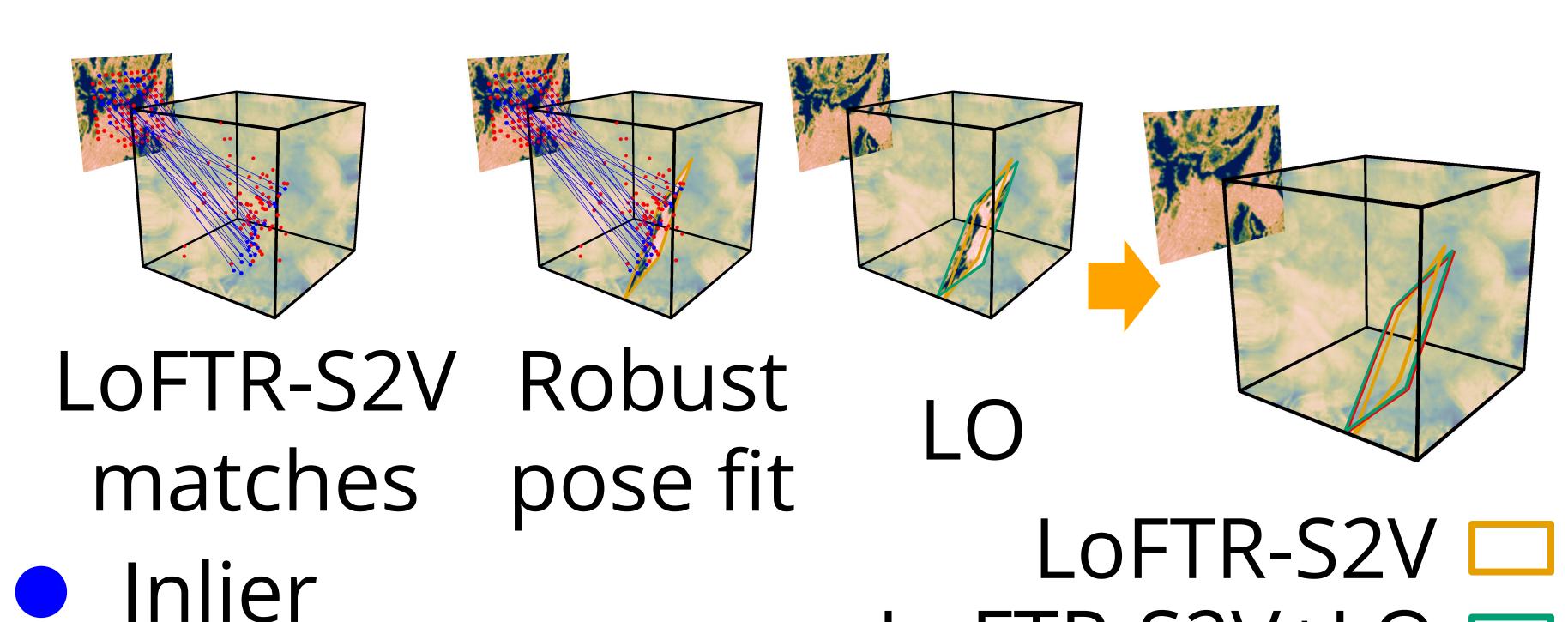
Train/Val: 158 436 tasks, Test: 8 461 tasks

8 Baseline: Random search + LO



Solution x Nrand times, pick best Ground-truth

9 Baseline: LoFTR-S2V

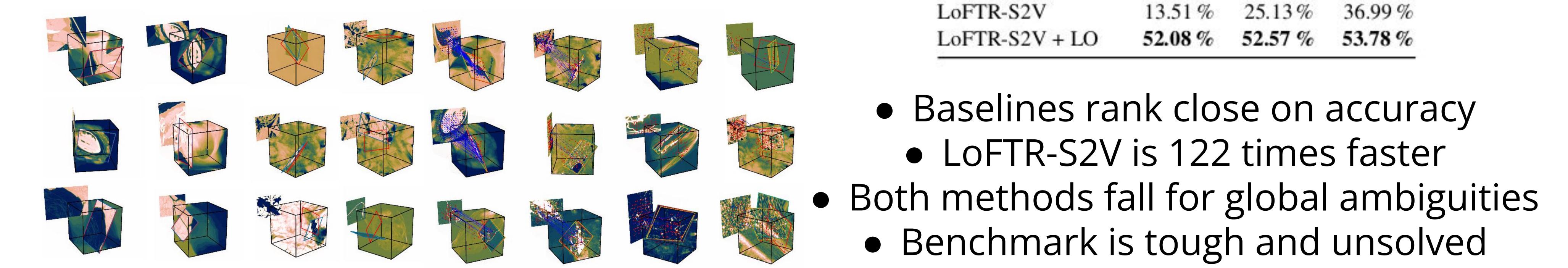


Outlier (no line)

Loftr-S2V+LO Ground-truth

10 Results

Random search + LO LoFTR-S2V + LO



- LoFTR-S2V 52.57 % 53.78 %
- Baselines rank close on accuracy
- LoFTR-S2V is 122 times faster