

Land-Ice Altimetry Activities for Sentinel-3C Tandem Phase

Core S3-MPC Activities and Possibilities



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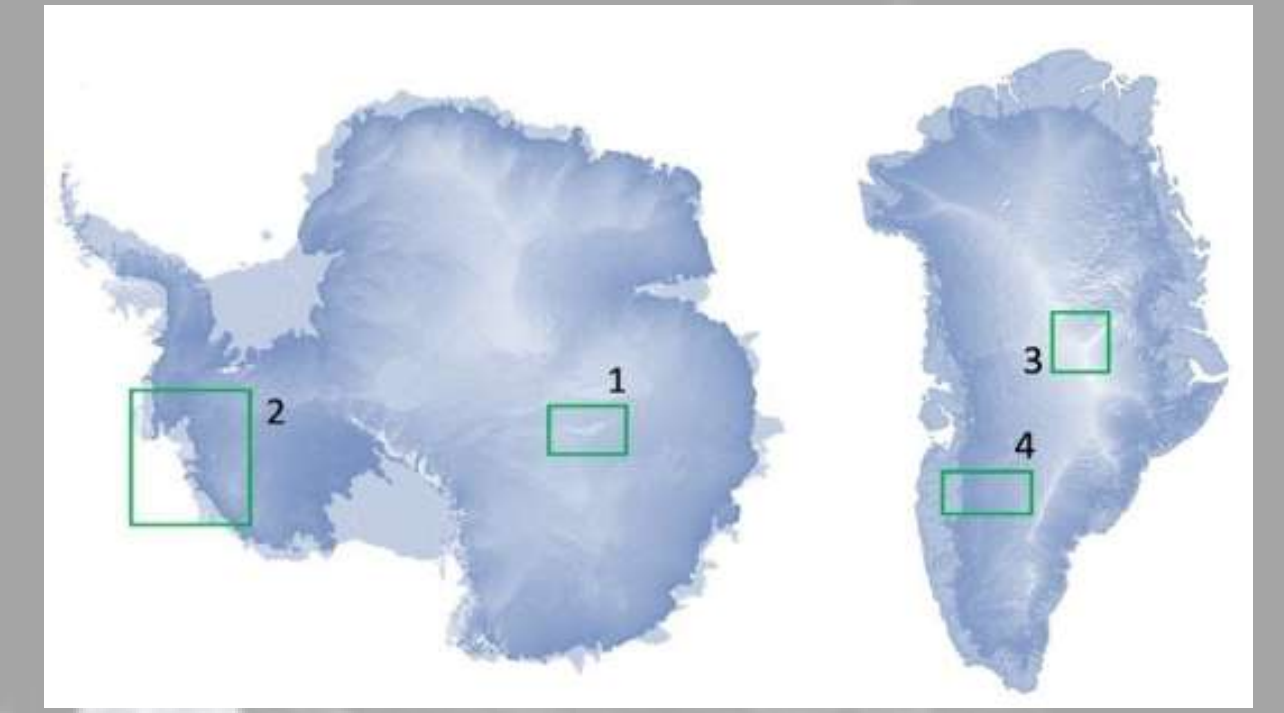


Introduction

The Sentinel-3C tandem phase offers a unique opportunity to assess the continuity, stability, and long-term performance of radar altimetry observations over land ice. Within the Sentinel-3 Mission Performance Cluster (S3-MPC), we will evaluate Sentinel-3C surface elevation and radar backscatter over the Antarctic and Greenland ice sheets, with particular emphasis on mission-to-mission consistency and the robustness of retrievals once Sentinel-3C becomes operational.

This poster presents the core activities conducted within the S3-MPC, along with a set of complementary analyses that further exploit the tandem phase for instrument performance evaluation and scientifically relevant investigations.

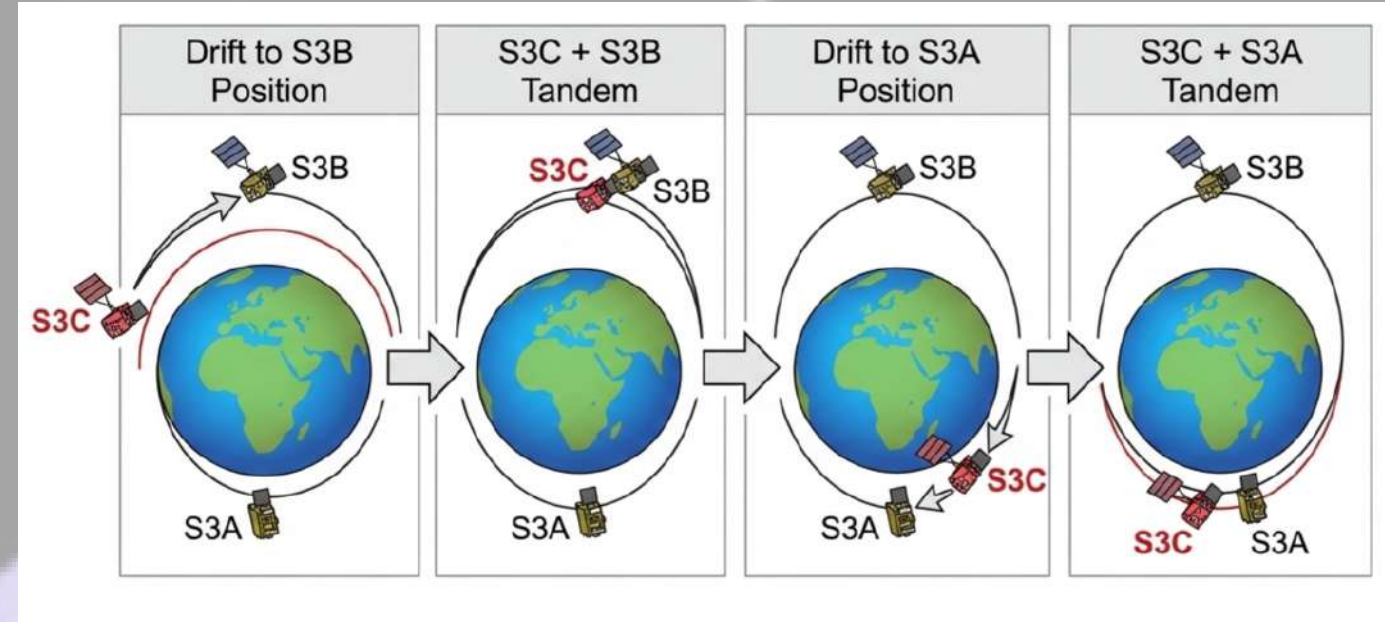
Study Areas



1) Lake Vostok, 2) Amundsen Sea, 3) Greenland Summit, 4) Russell Glacier

Tandem Phase Facts

- S3C expected launch 10 Sep. 2026 (± 5 days)
- S3-MPC Commissioning phase: 6 months
 - Drift to S3B ~ 1.5 months
 - S3C-S3B tandem phase: ~ 3 months
 - Drift to S3A ~ 1.5 months



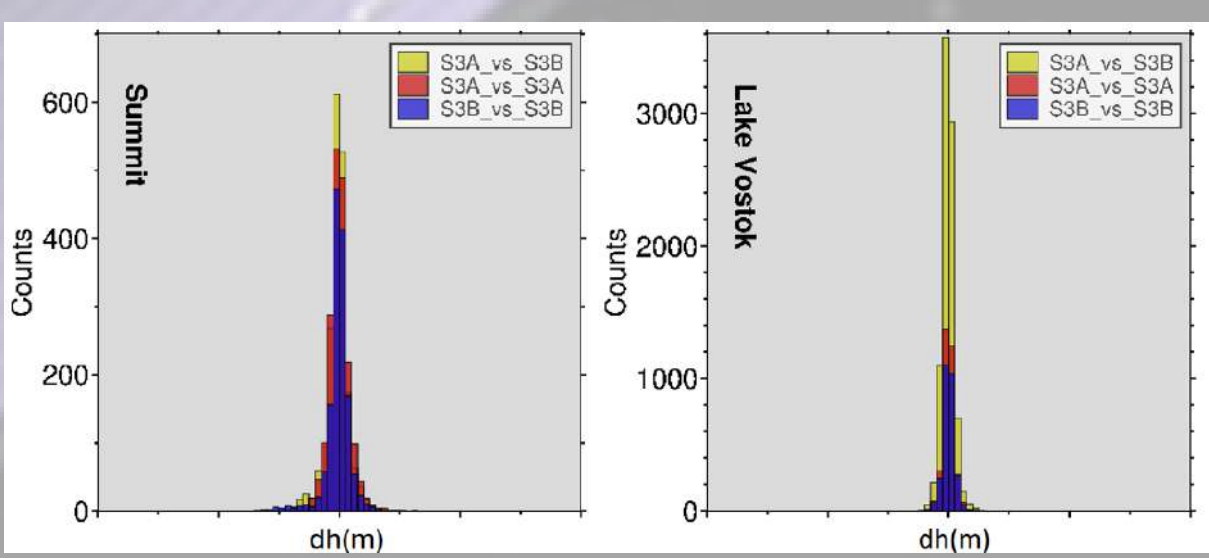
- Tandem Phase position: 30 seconds apart
- Full SRAL Open-Loop commissioning: TBD.
- 2nd Tandem Phase:
 - S3C-S3A tandem: ~ 3 months

Core MPC-Activities

S3C Diagnoses

As currently performed within S3MPC, S3C diagnostics will be performed

- Ice sheet wide spatial and temporal statistical analysis of surface elevation and the backscatter parameter (σ_0), including comparisons with S3A/B.
- Regional elevation difference (asc/des) for Lake Vostok and Greenland Summit for S3C and compared against S3A/S3B (inter and intra cross-overs).

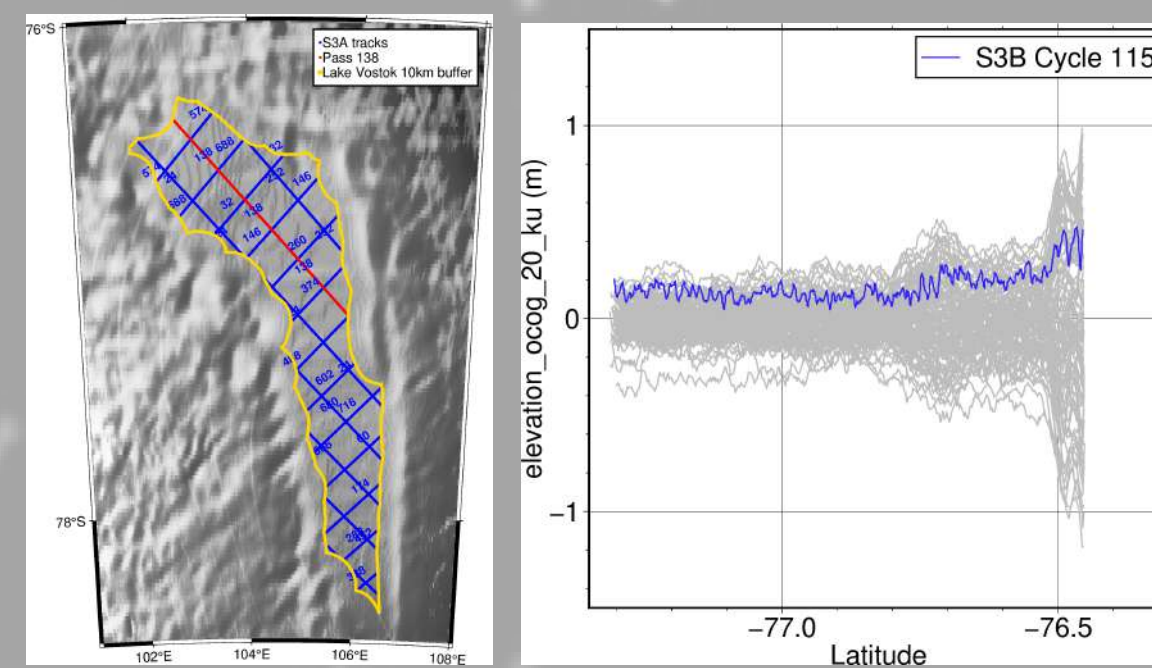


Tandem Diagnoses

Assessment of surface elevation precision and accuracy (S3C vs. S3B)

- Repeat-track analysis
- Elevation wrt. DEM
- Backscatter statistics

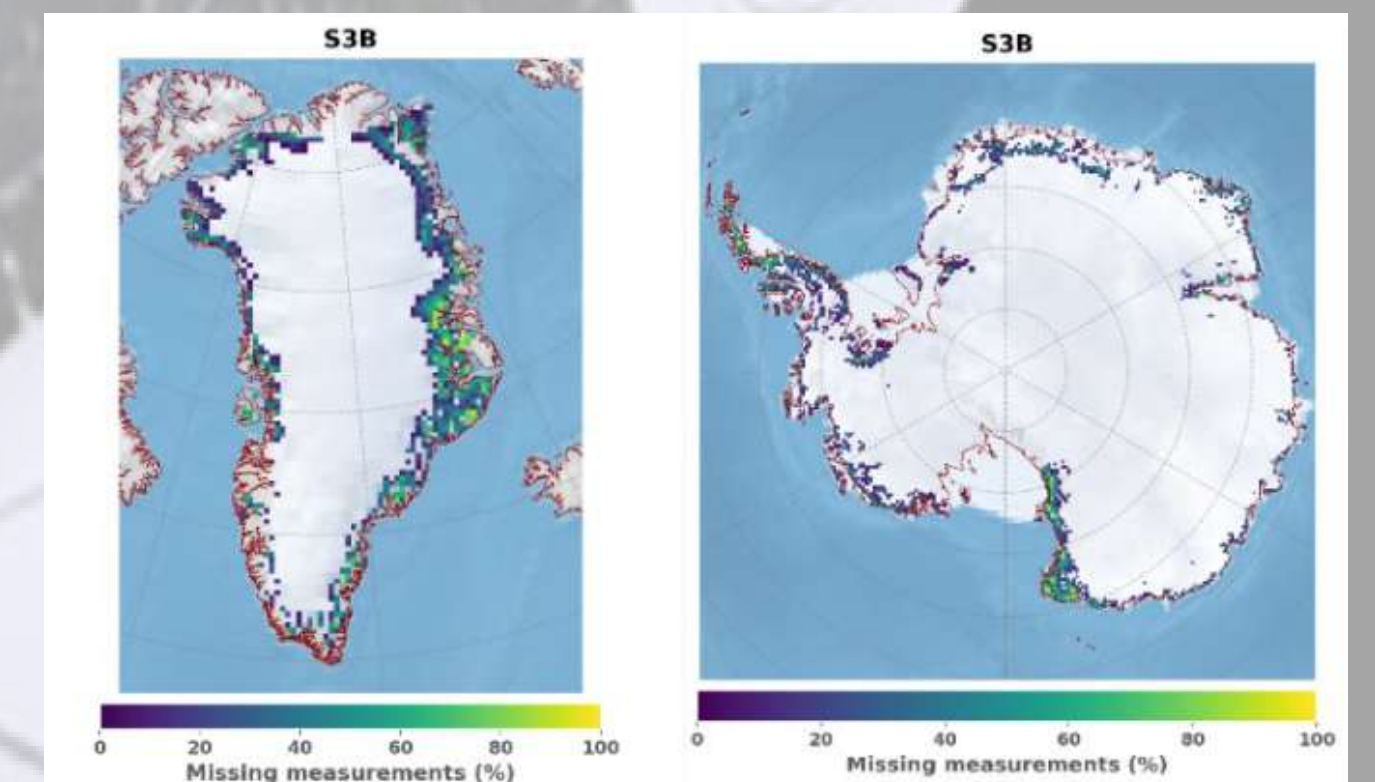
Site: Mainly Lake Vostok, but additional sites (Greenland Summit, Amundsen Sea and Russell Glacier, Petermann Glacier) may be investigated for deeper insights in the performance and terrain.



Closed-loop Diagnoses

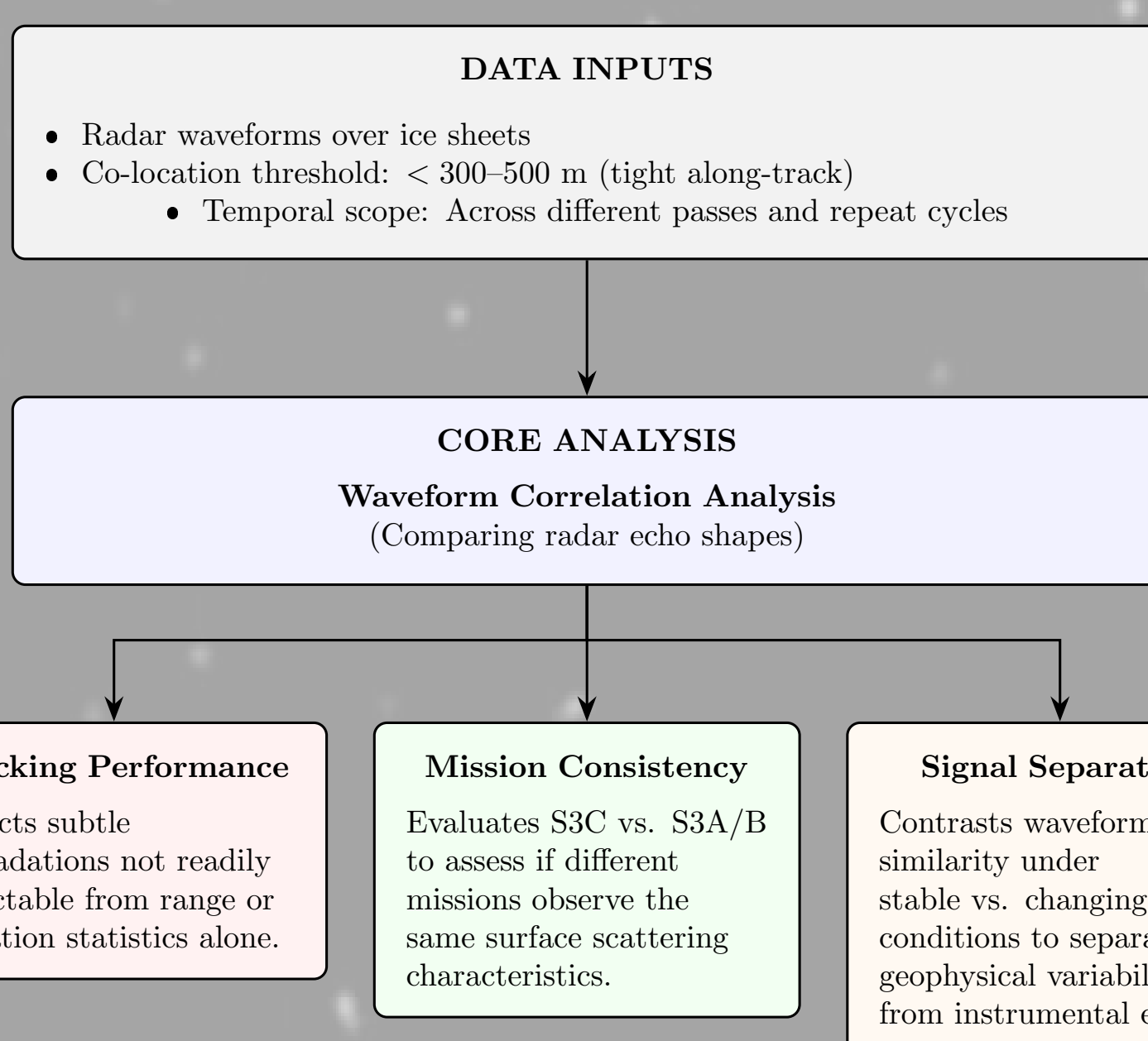
Ice sheet wide and local case studies of S3C with maps and statistics of:

- Missing measurements along-track
- Waveform position in range window
- Elevation retrievals error
- Waveform quality flagging
- Comparisons to S3B

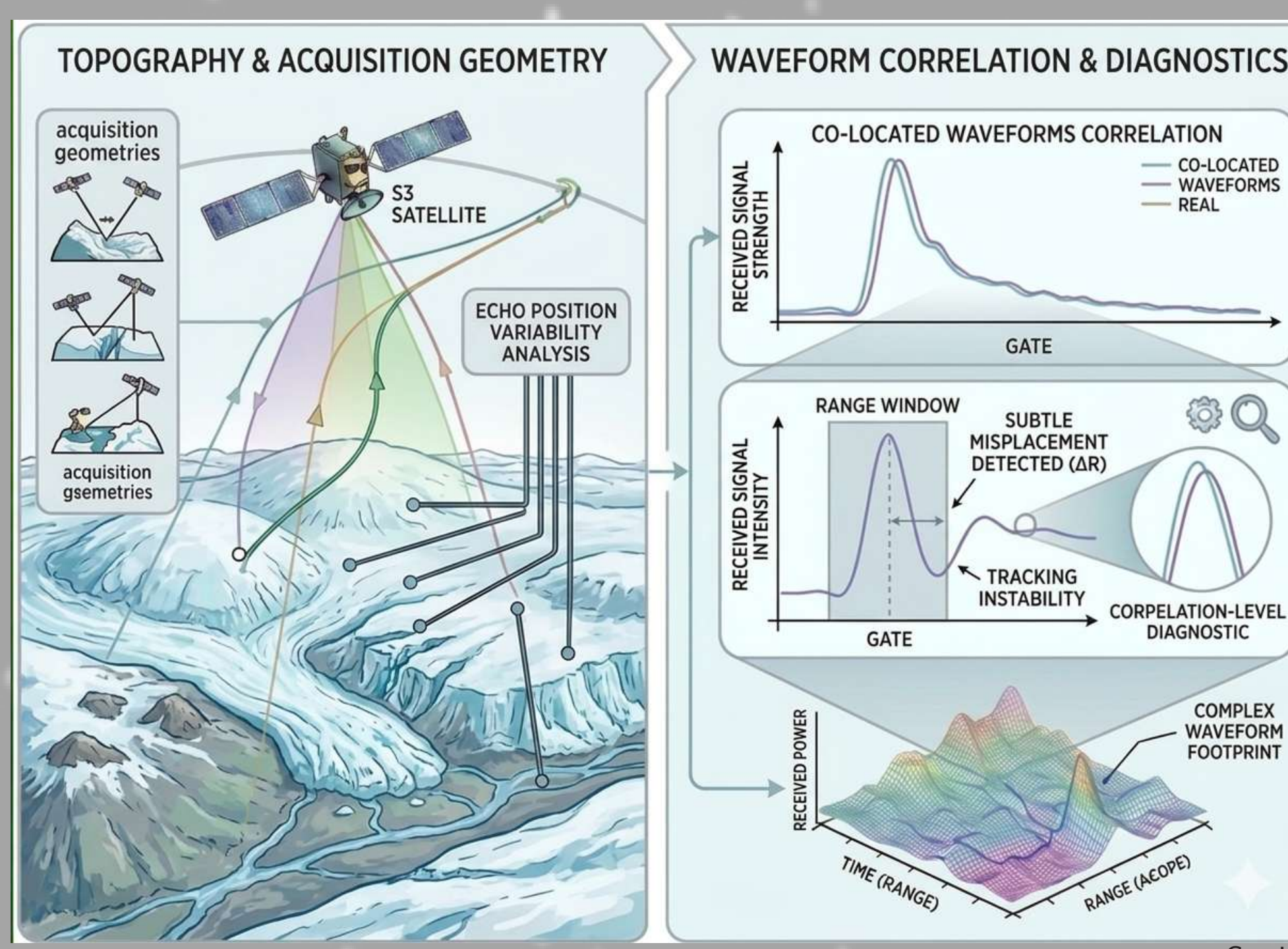


Additional Analysis

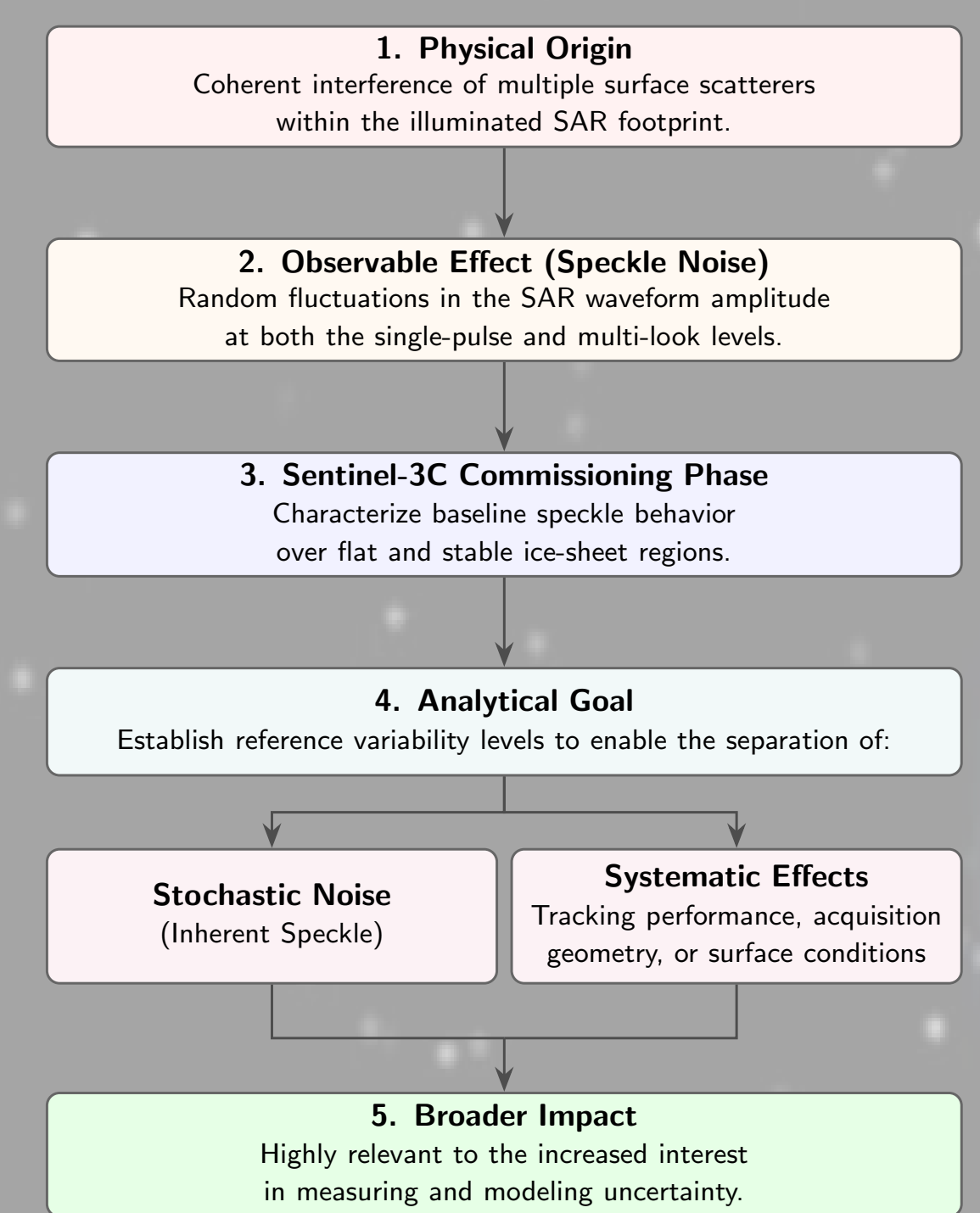
Waveform co-location



OLTC Performance Diagnoses

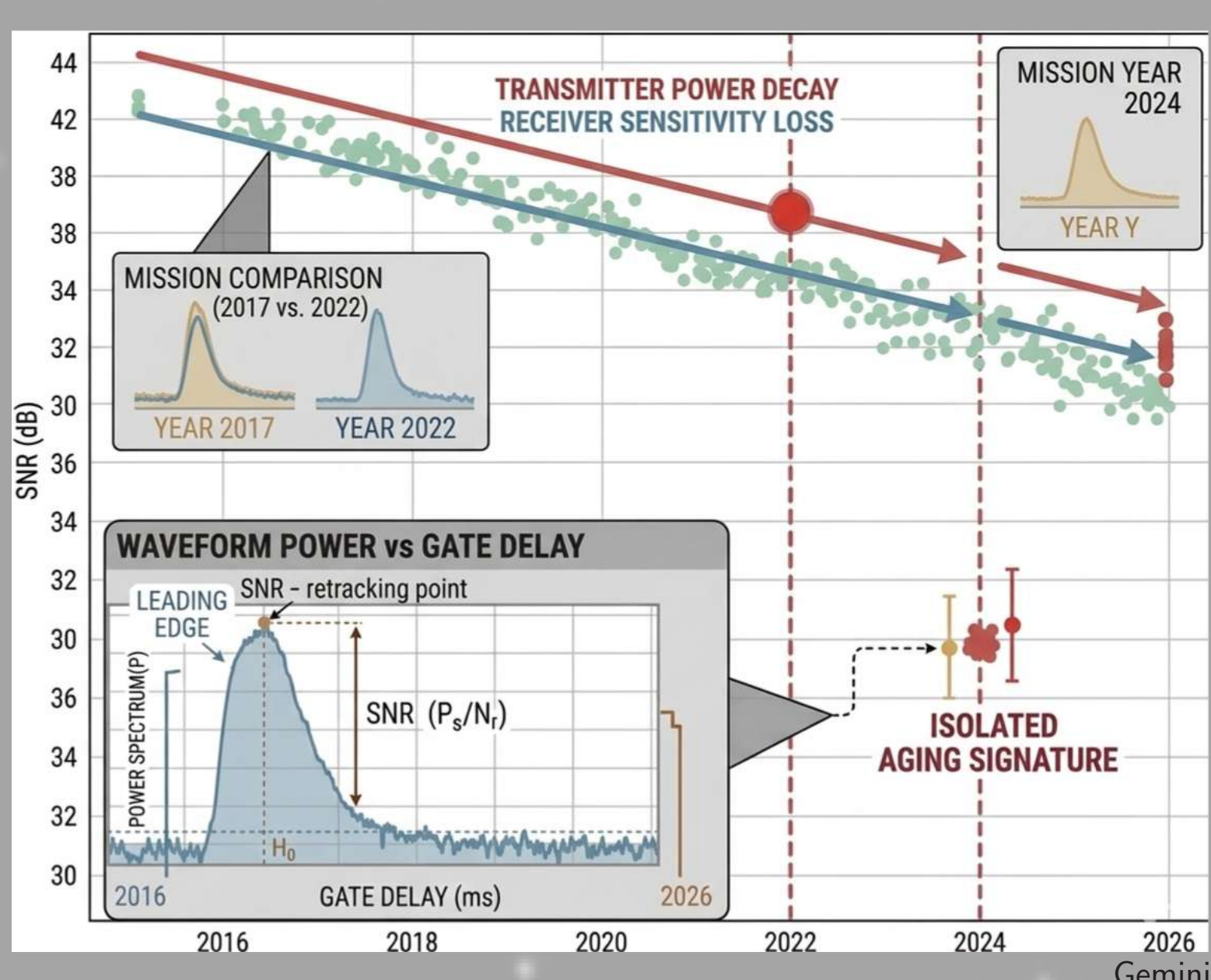


Speckle Noise

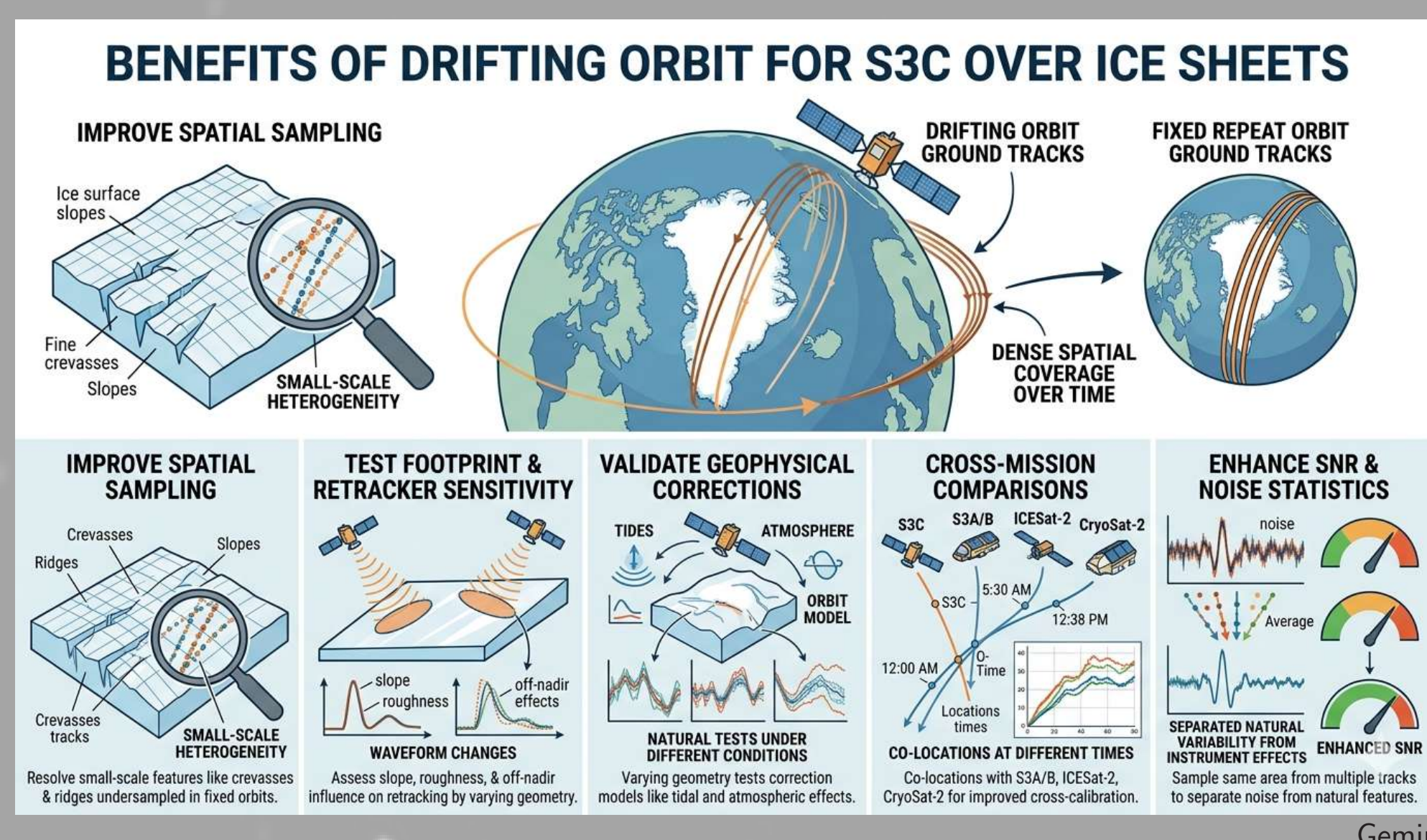


Additional Analysis

Instrument Aging (S3A)



Drifting Orbit



The Crazy ideas

- Harmony-style communication between the tandem satellites.
- After tandem phase, lower S3A altitude to a drifting orbit for:
 - Extended co-location studies
 - Evaluate impact on footprint size
 - Noise evaluation

