



International Space Science Institute Forum, Bern | 16-18 March 2026

***GNSS for Monitoring Earth Deformation:
Challenges in Resolving Subtle Ground Motion in Climate and Tectonics***

DRAFT AGENDA

DAY 1

Day 1 addresses current detectability limits of GNSS for resolving subtle tectonic and climatological deformation. We analyze how processing errors, frame realization, and incomplete separation of geophysical processes propagate into coordinate time series and constrain trend and transient detection and interpretation.

Time	Session	Structure	Scope and Objectives
09:00–09:30	Forum Opening	Introduction to ISSI and the Forum (presentation; M. Rast and R. Hohensinn)	What is ISSI, and what's its mission? Current detectability limits in resolving subtle tectonic and climatological deformation -- from measurement to coordinate realization to geophysical interpretation; trends (mm/yr) and

			transients (mm); context-dependent signal-noise separation.
09:30–10:30	GNSS Processing-Related Limits (I)	1–2 seed presentations (à 10 minutes), discussion, participants' ad-hoc presentation	Identify instrumental and processing-related limits (e.g., orbits, clocks, ionosphere, troposphere, stochastic modeling, monumentation, antenna models, multipath, reference frame); assess their propagation into coordinate time series and derived parameters.
11:00–12:30	GNSS Processing (con't) & Noise and error characterization	1–2 seed presentations (à 10 minutes), discussion, participants' ad-hoc presentation	Characterize the different types of noise and errors in station position time series (temporal and spatial fingerprints, origins - when known, consequences for the detection of deformation signals).
14:00–15:30	Limits in Geophysical Interpretation	1–2 seed presentations (à 10 minutes), discussion, participants' ad-hoc presentation	Detection of subtle deformation signals: assess structural ambiguity in interpreting tectonic and climate-driven trends and transients (e.g., GIA–tectonics–hydrology; geophysical loadings); implications to process attribution.
16:00–17:30	Plenary Synthesis	Discussion and document synthesis	Synthesize and classify limits (stochastic, systematic, structural), formulate quantified limit statements, and identify discussion items to be carried forward to day 2.

DAY 2

Day 2 evaluates realistic pathways to lower current detectability limits. We examine ways forward in GNSS processing, modeling, infrastructure, uncertainty assessment, and cross-disciplinary integration, and quantify their potential impact on the resolution of geophysical effects.

Time	Session	Structure	Scope and Objectives
09:00–10:30	Advancing Processing, Infrastructure and uncertainty evaluation	1–2 seed presentations (à 10 minutes), discussion, participants' ad-hoc presentation	Identify feasible advances in processing (model improvements, multi-GNSS, cross-AC-standards, stochastic modeling); assess practical and computational constraints; examine realistic uncertainty frameworks; assess infrastructure strategies (network, instruments & low-cost, monumentation and impact); achievable goals (sub-mm/year and sub-mm?) for subtle tectonic and climatological deformation monitoring.
11:00–12:30	Enhanced Geophysical Process Understanding, Integration	1–2 seed presentations (à 10 minutes), discussion, participants' ad-hoc presentation	Evaluate improvement of geophysical process understanding and retrieval & their role in reducing structural ambiguity and errors. Examine multi-sensor and cross-disciplinary integration (GNSS–InSAR–GRACE, seismometers) and quantify potential gains in detectability.

14:00–15:00	Plenary Consolidation	Concluding discussion and forming of breakout groups per topic	Concluding discussions of session 1 and 2, briefly consolidate discussions from day 1 and day 2, forming of breakout groups, gathering to breakout rooms
15:30–16:45	Breakout session and document drafting	Breakout groups aligned with topics 1 and 2; discussion and document synthesis	Further specify limits from day 1 and draft with “ways forward” into roadmap; distinguish reducible limits from structural constraints; identify feasibility (short-, medium-, long-term)
17:00–17:30	Plenary Synthesis	Discussion and document synthesis	Each breakout group presents core findings, followed by a short plenary synthesis.
19:00–22:00	Forum Dinner	Social event	Forum Dinner at the Restaurant “Rosengarten” in Bern (https://maps.app.goo.gl/HA218gqUGPgaZL379)

DAY 3

Day 3 focuses on how GNSS products should be standardized, documented, and delivered so they can be used reliably in Earth-system and climate studies. We discuss uncertainty information, transparency of processing choices, and how to communicate both capabilities and limits clearly to scientists and decision makers.

Time	Session	Structure	Scope and Objectives
09:00–10:30	Next-generation GNSS deformation products	1–2 seed presentations (à 10 minutes), discussion, participants' ad-hoc presentation	Next-generation GNSS deformation products for Earth-system and climate applications, including realistic and transparent uncertainty representations (+sensitivity to choices); cross-AC comparability, end-to-end traceability; cross-sensor consistency (InSAR, GRACE/-FO, altimetry, models); positioning of GNSS-derived products to Essential Climate Variables (e.g., vertical land motion in sea-level studies, orbits, reference frames).
11:00–12:30	Open science, outreach, transparency, and network evolution	1–2 seed presentations (à 10 minutes), discussion, participants' ad-hoc presentation	Best practices for broad and responsible use: open and interoperable data systems (portals, metadata); transparent and reproducible processing; fitness-for-purpose products (real-time, low-latency vs climate-grade products) and associated uncertainty trade-offs; stability-driven instrumentation and network design, including low-cost densification; clear communication of capabilities and limitations to prevent over-interpretation.
14:00–15:00	Breakout session and document writing	Breakout groups aligned with topics 1 and 2; discussion and document synthesis	Draft the guideline and recommendation sections of the paper; consolidate core findings from days 1–3; detectability criteria, uncertainty expectations, and usability guidance; assign

			writing responsibilities and outline coordination with relevant working group
15:00–16:00	Plenary synthesis and outlook	Discussion, closing	Forum conclusions and outlook, plan paper writing process.