

Strategic outlook for space geodesy at OSO

Discussion paper for the OSO Steering Committee – 8 October 2026

Purpose

Space geodesy is entering a period of significant change. Developments at global, European and Nordic levels raise questions that go beyond the scientific and operational development of Onsala Space Observatory.

The purpose of this paper is to provide a common basis for a strategic discussion in the Steering Committee. This paper deliberately focuses on space geodesy and does not attempt to address the broader strategy for OSO or radio astronomy.

The central question is:

What role should space geodesy at OSO play in a more resilient global geodetic supply chain – and what does Sweden need to understand and decide about its future contribution?

This is not a question that OSO or Lantmäteriet can answer alone. Ultimately, it concerns Sweden's contribution to an international infrastructure on which Sweden itself depends. OSO and its Steering Committee can, however, help identify the choices and issues that should be raised at national level.

Why does this matter?

Modern satellite navigation, Earth observation and satellite operations depend on a global geodetic infrastructure.

Observatories such as Onsala provide measurements that, together with observations from other countries, are processed through international services and analysis centres. The resulting products include global reference frames and information about the Earth's orientation and rotation – fundamental inputs to many satellite-based systems and services.

No country produces these capabilities alone. They are created through a chain of national infrastructure, competence, analysis and international cooperation – the global geodetic supply chain.

This system has worked remarkably well for decades. At the same time, its long-term sustainability has largely depended on national investments, scientific cooperation and arrangements that have not necessarily been designed as one coherent global infrastructure.

This is now receiving increasing strategic attention.

If critical capabilities in this chain are degraded or lost, the availability, timeliness or quality of these geodetic products can deteriorate, with consequences for satellite navigation, satellite operations and Earth observation.

Global development – evidence, awareness and future responsibility

UN-GGIM has initiated a process towards an international consultation on how the global geodetic supply chain can become more sustainable and resilient, including consideration of future governance arrangements.

The consultation will examine what Member States, regions and the international community currently contribute to the system, where critical dependencies and vulnerabilities exist, and where responsibility should sit in a more resilient future system.

The work will look more systematically at questions such as:

- What geodetic products and service levels does society require?
- Which infrastructure, services and capabilities do these depend upon?
- Where are the important vulnerabilities and interdependencies?
- What are the consequences if critical capabilities are degraded or lost?
- What level of resilience is required?
- What does this imply for future responsibility, financing and governance?

The sequence is important. The first step is to establish evidence about how the system works, what it depends upon and where it is vulnerable. This provides the basis for greater awareness among decision-makers. Only then can informed decisions be made about where responsibility should sit and how the system should be governed and sustained.

The answers are therefore not yet known, and the consultation should not prejudge them.

Against this background, it may be timely for Sweden to take stock of its current contribution to the global geodetic system, consider which capabilities may become important in the future, and understand how these relate to the wider international system.

Onsala is clearly an important part of that picture.

This also points to the value of a shared understanding among relevant authorities, decision-makers and other actors of the role geodesy plays in space infrastructure and other functions of societal importance.

Europe – resilience in the infrastructure behind space systems

A parallel and increasingly concrete discussion is developing in Europe.

The European Commission is examining the geodetic supply chain underpinning Galileo and EGNOS and how Europe can strengthen the resilience of the capabilities and products on which these systems depend.

Galileo and EGNOS provide Europe with a high degree of autonomy in satellite navigation. At the same time, beneath these visible European systems lies a less visible dependency on global geodetic infrastructure and products, including reference frames, Earth orientation information and precise orbit-related services.

The European objective is not to replace the global system with a closed European one. Rather, the aim is to understand which capabilities Europe critically depends upon, strengthen resilience where necessary, and ensure that Europe can sustain an effective contribution to the global geodetic supply chain.

The implications for OSO are not yet fully clear. European requirements and future capacity needs are still developing.

This makes it important for Sweden and OSO to follow the work actively and ask: Where could Swedish capabilities be important in a more resilient European geodetic system?

A Nordic opportunity

The Nordic Geodetic Commission (NKG) is the regional cooperation body for geodesy across the Nordic and Baltic countries.

At its 2026 General Assembly, NKG approved the establishment of a Task Force on a Nordic Geodetic Observing System (NGOS).

The Task Force will assess the resilience, sustainability and coordination of Nordic and Baltic geodetic observing infrastructure, initially focusing on VGOS and SLR stations. The work will consider infrastructure, staffing, funding mechanisms, operational risks, recovery capabilities and interdependencies.

Based on this assessment, the Task Force will develop proposals for stronger regional cooperation. Possible areas include shared technical support, contingency planning, joint training, knowledge exchange and models for closer collaboration.

This raises a broader strategic question: Could closer coordination of complementary national capabilities create a stronger and more resilient Nordic contribution to the global geodetic supply chain?

The Nordic observatories are individually relatively small. This can create vulnerabilities related to specialist competence, technical failures, staffing and limited redundancy. Closer cooperation could strengthen resilience and competence while increasing the value of the Nordic contribution internationally.

VGOS correlation capacity is one possible example of an emerging capability where Nordic cooperation could potentially strengthen both regional resilience and the global system. Its role should be assessed in the broader Nordic and international context rather than as an isolated technical project.

What does this mean for Sweden and OSO?

Sweden already supports geodetic activities at Onsala through the cooperation between Chalmers and Lantmäteriet. The recent dialogue between the two organisations is an important step towards a more long-term perspective.

The larger question is what Sweden expects from this infrastructure.

OSO is clearly a research infrastructure. At the same time, its geodetic observations contribute to international services supporting satellite navigation, Earth observation and other functions of broad societal importance.

These roles are complementary, but they may imply different expectations regarding continuity, resilience, competence, responsibility and long-term funding.

This raises a more fundamental strategic question: how should the geodetic capability at Onsala be understood in a Swedish context? Is it primarily a research infrastructure, or should it also be regarded as a sustained Swedish contribution to an international infrastructure of societal importance?

These roles are not mutually exclusive. However, the answer has implications for the level of continuity and resilience expected from the infrastructure, how competence should be sustained, and how responsibility and long-term funding should be organised.

There may therefore be a need for a broader national dialogue involving Chalmers, Lantmäteriet and relevant parts of the Swedish government to clarify:

- the strategic and societal importance of space geodesy
- the role Sweden wants the geodetic capability at Onsala to play
- Sweden's contribution to the global geodetic system
- the role of Onsala within stronger Nordic and European capabilities
- the level of resilience and continuity expected from the infrastructure
- and the competence and education needed to sustain it over the longer term.

The starting point should therefore not necessarily be additional funding, but greater clarity about the role Sweden wants this capability to play. Funding, organisation and future investment can then follow from that choice.

Questions for the Steering Committee

I suggest the Steering Committee focuses its discussion on three questions:

- 1. What role should space geodesy at OSO aim to play over the next 5–10 years?**
- 2. How should OSO position itself in response to the developments now taking place at UN, European and Nordic levels?**
- 3. Which questions need to be raised at Swedish national level – beyond OSO and Lantmäteriet – to clarify Sweden's long-term role, contribution and any associated responsibilities?**

The immediate objective does not need to be a complete strategy.

A useful outcome would be a shared understanding of the most important strategic questions for OSO, which issues should be developed through Nordic and European cooperation, and which require a broader dialogue at Swedish national level.