

## WP23\_25: Earth Observations for multi-scale monitoring of mining impacts

1186,298

### Basic Information

#### Full title of the Initiative

Earth Observations for multi-scale monitoring of mining impacts

#### Short Title or Acronym

GEOMIN

#### Current category in the 2020-2022 GWP

Community Activity

#### Proposed category in the 2023-2025 GWP

Pilot Initiative

### Points of Contact

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### Purpose

#### Objective

The purpose of the GEOMIN activity is to increase awareness and use of state-of-the-art EO data and methods which represent a novel means for sustainable monitoring and management of mineral resources and efficient multi-scale monitoring mining impacts.

#### Please provide a short description of the Initiative

To meet strategic objectives on zero-pollution, the entire mining life cycle (exploration, extraction, closure, mine-site rehabilitation) needs to develop minimal impact exploration and monitoring technologies. In this respect EO and relevant in-situ data bring significant contribution for both, sustainable management of mineral resources and efficient multi-scale monitoring of mining impacts.

To tackle some of these challenges our initiative will focus on the following strategic areas:

1. Showcasing state of the art EO methods depending on the scale of mining and how those methods can help mitigate and monitor mining activities.

More specifically, following topics will be further developed:

- Defining and promoting interoperable strategies and other relevant standards for spectral in-situ data collection (e.g., soil and mineral spectral libraries) and demonstrating how these data can be up-scaled to different EO image data;
- Demonstrating and communicating cutting edge EO data and methods (e.g, hyperspectral approaches) for mineral mapping and environmental monitoring to speed up the transmission of scientific and technological EO innovations and accelerate adoption globally;
- Promoting freely available EO data, platforms and tools.

2. based on the theories and methods of differential interferometry and three-dimensional topographic mapping, to develop efficient and intelligent deformation and mining volume monitoring technology. To carry out application research in typical regions around the world. To produce and release monitoring products and valuable cases for sustainable development, disaster mitigation and energy security assessment of mining areas. So as to provide assistance in improving the impact of GEO activity.

3. Identifying the main challenges and barriers hindering efficient use of EO data and methods in the mining sector and supporting capacity building for EO data use and management while focusing on different end-users (academia, environment agencies, mining stakeholders)

### **Why is this Initiative needed?**

Currently most of the developed countries are highly dependent on the import of raw materials from a few third countries (3rd Raw Materials Scoreboard, 2021) and the supply might be restricted due to different unpredictable disruptions (e.g., Russian invasion of Ukraine, Omicron) in the future. Therefore, they need to improve the strategic autonomy and increase domestic raw material production. The World Bank and the International Energy Agency indicate that the production of mineral raw materials may increase by up to 500% by 2040 (IEA 2021; World Bank, 2017). On the other hand the long-term global sustainability visions including aspects such as “clean energy”, “cutting-edge clean technological innovation” and “resilient industry” needs to be taken in account. In this respect EO data and methods which are contactless, non-destructive and scalable represent an optimal tools and means for sustainable management of mineral resources, mine security monitoring and efficient multi-scale assessment of mining impacts (e.g., tailored solutions for artisanal vs. large open pit mining); hence contributing significantly to the UN Sustainable Development Goals.

### **What evidence is there to support this need?**

The development of cleaner energy production towards a low-carbon society will require tremendous growing demand for raw material and mineral resources, in particular Critical Raw Materials (CRMs). This need has been expressed in several strategic documents (IEA 2021; World Bank, 2017) and already mentioned EU Green Deal and transition towards carbon-neutral EU economy. To support these global trends and needs, EO provides new means for sustainable management of mineral resources, mine security monitoring and efficient multi-scale assessment of mining impacts.

### **Is this Initiative open to participation by representatives of any GEO Member, Participating Organization, and GEO Associate?**

Yes

### **Are you aware of other projects or initiatives at a global or regional scale (both in GEO and externally) that provide similar products or services?**

No

**Please identify the most important actual and/or intended outputs (products, services, etc.) produced by the Initiative, along with their intended and/or actual users. This list**

**does not need to be comprehensive but should identify the outputs which are most used and are expected to have the greatest potential impact.**

<b>Output</b>	<b>Status</b>	<b>Users</b>	<b>Additional info</b>
EnMAP toolbox	Regularly updated	Remote Sensing community	Free EnMAP toolbox integrates different tools for mineral and soil mapping
Novel EO and AI based tools for multi-scale monitoring of mining impacts	Planned	Remote Sensing community	Will be provided as open-source
Surface deformation datasets in mining areas	In development	Government departments, mining companies, etc	Satellite SAR images based
Open pit volume change datasets	Planned	Government departments, mining companies, etc	Satellite optical stereo images based

**If needed, please provide additional comments or explanation to accompany the outputs table**

EnMAP is a free toolbox that has been continuously developed/updated and provides vital processing tools for mapping soil and minerals using EnMAP and other hyperspectral data.

Surface deformation is an intuitive reflection of mining subsidence and slope instability in the mining areas. It can accurately indicate the region and the intensity of mining activity. It provides auxiliary support for the safety and management of the mining area, reliable information for ecological environment protection and relevant geohazards prevention. The volume change of the open pit mining area is closely related to minerals generation, and reflects the supply of mine resources, which can provide data reference for the estimation of regional minerals production and the supply balance of bulk goods.

Both indented outputs could be regularly updated, based on the short re-visit time of current or coming satellite sensors. For example, the updated time of surface deformation results derived from Sentinel-1 SAR could be 12 days.

**What kinds of decisions are the outputs of this Initiative primarily intended to support?**

These outputs primarily serve scientific community and remote sensing experts allowing them to quickly derive thematic mineral and soil maps. Mapping surface deformation can contribute to disaster prevention when building early warning systems for infrastructure stability assessment and land protection.

**How will these decisions benefit from the outputs of this Initiative?**

The outputs allow rapid and timely mapping/monitoring of complex mining environment including mine and land stability. Such maps can help different stakeholders to make informed decision making. The extraction and statistical analysis of surface deformation and mining volume is closely related to mining production activities. Relevant statistical information can be used to carry out the activity index of global mining production activities, assist and guide global mining energy production activities.

**What kinds of impacts (for example, reduced loss of life, monetary savings, conservation of biodiversity, etc.) are anticipated as a result of the use of the outputs of this Initiative?**

Minimize environmental impacts of mining and increase mine security and the societal acceptance of mining in overall.

**Has this Initiative been asked to provide specific information (for example, reports, data, services) on an ongoing basis to an international convention, organization, or other multilateral body?**

No

## **Technical Synopsis**

**Please provide a brief description of the methods used by the Initiative to produce its (actual or planned) outputs.**

The proposed GEO activity needs to increase its visibility with respect to the importance of raw materials in every sector of the society and economy. We will focus on promoting free and open access EO data, tools and platforms that have a potential to bring significant benefits for managing mineral resources in an efficient and socially acceptable way.

The key objectives are defined as follows:

1) EO for multi-scale and multi-sensor monitoring (optical and radar systems) of mining impacts covering applications for artisanal and small-scale mining (ASM) to regional and global scale

Goal: Assess the potential of EO methods for monitoring ASM activities at different scales, assessing related environmental impacts, and supporting policy making and implementation. Because of unique concerns related to mercury pollution from artisanal and small-scale gold mining, focus will be on this sector, but could also include applications relevant for regional and global scale.

Planned activities/methods:

- Review existing initiatives, programmes and data repositories.
- Identify key issues, challenges and gaps.
- Identify benefits of EO methods for the sector.
- Propose a set of indicators and KPIs for monitoring the sector.
- Develop methods to assist miners in prospecting using EO combined with other data.
- Investigate using EO data, machine learning and artificial intelligence in detecting mining sites and impacts at different scales.

Goal: Promote free EO and in situ data, tools and platforms focusing on hyperspectral missions (operational: EnMAP, PRISMA, DEISIS, EMIT; HISUI, future: ESA CHIME, NASA SBG) and InSAR approaches and missions (operational: Sentinel-1A, LT-1/2, future: Sentinel-1C, PIESAT, etc)

Planned activities:

- Via demonstrating innovative applications and use cases to promote free SW tools and platforms that have been made freely available for raw material mapping (e.g. EnMAP-Box 3, EnGeoMAP, WORLD SOIL) This will enable us to build a bigger user community.

Outcomes: Dissemination in international events, open-access topical spectral libraries, open-access tools for mine environmental monitoring, webinars, open-access SW, publications and webinars

2) Based on high-performance computing platforms and parallel algorithms, SAR data preprocessing for surface subsidence distribution mapping

Planned activities/methods:

- Developing novel stereo photogrammetry technology for terrain mapping
- Propose guidelines and recommendations for policy makers and other stakeholders.
- Validate the outcomes with relevant stakeholders.

3) Building community and GEO Knowledge Hub for GEOMIN

Goal: Create a global network connecting scientists, technology innovators and mining stakeholders focusing on the following aspects:

- Allowing sharing scientific findings, best-practices and promotion of free EO tools and data
- Identifying needs and requirements of end-users

This will allow us to develop and implement capacity building activities which can improve the future uptake of EO data and tools for raw material's applications.

Planned activities/methods:

- Disseminate EO data tools, services, and other resources of the space-based remote sensing data sets.
- Disseminate news and activities to highlight upcoming workshops, conferences and meetings relevant to minerals and Raw materials
- Connecting scientists, technology innovators and mining stakeholders to share best-practices and learnt lessons (EO data calibration, spectral in-situ data collecting) with wide community of end users
- Disseminate future outputs through the GEO Knowledge Hub Outcomes: conferences, workshops, webinars

**If you would like to provide further details on the technical methods, you may upload one or more documents here.**

- no supporting documents provided -

**Are there any significant scientific or technical challenges that need to be resolved by the Initiative during the 2023-2025 period?**

Yes

**Please describe these challenges and the steps being taken to solve them.**

Massive data processing and analysis: Typical mining areas at the global scale are widely distributed, and the used remote sensing data are large. In order to improve the monitoring efficiency and seek the timeliness of the results, it is necessary to realize the automatic processing of massive data, the analysis of deformation information with the help of parallel computing technology and the AI assisted extraction of mining subsidence. Atmospheric impact correction: Using external topographic data and GACOS auxiliary data, the spatial distribution scale difference characteristics of atmospheric delay phase and surface subsidence-related phase are analyzed. Carry out the estimation and correction of the atmospheric phase delay on the surface of the mining area, so as to improve the reliability and accuracy of the deformation measurements. Large-gradient surface deformation extraction: The large-gradient deformation related to mining area often leads to decoherence. Using SAR data intensity information and pixel tracking algorithm to obtain the mining subsidence information. Our work will overcome the lack of D-InSAR decoherence in order to obtain large-gradient deformation and more detailed monitoring results by combining D-InSAR and pixel tracking methods. Stereo image pair homonymous point extraction and relative orientation: Accurate extraction of homonymic points in stereo image pairs is the premise of high-precision image pair registration. The relative orientation is a key step in estimating the position and attitude of the image pair. The relative orientation accuracy can be improved by spatial weighting of the signal-to-noise ratio and optimization iteration, thereby ensuring the reliability of the terrain extraction of the stereo image pair.

**Does the Initiative expect to complete any key new outputs, improvements to existing outputs, or improvements to the methods of producing outputs, in the 2023-2025 period?**

Yes

**Please describe these new outputs or improvements.**

1. Create a shortlist of relevant projects, initiatives (including the GEO Flagships) including the contact points;
2. Create a list of providers of free SW tools and platforms with focus on hyperspectral data analysis;
3. Identify and showcase specific applications and use cases to illustrate the benefits and challenges when employing EO data/techniques for minerals and raw materials
4. Create a list of mining stakeholders with relevant contact points, collect their requirements, define gaps
5. Coordinate with other subgroups and external activities to exchange knowledge and to prevent duplications.
6. White paper on proposed indicators and KPIs. .
7. Global typical mine deformation distribution: It plays an important role in reducing the geological disasters caused by subsidence and slope instability. It is helpful to protect life and property in the mining area.
8. Distribution of global open pit mining volume: It can indicate the activity of open-pit mine

excavation and production activities.

**Please identify the key tasks that must be implemented to ensure delivery of these changes, with target dates for completion.**

<b>Task</b>	<b>Task description</b>	<b>Expected completion (month/year)</b>
Mapping relevant projects and initiatives	This task is linked with the above listed output number 1	06/23
Mapping free SW and platform providers	This task is linked with the above listed output number 2	011/23
Prepare a series of webinars to showcase the selected use cases and applications	This task is linked with the above listed output number 3	09/24
Mapping stakeholders and their requirements, defining the challenges and gaps	On-going from the beginning till the end, linked with the above listed output number 4	12/25
Coordination with other external activities	On-going from the beginning till the end, linked with the above listed output number 5	12/25
Defining a set of indicators and KPIs for monitoring sector	This task is linked with the above listed output number 6	06/25
Developing novel methods and tools for mining area monitoring	Adaptive atmospheric correction method, Construction of mining subsidence sample library, Extraction of mining subsidence area combining DInSAR and AI, etc ; linked with the above listed outputs number 7 and 8	12/24
Monitoring datasets generation and application	Surface deformation and open pit volume change datasets in mining areas are produced in the form of meeting stakeholders' needs. Government departments, mining companies, and the other users apply the data; linked with the above listed outputs number 7 and 8	06/25

## Resources

**Have all resources required to implement the Initiative's planned work in the 2023-2025 period been secured?**

- Gap in financial resources
- Gap in human resources

**What is the estimated funding gap for the 2023-2025 period?**

In general, the insufficient funding was an issue for this initiative during 2019-2022. For 2023-2025 we re-define the goals to make them achievable taking in account the current situation.

For the deformation monitoring task in this initiative, several million CNY is the estimated funding gap.

**What are the essential skill sets needed by the Initiative but are not currently resourced?**

see the comment above

**What actions is the Initiative taking to obtain the required resources?**

The participants will be continuously working on getting new funds (e.g., Horizon Europe, Natural Science Foundation, National Key R&D Programs). for the defined activities in the GWP. Just recently we found out that our new Horizon Europe project called Multi-Miner starting from January 2023 was approved providing resources (total budget: 4.400.000 EUR) for developing open-source tools for multi-scale mine monitoring. We will also establish the network with PIs of the on-going projects that are considered to be strategic (e.g., GoldenEye: <https://cordis.europa.eu/project/id/869398>). We will try to involve new players from the commercial sector. UNEP will provide in-kind contribution through funded projects.

**Please list all financial and non-financial contributions to the Initiative (other than in-kind, voluntary participation by individual contributors) having a value of more than USD 50,000.**

<b>Contributing Organization</b>	<b>GEO Status</b>	<b>Type of Resource</b>	<b>Value</b>	<b>Currency</b>
Czech Geological Survey	Czech Republic	Financial	400000	EUR
China Aero Geophysical Survey and Remote Sensing Center for Natural Resources (AGRS)	China	Financial	600000	CNY
China Aero Geophysical Survey and Remote Sensing Center for Natural Resources (AGRS)	China	Equipment	4500000	CNY
China Centre for Resources Satellite Data and Application (CRESDA)	China	Data	400000	CNY
The University of Trás-os-Montes e Alto Douro (UTAD), Portugal	Portugal	Equipment	400000	CNY
University of Azad Jammu & Kashmir (UAJK), Pakistan	Pakistan	Equipment	400000	CNY
Aerospace Information Research Institute (AIR) , Chinese Academy of Sciences (CAS)	China	Equipment	2000000	CNY
China University of Mining and Technology	China	Equipment	1000000	CNY

## **Lessons from the 2020-2022 Period**

**Were all planned activities for the 2020-2022 period implemented as expected?**

No

**Please describe which activities were delayed or not implemented and how has this affected plans for 2023-2025.**

Mapping mineral resources to fill gaps existing in providing current and robust data on mapping mineral resources in developing countries: for this challenging goal no funding was granted, therefore it was not possible to start any activities in this direction.



The definition of Extractive Essential variables (EEV) was initiated in the frame of the H2020 GEOEssential project, which was over in 2020. Further funding would be needed to advance this activity.

### **Were there any key challenges faced by the Initiative in the 2020-2022 period?**

Yes

#### **Please describe.**

In the period 2020-2022 there has been a lack of funded projects to support the EO4MIN activity.

### **Were there any impacts or changes to operations due to COVID-19?**

Yes

#### **Please describe.**

Due to the COVID-19 policies, it was not possible to meet together to discuss and plan the progress. To improve this issue the team agreed on meeting on-line on quaternary basis to be able to catch up and plan the on-going activities and future actions.

### **Please describe the key changes proposed for the 2023-2025 period, for example, new projects, new areas of focus, or adjustments to the activity governance.**

In January 2022 Stephane Chevrel, the main PoC leading this Community Activity, retired and was not willing to keep his leadership after this date. The initiative is now lead by Dr. Veronika Kopackova-Strnadova <https://scholar.google.com/citations?user=nZVLfBcAAAAJ&hl=cs>, and the planned activities were adjusted taking in account the following points:

- previously defined goals that have not been achieved
- human and financial resources currently available
- modern trends in the field of focus

As a result, we defined fewer but still challenging objectives, though still achievable.

### **Does the Initiative have outputs (products, services, etc.) available to users now, even if only on a pilot or testing basis?**

Yes

#### **Please provide any available information describing this usage (for example, user statistics, results of user testing) and/or feedback from users (for example, user comments, evaluations).**

The following outputs are derived from H2020 GEOEssential (2017-2021):

- Framework based on quantitative and geospatial data for monitoring mineral exploitation and artificial light.
- Online tool for monitoring the footprint of mines.
- MapX platform for the extractives sector including interoperability with Copernicus and GEOSS.

All those outputs are available from: <https://owncloud.unepgrid.ch/index.php/s/8ZAFvsyhhrFxFxLaB>

For the period 2023-2025 it is expected to obtain different outputs, and to seek to link them with the World Environment Situation Room, e.g., through its Resources Efficiency, Sustainable Consumption and Production, Extractives and Green Economy components.

#### **Please provide supporting documentation if available.**

- no supporting documents provided -

### **Do you have evidence of any impacts that have occurred in part as a result of using the outputs of the Initiative (for example, policy decisions taken, behaviour changes by users, risks mitigated)?**

No

**Have there been any internal or external reviews or evaluations of the Initiative since 2019?**

No

**Please indicate any GEO Work Programme activities with which you have ongoing collaboration.**

**Please indicate any additional GEO Work Programme activities with which you would like to establish new collaborations.**

- DE-AFRICA - Digital Earth Africa
- GEO-CRADLE - GEO Capacity Building in North Africa, Middle East, Balkans and Black Sea Region

## **Stakeholder Engagement and Capacity Building**

**Are there specific countries or organizations that your Initiative would like to engage?**

Yes

**Please list these countries, regions or organizations.**

United Nations Environment Programme (UNEP).

Possibly other UN agencies involved in the monitoring of raw material.

Countries: Indonesia, Mongolia. Both the two countries are active in minerals production. And China

Geological Survey, the superior department of AGRS, has cooperation experiences with their geological staff.

Organization: Piesat Information Technology Co.,Ltd.

**What are your plans to engage them?**

Encourage UNEP staff to participate in the GEOMIN activity.

As to Indonesia and Mongolia, we plan to contact with the relevant departments through the Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP)

Regarding the enlisting of Piesat, we plan to discuss with Piesat after the launch of this pilot initiative in 2023 to extend the possibility of the company's SAR constellation data to support GEO's concerns. (Currently, we mainly depend on Sentinel-1 SAR as open data source. In 2023, Chinese LT-1/2, 2 new satellite SAR missions, would be another data source.)

**Does your Initiative engage users in the work of the Initiative (for example, consultation, testing, co-design)?**

No

**Does the Initiative have a user engagement strategy or similar kind of document?**

No

**Are there categories of users that are not represented at this time, but you would like to engage?**

Yes

**Please list these user categories or regions.**

Policy makers from the artisanal and small-scale gold mining (ASGM) sector. Possibly the ASM sector more widely.

**What are the plans for further engagement of users in the Initiative?**

Present project results (if any) in international conferences.

Propose guidelines and recommendations to policy makers of the mining sector.

Establishment of a "Community of Practice" amongst researchers, innovators, policy-makers (e.g., health authorities, environment ministries, mining agencies, international agencies) and other stakeholders working at the intersection between both sectors for the exchange of knowledge and advancements. Exchange frequency is to be determined but could be bi-annual.

### **Does the Initiative have a documented capacity development strategy?**

No

### **Please describe the approach to capacity development that is being implemented by the Initiative?**

We plan to prepare a series of webinars to showcase the selected use cases and applications (dead line 09/24). The final decision on how many and on what topics will be presize during 2023.

### **Are there any commercial sector organizations participating in this Initiative?**

Yes

### **Please list the commercial sector organizations.**

<b>Organization name</b>	<b>GEO Member/PO/...</b>	<b>Country in which the organization is based</b>	<b>City in which the organization is based</b>
China Railway Siyuan Survey & Design Group Co Ltd	China	China	Wuhan
JINNENG HOLDING COAL INDUSTRY GROUP	China	China	Changzhi
JIZHONG ENERGY FENGFENG GROUP CO., LTD	China	China	Fengfeng
LU'AN CHEMICAL GROUP CO., LTD.	China	China	Changzhi
PLANET Labs	Germany	Germany	Berlin

### **Are there opportunities for commercial sector uptake of the outputs of the Initiative?**

Yes

### **Please describe these opportunities.**

The deformation and mining volume of global typical mining areas can indicate the relevant production activities, which provides data support for mining companies to reasonably manage their production. Mining subsidence monitoring product is one of the basic data for railway route selection.

Contribution through project funding or co-funding.

### **Is there already commercial uptake occurring?**

No

### **Are there opportunities for further commercial sector participation in the Initiative?**

Yes

### **Please describe these opportunities.**

With typical mining areas in the world covered by the pilot initiative increase, more and more relevant companies need to take part in this activity. Carry out data verification, constantly improve the estimation models and methods, warn geological disasters and protect cultivated land resources in a wider range. Besides, it improves the reliability of the evaluation of global mining activities and reasonably provides professional titles for global coal resources.

### **Does the Initiative have a plan for commercial sector engagement?**

Yes

### **Please describe this plan or upload the relevant document.**

We plan to contact with more mining , infrastructure construction and ecological restoration companies in China, Pakistan and other countries with obvious mining activities after the monitoring results and thematic reports of this pilot initiative are proven to be useful. When making monitoring results and thematic reports, we would fully grasp the real needs and application characteristics of customers, to make the output more in line with user habits. At the same time, we will provide training for users around the characteristics and application pattern of output.

- no supporting documents provided -

## **Governance**

### **Please describe the roles of each of the key leadership positions, as well as any team structures involved in day-to-day management.**

The initiative is currently co-led by Dr. Veronika Kopackova-Strnadova and Jinghui Fan. Pierre Lacroix and Shiyong Yan are the important PoCs helping them to communicate, plan and monitor the activities. The main goals and products have been defined and the deadlines set. The partners agreed to meet on quaternary basis in on-line meeting (if not possible to meet physically) to discuss the progress and plan future steps.

The PoCs will make plan, implement what's working, continually refine what isn't, and carry on the continuous improvement. And the participants of this initiative will discuss about the management mechanism of rotating chair among PoCs.

A monitoring technology innovation team would be set up, whose main responsibility is to develop monitoring methods and tools. There would be a monitoring product application team, whose main responsibility is to generate monitoring products, provide special products and decision-making suggestions for relevant government departments and enterprises, and improve the pilot initiative's impact. Another important team is check team, who will regularly select necessary information in and out the pilot initiative, analyze the results against the planned criteria and user's demand, to assess whether the plan be successfully carried on. A resources management team would provide basic resources to the pilot initiative, for example, SAR and optical satellite data, hard and soft computing platform, meeting conditions and minutes.

### **Is there a steering committee or other governance bodies that advise the Initiative but are not involved in day-to-day management?**

Yes

### **Please describe the roles of each body. If there are multiple governance bodies, please describe the relationships among them (such as through a governance structure diagram).**

The steering committee will include experts with GEO cooperation experience, government departments and enterprise personnel related to mining deformation, and high-level deformation monitoring technical experts.

The pilot initiative plan to organize a special meeting every year to ask the steering committee to provide guidance. The objectives, technical routes, product forms and thematic reports to different users would be discussed. When encountering difficult problems or making important progress, the pilot initiative would timely communicate with appropriate steering committee members.

- no supporting documents provided -

### What methods does the Initiative use to communicate with its participants?

- Email / e-newsletters
- Regular conference calls
- Regular events
- Other

### Please describe.

As permitted by the epidemic control policy, we will arrange the exchange of mutual visits of China-Portugal and China-Pakistan cooperators. The funds will be from National Key R&D Program of China (ID: 2021YFE0116800) and Dragon 5 Cooperation Project (ID: 56796) between ESA and the Ministry of Science and Technology (MOST) of the P.R. China.

### Please describe the key risks that could delay or obstruct the completion of the planned activities and outputs of the Initiative, along with any actions taken to mitigate these risks.

Description of the hazard	Description of the possible impacts	Scale of impact	Likelihood of occurrence	Mitigation measures
Lack of funding or co-funding	Sleeping activity	Severe	Possible	Submitting proposal for relevant calls
Lack of involvement from the EO4MIN members	Sleeping activity	Severe	Possible	Make this activity visible and attractive, keep all members involved, make regular checkpoints
Lack of regular revisiting Sentinel-1 InSAR data because of the satellite accident	The planned products of the pilot initiative cannot reach the expected time frequency and space coverage.	Limited	Not very likely	The pilot initiative will have to use some half or whole commercial SAR data at its beginning. And then Chinese Lutan-1/2, the innovative L-band spaceborne SAR mission will play more important role while its performance is not proven now.

### What methods are used by the Initiative to monitor its effectiveness?

- Informal discussions with users / beneficiaries
- User or beneficiary surveys
- Consultations or events

- Evaluations

### Would the Initiative be interested in assistance from the GEO Secretariat for developing an impact plan?

Yes

### How are the results of the monitoring and evaluation activities shared with participants and the wider GEO community?

We plan to do knowledge sharing and capacity building using the GEO Knowledge Hub, see the Technical Synopsis part

### Are any monitoring or evaluation activities required by funders/contributors?

No

## Participants

### Please list the active individual participants in the Initiative

First name	Last name	Email address	Member	Org
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Sabine	Chabrilat	chabri@gfz-potsdam.de	Germany	GFZ - German Research Centre for Geosciences
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Pierre	Lacroix	pierre.lacroix@unige.ch	UN Environment - United Nations Environment Programme	UN Environment - United Nations Environment Programme
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Veronika	Kopařková-Strnadová	veronika.kopackova@seznam.cz	EuroGeoSurveys - The Association of the Geological Surveys of the European Union	- Czech Geological Survey
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## Other information

Please provide any other comments or information that was not included in the

## **previous sections, but you would like to appear in the Implementation Plan.**

Participants and contributing projects should as far as possible adhere to the GEO Data Sharing Principles and the GEO Data Management Principles. Data, metadata and products should be shared as open data; or, if international instruments, national policies or legislation preclude the sharing of data as open data, they should be shared with minimal restrictions on use, and at not more than the cost of reproduction and distribution.

- no supporting documents provided -

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