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第二届联合国地信周

Enabling SDGs with Geo-Spatial Intelligence: From Tech Systems to Multi-Scenario Empowerment

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1. SDGs Progress and Challenges: The Data and Methods Gap

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Progress Overview

- **SDGs Defined:**
  17 global goals launched by the UN in 2015

- **Milestone:**
  10 years on, with 5 years to 2030 deadline

- **Current Status:**
  1. Only 35% of targets are on track or making moderate progress;
  2. Nearly 50% are progressing too slowly;
  3. Alarmingly, 18% are in reverse…

Accelerated action and innovation are needed to achieve the 2030 Agenda.

1. SDGs Progress and Challenges: The Data and Methods Gap

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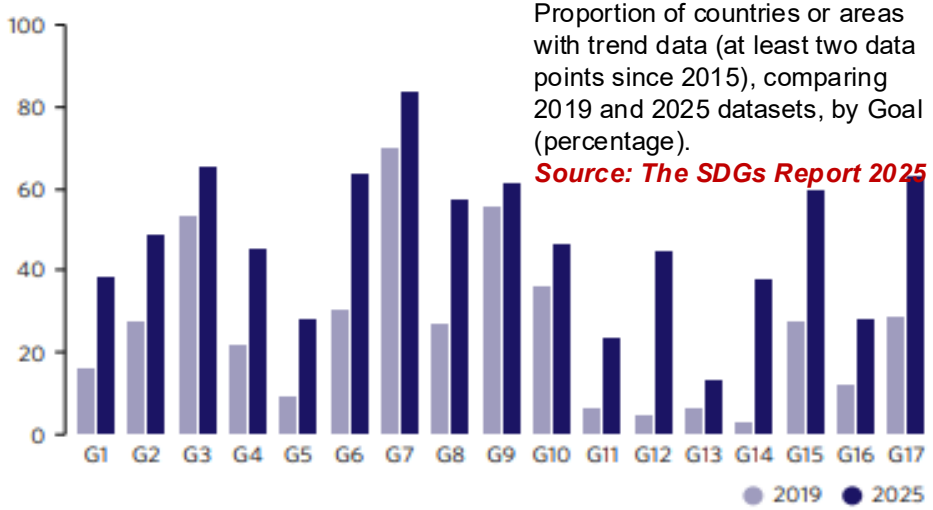
Persistent Challenges

Source: UN-GGIM Report



Proportion of countries or areas with trend data (at least two data points since 2015), comparing 2019 and 2025 datasets, by Goal (percentage).

Source: The SDGs Report 2025

- **Data Timeliness Gaps:**
  1. Nearly one-third of SDG indicators lack recent or sufficient data;
  2. For Goals 5, 11, 13, 16, trend data coverage remains below 30%, constraining timely assessment ...

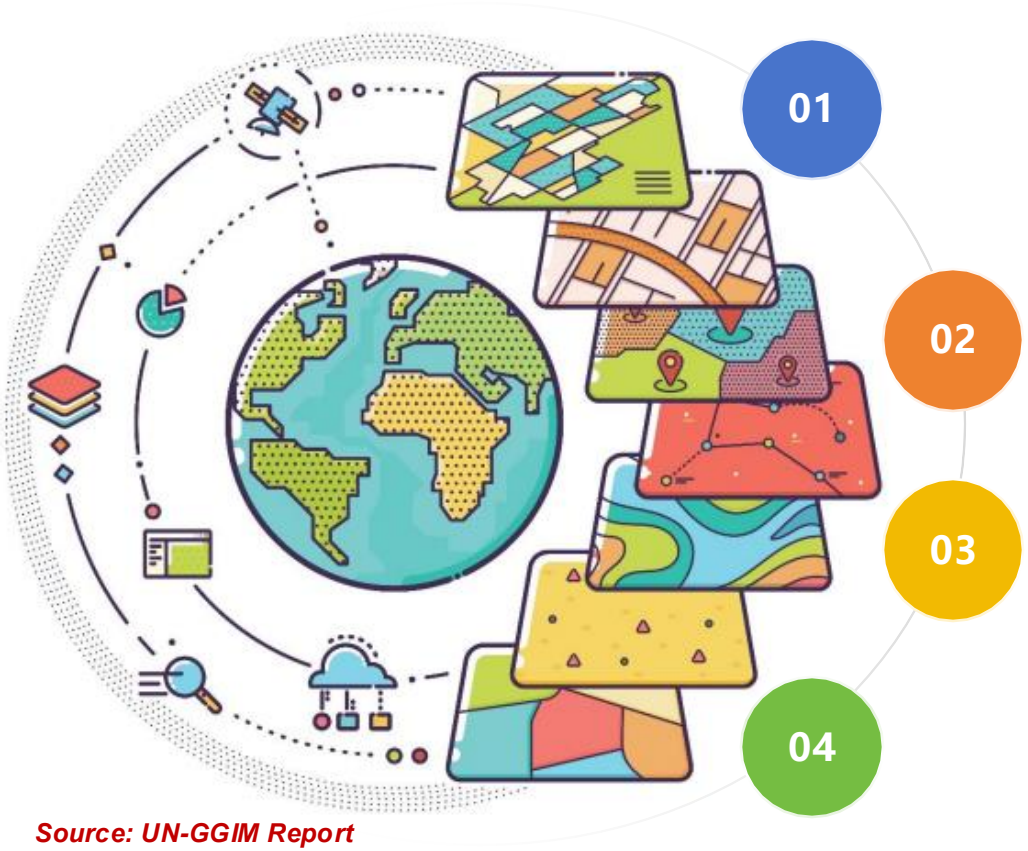
- **Data spatial Coverage Gaps:**
  1. Significant disparities across countries and goals;
  2. Some regions have limited or no trend data, undermining spatial analysis and policy formulation …

- **Methodological Limitations:**
  1. Challenges in integrating cross-sector and cross-scale data;
  2. Difficulty in capturing complex, interconnected SDG dynamics …

How to harness the power of data for SDGs?

2. Geo-Spatial Technologies: The core Enabler of SDGs

Geo-Information as Core Data:



Source: UN-GGIM Report

Universal Relevance:

Spatial context is fundamental to almost every SDG – poverty, health, cities, climate, environment, and more

Integration Power:

Serves as the common reference layer, enabling integration of diverse datasets and cross-sectoral analysis

Unified Standards & Interoperability:

Built on standardized frameworks, ensuring consistency, comparability, and scalability

Broad Acceptance…

Why GeoSpatial

Geo-information delivers the reliable, spatially explicit data needed to turn SDGs ambitions into evidence-based strategies.

Geo-Spatial Technologies: Driving Solutions

Tools platforms for capturing, managing, analyzing, and visualizing location-based data: GIS, remote sensing, GPS, mapping, and spatial analytics…

Provide a common framework for integrating diverse data

Support spatial modeling, scenario analysis, and hotspot detection to reveal patterns and trends

Enable dynamic monitoring and evaluation for evidence-based SDG progress tracking

……

Geo-spatial technologies elevate SDG implementation from fragmented data to integrated, actionable intelligence—making sustainable development truly measurable and achievable.

3. Need for Intelligent Transformation

Current geo-spatial information technologies and service paradigms suffer from low overall efficiency and limited levels of intelligence, falling short of the demands for modern complex data processing and real-time decision-making.

Current technologies and service paradigms

VS

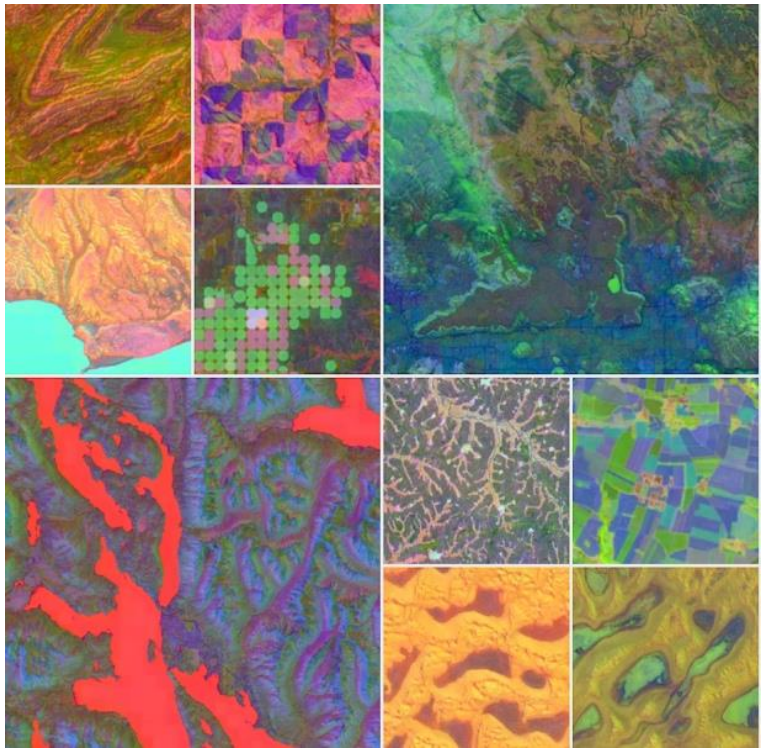
- Insufficient provision of high-quality geospatial information
- Lack of advanced spatio-temporal analysis methods
- Absence of efficient spatio-temporal empowerment paradigms

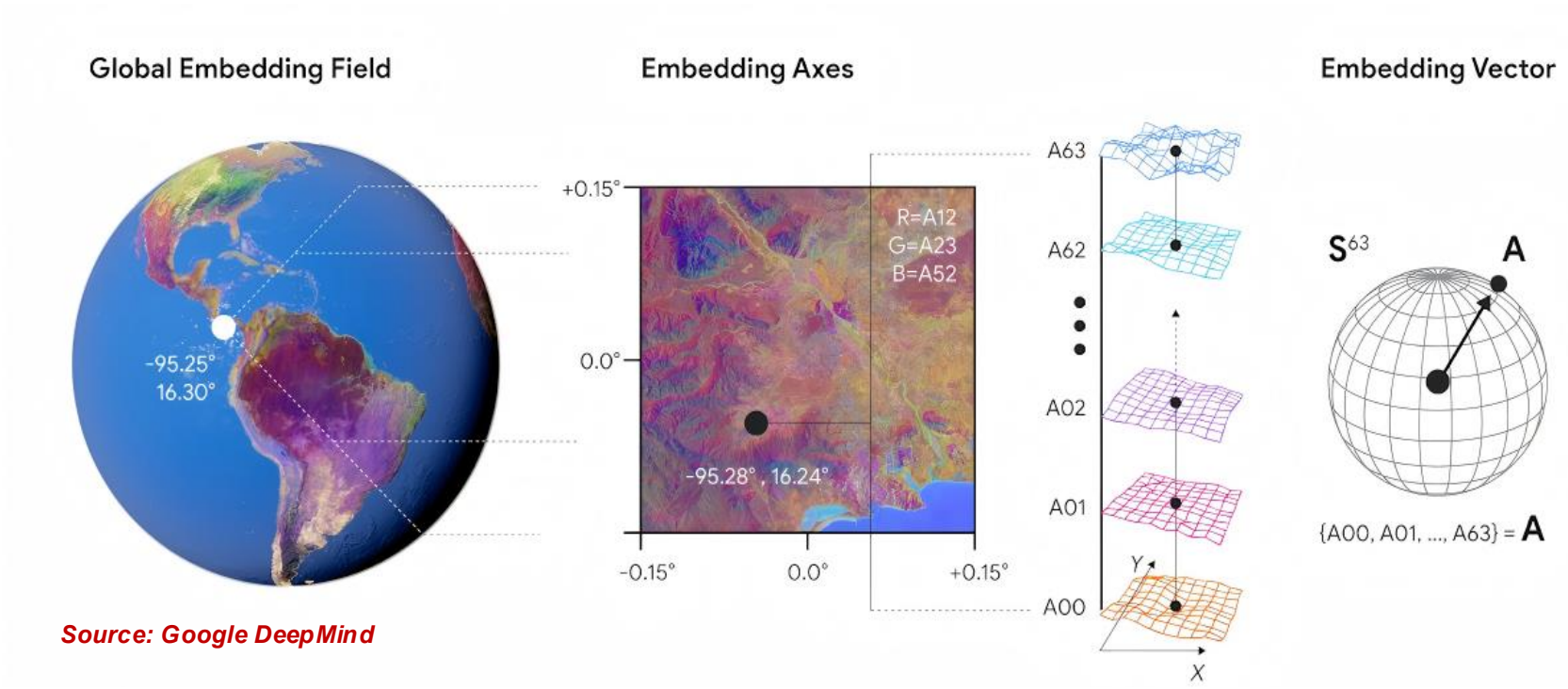
Intelligent technologies and service paradigms

Intelligent transformation is essential to unlock the full value of geo-spatial information, enabling integrated data, advanced analyses, and empowered, adaptive decision-making for the SDGs.

4. An Example from AlphaEarth

In July 2025, Google launched AlphaEarth Foundations, an AI model that integrates diverse Earth observation data into unified 10-meter grids. Its 64-dimensional embeddings deliver consistent, information-rich monitoring systematically bridging data gaps and enabling transformative global insight.





Source: Google DeepMind

AlphaEarth exemplifies how geo-spatial intelligence can systematically bridge critical data gaps, empowering integrated, evidence-based SDG assessment and accelerating progress towards global sustainability goals.

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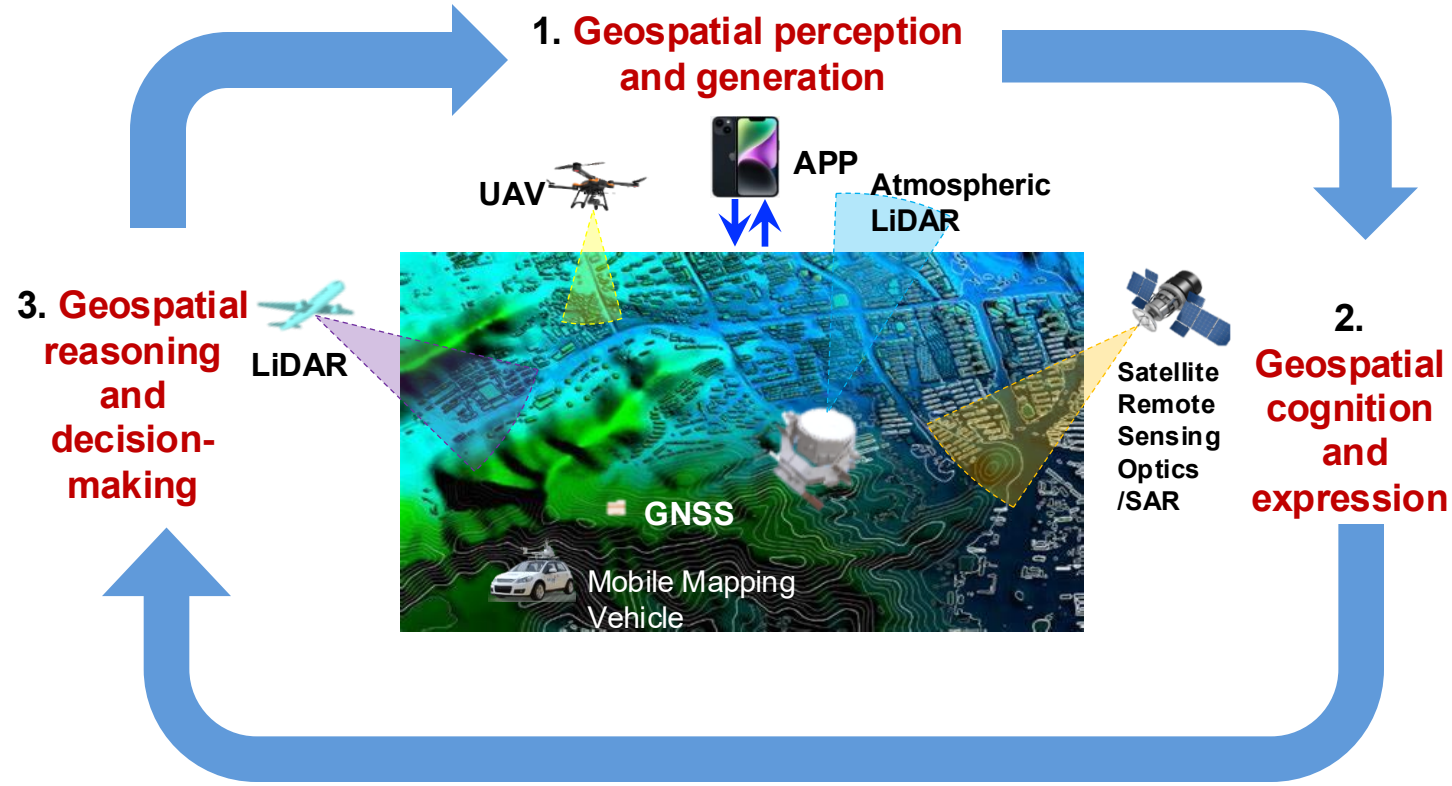
1. Geo-Spatial Intelligence

Geo-spatial intelligence, rooted in artificial intelligence and centered on geospatial information, **aims to emulate human intelligence**, and **is the engine for geo-spatial information supply and service transformation**.

Key Features

- Aims to emulate human intelligence
- Integrates space-time-semantics
- Driven by a hybrid of knowledge-data-models
- Excels in spatial cognition and predictive capabilities



By embedding intelligent thought processes into the representation and understanding of geo-spatial phenomena, **it strives to enable deep perception, cognition, reasoning, and decision-making**, effectively addressing complex geo-spatial challenges.

1. Geo-Spatial Intelligence

The inherent complexity of geo-spatial intelligence– spanning heterogeneous data, critical technologies, and multi-layered objectives – presents challenges beyond the direct reach of large language models (LLMs) .

LLM Strengths


Programming


Algorithm Design


Data Modeling


Information Integration


Logical Reasoning


Dialogue Interaction

Difficult to comprehend massive, spatiotemporal datasets.

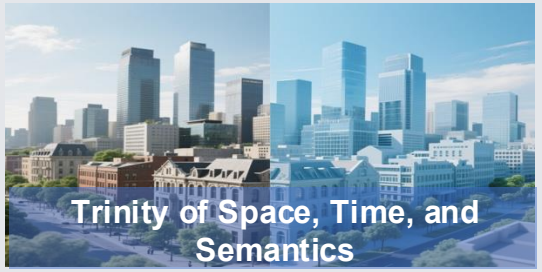
Difficult to understand spatiotemporal dynamics, topological structures, geometric relationships, and semantic logic.

Difficult to simulate physical spatiotemporal laws and perform efficient spatiotemporal computation and reasoning.

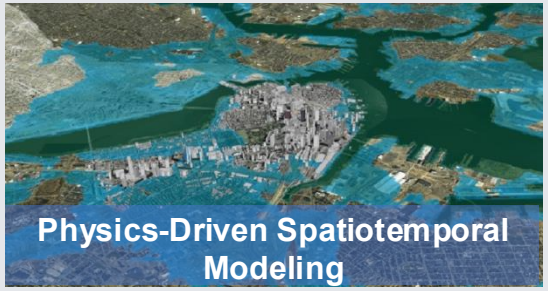
Core Tenets of Geo-Spatial Intelligence

Multi-layer Dynamic Synergy

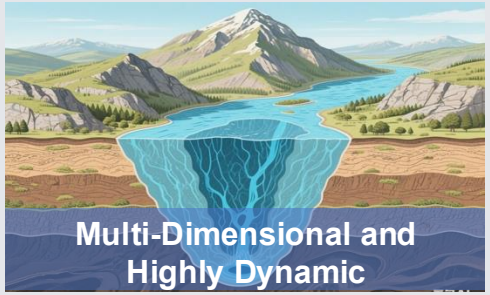
Unified Spatiotemporal Representation



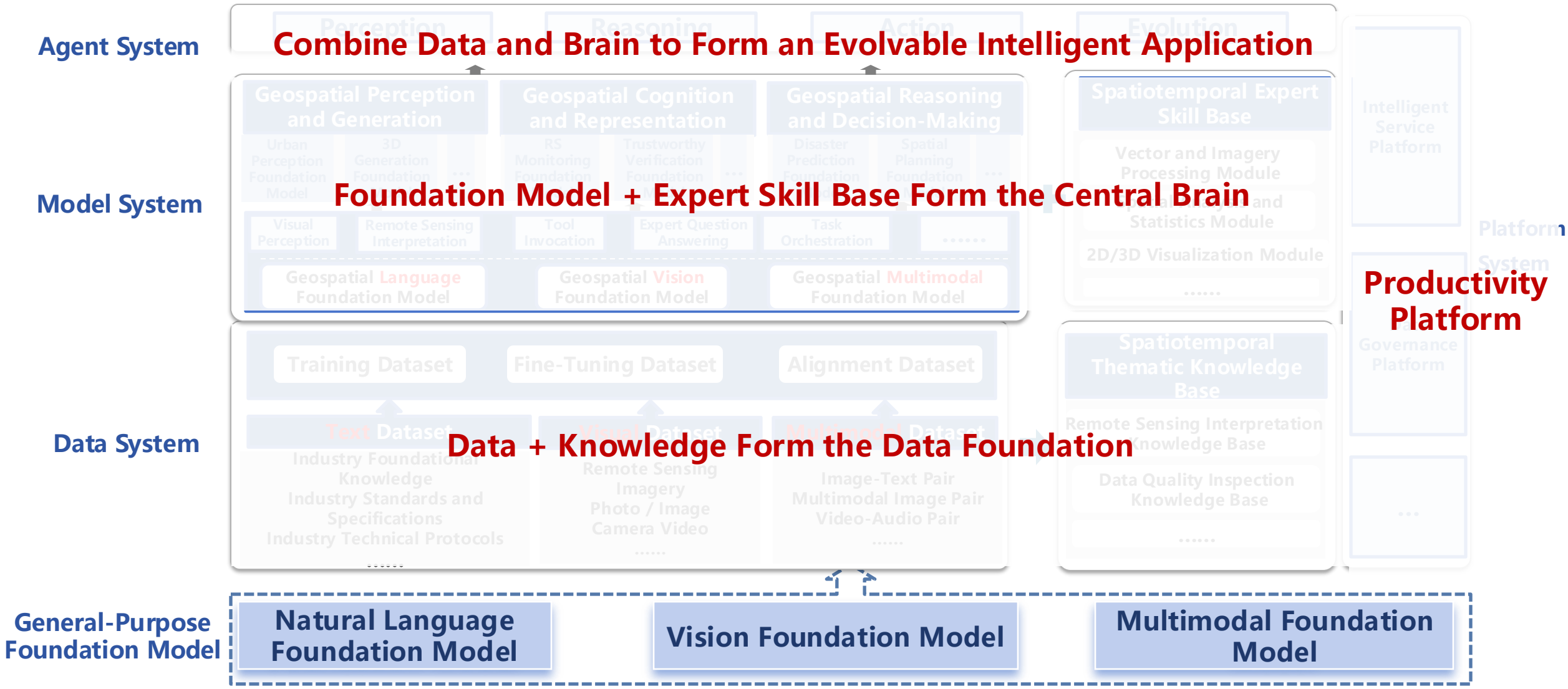
Spatiotemporal Simulation, Prediction, and Services



Features of Geo-Information



2. Building the Geo-Spatial Intelligence Tech System



3. Our Work: Developing the Mogan·Xuanyan GFM

Mogan·Xuanyan Geospatial Foundation Model Version 1.0 was released on January 5, 2025!
Mogan·Xuanyan Geospatial Foundation Model Version 1.5 was released on July 20, 2025!

The Mogan.Xuanyan Geospatial Foundation Model comprises a Geospatial Language Model, a Geospatial Vision Model, and a Geospatial Multimodal Model, by systematically modeling geospatial domain knowledge and data, **it achieves a deep integration of Industry knowledge pre-training and scenario-based fine-tuning,** to ensure model generality while allowing for optimization and adjustment for specific application scenarios.

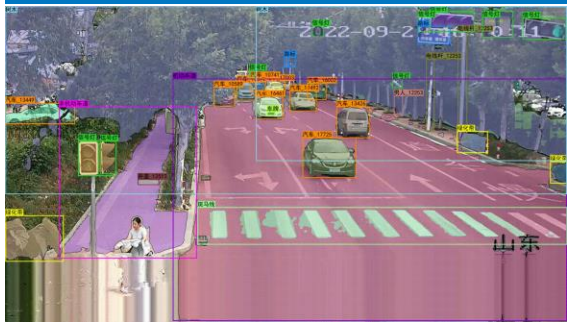
Trained via **pre-training and full fine-tuning** on massive, high-quality industry datasets, including **a 100M+ token corpus, ~10M remote sensing images, and hundreds of thousands of 3D samples.**

3. Our Work: Developing the Mogan•Xuanyan GFM

Capable of understanding geo-spatial semantics and widely adapting to multiple scenarios, with 8 distinctive features to effectively support the intelligent development of geo-spatial services.

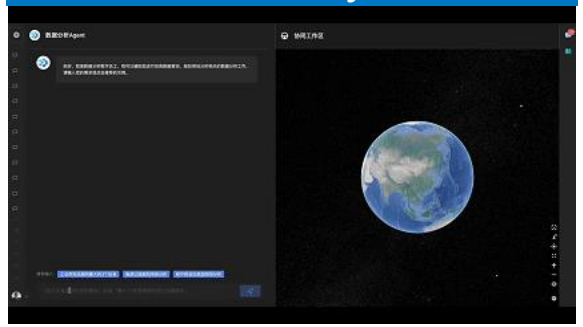
Remote Sensing Image Interpretation

All-domain Visual Perception



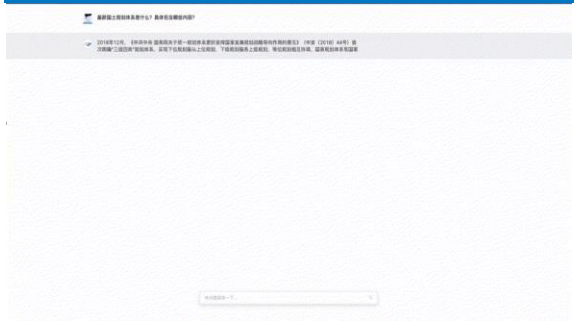
Intelligent 3D Generation

Geospatial Query and Analysis



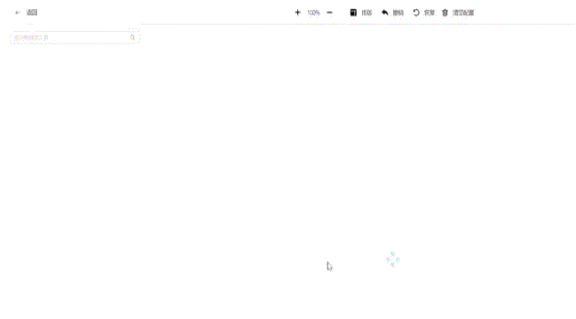
Intelligent Map Recognition

Expert Knowledge Questions and Answers



Complex Report Generation

Task Orchestration and Tool Scheduling



3. Our Work: Multi-Scenario Empowerment

E1: Generative 3D Modeling

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Revolutionizing large-scale 3D scene reconstruction: dramatically boosting efficiency, reducing costs, and enabling rapid, high-precision geo-spatial data updates.

Traditional Photogrammetric 3D Modeling

High-density aerial images

- Image Registration and Camera Calibration
- Aerotriangulation
- Dense Point Cloud Reconstruction
- 3D Mesh Construction
- Model Simplification and Refinement
- Texture Mapping Rendering

3D scene

Input photos: approximately 5,000 images | Time-consuming: approximately 24 hours

Data volume: Reduced by 94%

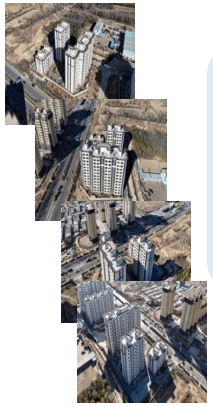
Efficiency: Improved by more than 10 times

Effect: High-fidelity and computable

1km² modeling comparison

Generative Foundation Model-based 3D Modeling

Few Photos from Sparse Views



Generative Point Cloud Geometric Constraints

- Diffusion Model for Generating Building Geometry
- Diffusion Model for Generating Building Textures
- 3DGS Partition Processing

Building restoration

Scene Synthesis

3D single building

Large-scale 3D scene

Input photos: Approximately 300 images | Time - consuming: Approximately 2 hours

Traditional photogrammetric 3D modeling is data- and time-intensive. Generative large models **reduce photo input by 90% and boost efficiency tenfold**, enabling scalable, cost-effective 3D applications.

3. Our Work: Multi-Scenario Empowerment

E2: AI-Driven Urban Governance

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AI empowers low-altitude urban governance, enabling an intelligent closed-loop from passive monitoring to active governance, and promoting scientific decision-making and precise services

Small Model Governance Mode (Single Small Scenario)

Affected by the environment、Lack of self-learning ability、High false alarm rate 、 Low recognition precision 、 Low accuracy rate、Single type of recognition

Reduction in annotation requirements: 70%

Cost reduction: 70%

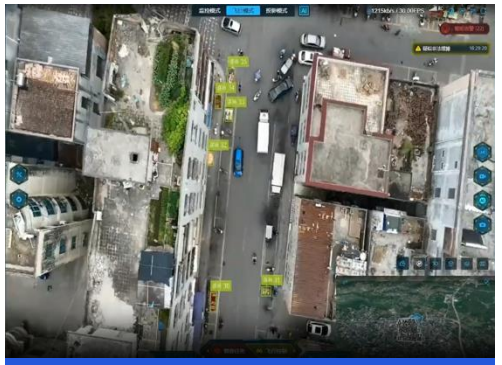
Coverage extension: 95%

Accuracy rate of large models: 90%

Small Models vs Large Models

Large Model Governance Mode (Strong Generalization Ability)

No environmental impact 、 Strong generalization (multiple categories)、High precision (low false alarm rate)、Evolvable (strong self-learning ability)



Non-motorized Lane Occupancy Recognition

One model identifies urban multi-dimensional events

Overcoming the limitations of traditional small models, our city-focused multimodal foundation model achieves **real-time recognition of 70+ targets**, second-level response to 40+ high-frequency events, **70% cost reduction**, and **coverage of 100+ governance scenarios**.

本地视频分析
• 文件管理
• 事件识别
实时监控
实时视频分析

城市治理事件检测

事件预览 监测事件

【城市视频.mp4】 下载事件图片 下载视频

告警事件统计

事件统计为任务中视频和图片的全部事件数量

视频分析 共分析视频数量：10


城市视频.mp4


城市视频02.mp4


城市视频03.mp4


城市视频04.mp4


城市视频05.mp4


城市视频06.mp4


城市视频07.mp4


城市视频08.mp4


城市视频09.mp4


城市视频10.mp4

3. Our Work: Multi-Scenario Empowerment

E3: Scenario-Based Intelligent Map Generation

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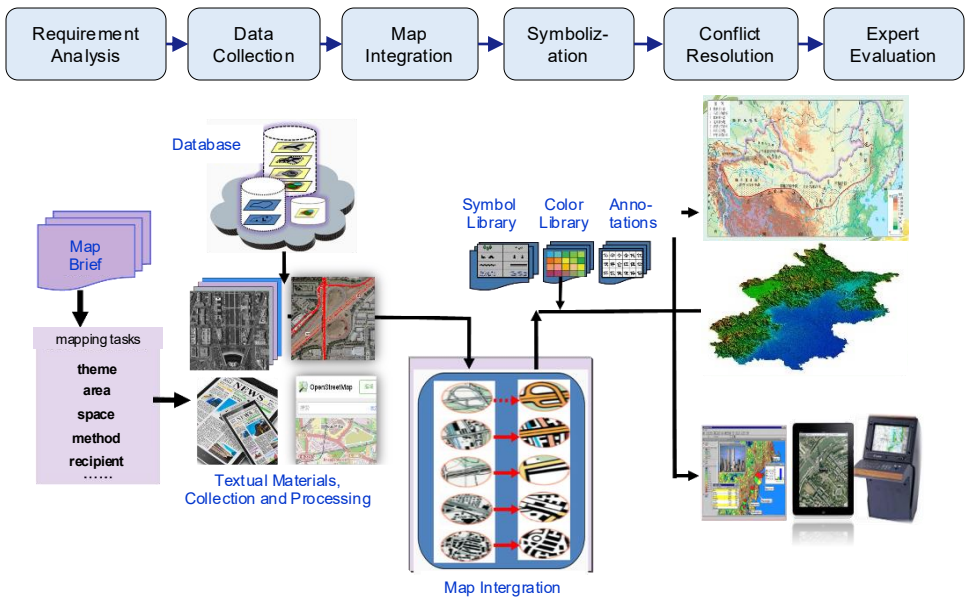
Achieving minute-level map generation through natural language interaction, enabling rapid mapping for emergency response, urban management, mobility, and low-altitude economy.

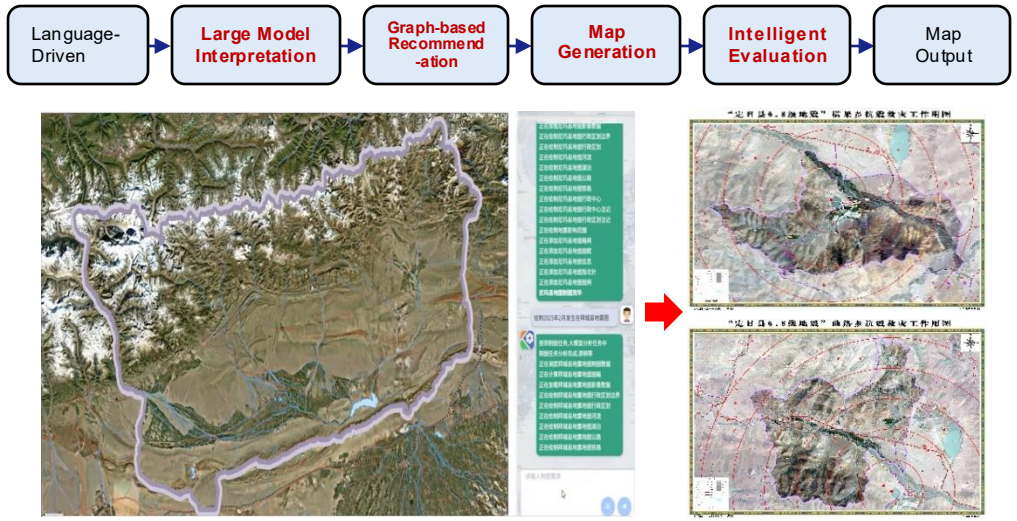
Traditional manual cartographic production mode (with complex professional workflows)



- Requirement Understanding Accuracy: 95%
- Map Production Efficiency Gain: 50%+
- Output Time: Minutes

Traditional VS Large Modle

Intelligent Map Generation Based on Large Models (Fast, Intelligent, and Flexible)



Boost efficiency in emergency response, public services, and urban mobility

By overcoming the limitations of traditional cartography, our large model **increases mapping efficiency by over 50%, reduces production time from hours to minutes**, and enables personalized, adaptive map generation.

请提出制图要求

绘制2025年2月发生在拜城县地震图

接到制图任务,大模型分析任务中
制图任务分析完成,请稍等
正在调度拜城县地震地图制图数据
正在计算拜城县地震地图图幅
正在加载拜城县地震地图影像数据

请输入制图需求

CONTENTS

Geo-Spatial Intelligence for the World

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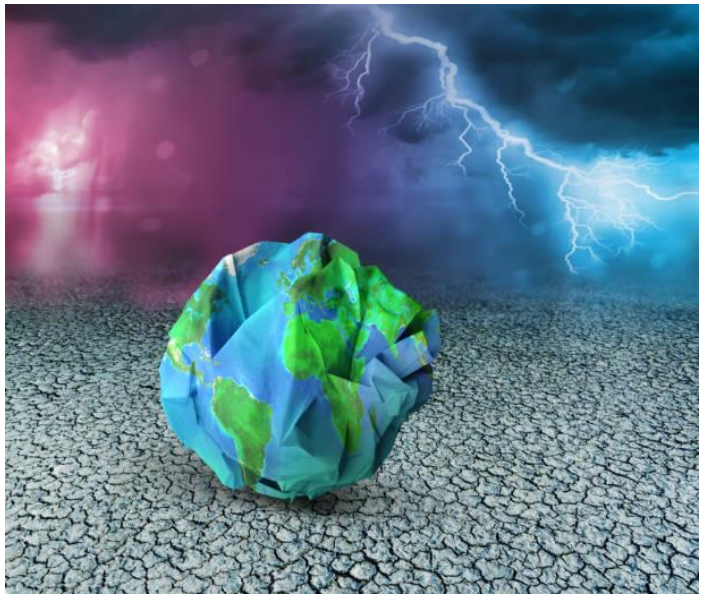
The journey to Beautiful Tomorrow begins with tackling today's challenges. We are committed to delivering geo-spatial intelligence services worldwide, making its benefits accessible to everyone. Efforts are underway to develop the international Global Geospatial Intelligence Framework Platform, powered by Mogan·Xuanyan, to deliver collaborative solutions for the SDGs.



◆ Environmental Crisis

Climate change, resource depletion, biodiversity loss…

◆ Digital Divide

Access inequality, affordability gap, technology benefits…

◆ Economic Inequality

Wealth gap, income disparity, unequal access to opportunities…

◆ Social challenges

Community inclusivity, cultural divides, trust deficit…

◆…

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Thank you for your attention!