Programme at a Glance

Timing	Monday 5 May	
10.00 - 11.30	**Welcome session - plenary**	
11.30 – 12.00	Coffee break	
12.00 - 13.30	**Latest advances in AI Foundation Models – Session 1**	**Advances in Earth science, weather prediction and climate using Foundation Models – Session 1**
13.30 - 14.30	Lunch break	
14.30 – 16.00	**Latest advances in AI Foundation Models - Session 2**	**Advances in Earth science, weather prediction and climate using Foundation Models – Session 2**
16.00 – 16.30	Coffee break	
16.30 – 18.00	**Computational challenges in training / running large-scale Foundation Models**	**Dataset, benchmarking and evaluating Foundation Models in EO – Session 1**
18.00 – 20.00	Cocktail – **Poster session 1**	

Timing	Tuesday 6 May	
10.00 - 11.30	**Adapting Foundation Model to geospatial data (multi-modal, multi-resolution, etc.) and specific EO tasks**	**Dataset, benchmarking and evaluating Foundation Models in EO – Session 2**
11.30 – 12.00	Coffee break	
12.00 - 13.30	**From adaptation to adoption of FM for EO**	**Embedding, Geospatial Semantic data mining and data volume reduction**
13.30 - 14.30	Lunch break	
14.30 – 16.30	Coffee - **Poster session 2**	**Earth2Vec Xchange**
16.30 – 18.00	**Utilization of FMs for downstream use cases, commercial applications, and geospatial Digital Twins.**	**Agent AI, Digital Assistant, LLM**
19.30 -	Non-hosted dinner at Frascati	

Timing	Wednesday 7 May		
09.15 – 10.45	**Deep dives in Prithvi-EO/-W&C, TerraMind, INDUS and EVE LLMs**		
10.45 – 11.15	Coffee break		
11.15 – 12.15	**What's next for Infrastructure?**		
12.15 - 13.30	**Closing session**		
13.30 - 14.30	Lunch break		
14.30 – 15.00	**Setting Infrastructure for hands-on participants**		
15.00 – 18.00	Hands-on 1 **Using Geospatial AI FM**	Hands-on 2 **LLMs in use for EO**	Hands-on 3 **Benchmark FM4EO**

Plenary Big Hall (main stage), Magellan	Big Hall	Magellan	Room 15111 (main stage), Room 15109	James Cook

Detailed Programme

Monday 5 May

Welcome session

10.00 - 11.30, Big Hall

- 10.00 - Introduction: opening words - Nicolas Longépé (ESA Φ-lab)
- 10.05 - ESA Welcome - Simonetta Cheli (Director of Earth Observation Programme, ESA)
- 10.10 - Overview of ESA EOP Climate Action, Sustainability & Science activities - Rune Floberghagen (Head Climate Act., Sustain. & Science Dep, EOP ESA)
- 10.30 - Future of AI for EO Panel - moderated by Anca Anghelea (ESA) and Rahul Ramachandran (NASA)
    - Kevin Murphy - Chief Science Data Office for NASA SMD - NASA HQ
    - Yifang Ban– Lead of the UN GEO AI4EO
    - Gustau Camps-Valls - Full Professor at the Universitat de València, Spain.
    - William El Sayed – Go to Market Public Sector at Mistral AI
    - Federico Fierli – Senior Scientist, DG RTD, European Commission

Oral Sessions

1 - Latest advances in AI Foundation Models – Session 1

12.00 - 13.30, 15 mins per presentation incl. Q&A, Big Hall

Session chairs - Thomas Brunschwiller (IBM Research Europe), Rahul Ramachandran (NASA)

- 12.00 - Enhancing Remote Sensing Representations Through Mixed-Modality Masked Autoencoding by Leifman et al. (Google Research)
- 12.15 - SatSwinMAE: A Spatio-Temporal Autoencoder for Multiscale Satellite Imagery by Jenks et al. (Degas Africa)
- 12.30 - GeoDINO: A Vision Foundation Model for Earth Observation Leveraging DINO Architecture and Sentinel-2 Multi-Spectral Data by Musto et al. (Leonardo Labs)
- 12.45 - AnySat: A Multi-Resolution, Multimodal, and Multi-Scale Earth Observation Model by Astruc et al. (ENPC)
- 13.00 - FAST-EO: Multi-Modal Foundation Models for Scalable Earth Observation and Earth Sciences by Kuzu et al (DLR)
- 13.15 - Breaking Representation Barriers for Earth Observation: A Sensor-Agnostic Foundation Model by Sumbul et al. (EPFL)

2 - Advances in Earth science, weather prediction and climate using Foundation Models – Session 1

12.00 – 13.30, 15 mins per presentation incl. Q&A, Magellan

Session chairs – Gustau Camps-Valls (Universitat de València), Sujit Roy (UAH/NASA)

- 12.00 - FM4CS: Foundation Models for Climate and Society by Salberg et al. (Norwegian Computing Center)

- 12.15 - Comprehensive Evaluation of the Prithvi WxC Model: Process-Based Validation of Atmospheric Principles by Kumar et al (The University Of Alabama In Huntsville)
- 12.30 - Towards a foundation model of land surface dynamics by Benson et al. (BGC Jena)
- 12.45 - Integrating Satellite Observations into Atmospheric AI Foundation Models for Precipitation Forecasting by Pfreundschuh et al (Colorado State Univ. Fort Collins)
- 13.00 - Geospatially-aware Masked Autoencoders for 3D Cloud reconstruction by Girtsou et al (National Observatory of Athens)
- 13.15 - A physics-aware data-driven surrogate approach for fast atmospheric radiative transfer inversion by Sgattoni et al (CNR – IBE)

3 - Latest advances in AI Foundation Models – Session 2

14.30 – 16.00, 15 mins per presentation incl. Q&A, Big Hall

Session chairs - Thomas Brunschwiller (IBM Research Europe), Rahul Ramachandran (NASA)

- 14.30 - Towards Unified Copernicus Foundation Models for Sentinels by Wang et al. (Technical University of Munich)
- 14.45 - GeoLangBind: Unifying Earth Observation with Agglomerative Vision-Language Foundation Models by Xiong et al. (Technical University of Munich)
- 15.00 - MAPEX: Modality-Aware Pruning of Experts for Efficient Multi-Modal Remote Sensing Foundation Models by Hanna et al. (University of St. Gallen)
- 15.15 - GeoViT: Self-Evolving Foundation Models for Dynamic Earth Observation through Adaptive Vision Transformers by Yagiz et al. (BTS Labs)
- 15.30 - Towards Sensor-Informed Foundation Models for Satellite-based Earth Observation by Prexl et al. (University Of The Bundeswehr Munich)
- 15.45 - Investigating redundancy in remote sensing images and their implications to foundation models by Bountos et al. (National Technical University Of Athens)

4 - Advances in Earth science, weather prediction and climate using Foundation Models – Session 2

14.30 – 15.45, 15 mins per presentation incl. Q&A, Magellan

Session chairs – Gustau Camps-Valls (Universitat de València), Sujit Roy (UAH/NASA)

- 14.30 - Harnessing AI for Good: Tackling Global Challenges with Intelligent Solutions by Arcucci et al (Imperial College London)
- 14.45 - Earth Observation with Foundation Models: Toward Adaptive, Self-Learning Geospatial AI for Climate Resilience and Sustainability by Yagiz et al (BTS Labs)
- 15.00 - Geospatial solutions for flood and landslide risk assessment and mitigation strategy by Qasim et al (University of Munster, Germany)
- 15.15 - HiRes-FusedMIM: A High-Resolution RGB-DSM Pre-trained Model for Building-Level Remote Sensing Applications by Mutreja et al (DLR)
- 15.30 - 3D-ABC: A new Foundation model for mapping global vegetation and soil carbon stocks by Zandi et al (Forschungszentrum Jülich)

5 - Computational challenges in training / running large-scale Foundation Models

16.30 – 18.00, 15 mins per presentation incl. Q&A, Big Hall

Session chairs – Gabriele Cavallaro (Forschungszentrum Jülich GmbH), (TBC) Muthukumaran Ramasubramanian (UAH/NASA)

- 16.30 - What Does it Take to Deploy a Foundation Model in an Operational Context? The WorldCereal-Presto Global Crop Mapping Case Study by Van Tricht et al (VITO Remote Sensing)

- 16.45 - Integration of Foundation Models with up-/down-stream applications and geospatial Digital Twins by Ibrayeva et al (Celestial Strategy oy)
- 17.00 - Computationally efficient head-only fine-tuning for Earth Observation Foundation Models: Benchmarking FMs for semantic segmentation by Beltrame et al (Austrian Institute of Technology (AIT))
- 17.15 - Enhancing Deployable Models for on-board Applications Through Multi-Modal Remote Sensing Foundation Models by Bechini et al (AIKO S.r.l.)
- 17.30 - Designing Compact Multi-Modal Change Detection Models For On-Board Earth Observation by Mukherjee et al (TCS Research, Tata Consultancy Services Limited)
- 17.45 - ΦsatNet: A Deployable Foundation Model for Onboard AI on Φsat-2 by Collado-Capell et al (EPFL)

6 - Dataset, benchmarking and evaluating Foundation Models in EO – Session 1

16.30 – 18.00, 15 mins per presentation incl. Q&A, Magellan

Session chairs – Paolo Fraccaro (IBM Research Europe), Nikolaos Dionelis (ESA)

- 16.30 - GEO-Bench-2.0: Advancing Benchmarking of Foundation Models for Earth Monitoring by Simumba et al (IBM Research)
- 16.45 - GFM-Bench: An Explainable AI (XAI) Benchmark for Geospatial Foundation Models by Alemohammad et al (Clark University)
- 17.00 - PANGAEA: A Global and Inclusive Benchmark for Geospatial Foundation Models by Marsocci et al (ESA Φ-lab)
- 17.15 - The AI Foundation Model for Earth Observation PhilEO, Techniques and Applications, and an Evaluation Framework including Confidence Assessment by Dionelis et al (ESA Φ-lab)
- 17.30 - MMEarth: Exploring Multi-Modal Pretext Tasks For Geospatial Representation Learning by Kariryaa et al (University Of Copenhagen)
- 17.45 - Benchmarking Foundation Models for Fire Segmentation in Forest-2 images by Liesenhoffet al (Ororatech Gmbh)

Poster session 1

18.00 – 20.00

Latest advances in AI Foundation Models (7)

- Enhancing Remote Sensing Vision-Language Models based on Redundancy Aware Pretraining by Demir et al. (BIFOLD and TU Berlin)
- Dif4Sat: Diffusion Fused Features for Earth Observation by Marsocci et al. (ESA Φ-lab)
- Joint-Embedding Predictive Architectures with Domain-Aware Masking for Foundation Model Pretraining in Earth Observation by Sumbul et al. (EPFL)
- Multi-modal Generative Modelling of Copernicus Data by Espinosa et al. (University of Edinburgh)
- Multi-modal Foundation Model for EO and SAR Images by Cho et al. (TelePIX)
- A systematic evaluation of patch- and object-level self-distillation methods in the context of remote sensing by Đukić et al. (KU Leuven)
- Minimalistic, compact, interpretable, dynamic foundation model for repeated satellite/arial/drone/ground-based hyperspectral imaging by Martens et al. (Idletechs As)

Advances in Earth science, weather prediction and climate using Foundation Models (8)

- Cloud detection using machine learning techniques with application to IASI measurements by Zugarini et al. (Istituto Applicazioni Del Calcolo (IAC) - National Research Council (CNR) and University of Florence (UNIFI))
- Hybrid Framework for Hurricane Forecasting: Integrating Prithvi WxC with a Deep Learning-Based Intensity Estimation Model by KUMAR et al. (The University Of Alabama In Huntsville)
- Integrated Multi-Sensor Data Preparation Framework for Climate-Specific Peatland Degradation Monitoring by Kaparthi et al. (Sapienza University of Rome)
- AI-Based Detection and Visualization with Satellite Imagery and Heatmap Technology for Air Pollution Analysis in Europe by Staffieri et al. (Polytechnic University of Bari)
- Towards Permafrost Soil Carbon Stock Estimation using a Multimodal Geospatial Foundation Model, 3D-ABC by Hashemi et al. (Alfred Wegener Institute For Polar And Marine Science)
- ARCEME: Adaptation and Resilience to Climate Extremes and Multi-hazard Events by Teber et al. (University Of Leipzig)
- Deep Learning-Based Estimation of Soil Moisture and Surface Water Dynamics from CYGNSS Observations by Pérez et al. (University of Luxembourg)
- MMOcean: Multi-Pretext Self-Supervised Learning for Ocean and Coastal Earth Observation by Oehmcke et al. (University Of Rostock)

Dataset, benchmarking and evaluating Foundation Models in EO (12)

- Sat4Plasticulture: a dataset for plasticulture identification from multi-satellite time series by Tong et al. (University Of Copenhagen)
- Foundation Models for Earth Observation: Enhancing Fairness and Representativeness in Geospatial Contexts by Ferrari et al. (Consultant)
- Securing AI Models for In-Space Processing: A Blockchain-Based Approach by Suresh et al. (3ipk)
- Is the current geospatial workforce ready to use AI foundational models? by Sampoornam Swaminathan et al. (Unicef)
- Fine scale cocoa mapping with a foundation model by Orlowski et al. (Joint Research Centre)
- Establishing Benchmarks for SAR-Based Ocean Observation Using Sentinel-1 WV Imagery by Tuel et al. (Galeio)
- Evaluating Foundational Multimodal Models for High-Resolution Earth Observation: Object Recognition and Contextual Understanding by Sukhanov et al. (Flypix AI GmbH)
- Model Calibration and Uncertainty Quantification of Fine-tuned Geospatial Foundation Models by Hümmer et al. (CNES - Centre National d'Etudes Spatiales)
- Towards Ethical and Human-Centered AI in Earth Observation: Addressing Bias, Transparency, Accountability, and Democratization by Marzo et al. (ESA)
- Evaluating Geospatial Foundation Models with a Global Hyperspectral Imagery Benchmark Dataset for Aboveground Biomass Estimation by Banze et al. (German Aerospace Center (DLR))
- Benchmarking Foundation Models for Land Cover Segmentation Using DeepGlobe Land Cover Dataset by Hucko et al. (Istanbul Technical University)
- Responsible Vision: A Comprehensive Framework for Ethical AI in Earth Observation by Yagiz et al. (BTS Labs)

Agent AI, Digital Assistant, LLM (2)

- SAI4EO - Symbiotic Artificial Intelligence for Earth Observation by Taggio et al. (Planetek Italia)
- Continual Pretraining for Satellite Imagery: A Foundation Model Framework with LLM Agents by Park et al. (Telepix)

Computational challenges in training / running large-scale Foundation Models (2)

- Efficient Remote Sensing Foundation Models with Mixture-of-Experts by Hackel et al. (Technische Universität Berlin)
- A Unified Framework for Multi-resolution and Multi-spectral Satellite Imagery in Foundation Model Training by Cho et al. (TelePIX)

Embedding, Geospatial Semantic data mining and data volume reduction (4)

- Scalable Earth Observation Analytics through Global Major TOM Embeddings of Sentinel-1 and Sentinel-2 Data by Kluczek et al. (Cloudferro)
- Workflow for Large-Scale Processing and Evaluation of Global Major TOM Embeddings for Sentinel-1 and Sentinel-2 Data by Kluczek et al. (Cloudferro)
- An Agentic Action Graph for Crisis Response by King et al. (Trillium Technologies)
- DeepFeatures: A Deep Learning Approach to Dimensionality Reduction of Spectral Indices for Scalable Earth System Analysis by Peters et al. (Leipzig University)

Tuesday 6 May

Oral Sessions

7 - Adapting Foundation Models to geospatial data (multi-modal, multi-resolution, etc.) and specific EO tasks

10.00 – 11.30, 15 mins per presentation incl. Q&A, Big Hall

Session chairs – Hamed Alemohammad (Clark University), Anna Jungblunth (ESA)

- 10.00 - Denoising Diffusion Models for the Augmentation of Optical Satellite Datasets by Schulte Strathaus et al. (Technical University of Munich)
- 10.15 - Multimodal, Multitemporal, and Multispectral Masked AutoEncoders for Earth Observation by Labatie et al. (IGN)
- 10.30 - Addressing cloud- and shadow-induced data gaps in complex terrains for forest monitoring: Advancing EO foundation models with a multi-resolution approach by Lampert et al. (AIT Austrian Institute Of Technology)
- 10.45 - Bridging the Spatiotemporal Gap: High-Frequency Time Series Foundation Models with VENµS Satellite Data by Rampersad et al. (Earthdaily Analytics)
- 11.00 - LangRS: Optimizing Zero-Shot Semantic Segmentation of Remote Sensing Imagery by Diab et al. (EURAC Research)
- 11.15 - A Remote Sensing Vision-Language Foundation Model for Zero-Shot Tasks by Gigi et al. (Google)

8 - Dataset, benchmarking and evaluating Foundation Models in EO – Session 2

10.00 – 11.30, 15 mins per presentation incl. Q&A, Magellan

Session chairs – Paolo Fraccaro (IBM Research Europe), Nikolaos Dionelis (ESA)

- 10.00 - Towards Efficient RSFM Benchmarking: A Capabilities Embedding Approach by Adorni et al. (IRISA)
- 10.15 - On the generalization capacity of pretrained uncertainties in remote sensing by Bountos et al. (National Technical University of Athens)
- 10.30 - GAIA: A Global, Multi-modal, Multi-scale Vision-Language Dataset for Remote Sensing Image Analysis by Zavras et al. (University of Athens)
- 10.45 - Evaluation of cross-domain generalization capabilities of remote sensing Foundation Models by Cohen et al (CNES)
- 11.00 - FORTY: A Benchmark for Forest Type Mapping and Geospatial Foundation Models by Jiang et al. (University of Zurich)
- 11.15 - Full Lifecycle of EO-based AI Foundation Models: Lessons Learned from Real-World Deployment by Zhang et al. (Allen Institute for Artificial Intelligence)

9 - From adaptation to adoption of FM for EO

12.00 – 13.30, 15 mins per presentation incl. Q&A, Big Hall

Session chairs – Hamed Alemohammad (Clark University), Anna Jungblunth (ESA)

- 12.00 - VLMs for EO Regression: A Go or No-Go? by Xue et al. (Technical University of Munich)

- 12.15 - Foundation models for synthetic aperture radar data - a review and outlook by Anfinsen et al. (NORCE Norwegian Research Institute)
- 12.30 - Foundation Models for Tree Crown Delineation by Jazib Zafar et al. (Georg-August-Universität Göttingen)
- 12.45 - AI Foundation Models: a commercial perspective by Di Vito et al (ESA Φ-lab)
- 13.00 - Geospatial Foundation Models: Slayers of the beasts of change? by Kennedy et al. (Oregon State University)
- 13.15 - On the Added Value of AI Foundation Models to Monitor Biodiversity Change and Resilience by Ferraz et al. (NASA Jet Propulsion Laboratory)

10 - Embedding, Geospatial Semantic data mining and data volume reduction

12.00 – 13.30, 15 mins per presentation incl. Q&A, Room 15111

Session chairs – Gencer Sümbül (EPFL)**,** Begum Demir (TU Berlin)

- 12.00 - Representation Learning for EO - Physically plausible foundation models by Inglada et al (CNES)
- 12.15 - Embed2Scale: Transforming Earth Observation through AI-Driven Data Compression and Collaboration by Ait Ali Braham et al (DLR)
- 12.30 - Parameter-Efficient Adaptation of Geospatial Foundation Models through Transport by Marsocci et al (ESA Φ-lab)
- 12.45 - Leveraging Neural Compression for Earth Observation Data by Wittmann et al (IBM Research)
- 13.00 - Synthetic geospatial data for training AI-enabled downstream tasks by Abady et al (Another Earth)
- 13.15 - Democratizing Earth Observation Analytics: The Case for Systematic Distribution of Foundation Model Embeddings by Satellite Data Providers by Gilman et al (Element 84)

11 - Utilization of FMs for downstream use cases, commercial applications, and geospatial Digital Twins

16.30 – 18.00, 15 mins per presentation incl. Q&A, Big Hall

Session chairs – Xiaoxiang Zhu (TU Munich), Jose Manuel Delgado Blasco (ESA), Robert Kennedy (OSU –TBC),

- 16.30 - Foundation model for tabular data: application of TabPFN to yield forecasting in South Africa by Sabo et al. (European Commission, Joint Research Centre)
- 16.45 - Consideration of AI/ML approaches for the consolidation of EUMETSAT near-real time operational cloud mask products by Spezzi et al. (EUMETSAT)
- Foundation Models for enhanced change detection in Very High Resolution satellite imagery by Schenck et al. (LiveEO)
- 17.15 - Fine-Tuning Prithvi on a Large-Scale Land Cover Segmentation Task by Sylos Labini et al. (Planetek)
- 17.30 - AI Data Handling for an Edge Satellite towards Low-latency Natural Disaster Alert and Monitoring by Martínez et al. (Deimos)
- 17.45 - Leveraging Vision Foundation Model Embeddings for Urban Mobility Prediction with Graph Neural Networks by Murdaca et al. (Mindearth)

12 - Agent AI, Digital Assistant, Large Language Model

16.30 – 18.00, 15 mins per presentation incl. Q&A, Room 15111

Session chairs – Kaylin Bugbee (NASA), Nicolas Longépé (ESA)

- 16.30 - Leveraging Large Language Models and Retrieval-Augmented Generation for Enhanced Sentinel-2 Data Analysis by Faur et al. (National University of Science and Tehnology Politehnica Bucharest)
- 16.45 – SatCHAT: A Multi-Agent LLM-Based Service for Enhanced Earth Observation and Remote Sensing by Jeong et al. (TelePIX Co., Ltd.)
- 17.00 - EVE: A Suite of LLM and Data for Earth Observation and Earth Sciences by Ramirez Atrio et al. (Pi School)
- 17.15 - AI Driven Accelerated Discovery for NASA's Science Mission Directorate by Bugbee et al. (NASA Marshall Space Flight Center)
- 17.30 - An AI Initiative from Research to Operations: AI EO Data Discovery Assistant by Abdula Keary et al. (ESA)
- 17.45 - Blablador: The Jülich Supercomputing Centre Inference Infrastructure by Strube et al. (Forschungszentrum Jülich GmbH)

Poster session 2

14.30 – 16.30

Utilization of FMs for downstream use cases, commercial applications, and geospatial Digital Twins (28)

- Utilizing Multi-Sensor Data and AI for Urban Heat Island Hotspot Detection and Land Surface Temperature Monitoring in Ahmedabad, India by Patel et al. (Silver Oak University)
- Mapping individual trees on smallholder farms and forest restoration areas in Rwanda using deep learning by Mugabowindekwe et al. (University of Copenhagen)
- Automatic Multi-Class Mask Generation Based on Sentinel-1/2 Derived Indices and Deep Learning Neural Network by Fakhri et al. (Independent Researcher)
- Scalable high-resolution wetland mapping using Earth Observation data and Foundation Models by Kovacs et al. (University Of Copenhagen, Department Of Geosciences And Natural Resource Management)
- Estimate Rooftop Heights from Orthophotos: a Machine Learning Approach by Belaid et al. (Nilu, Climate And Environmental Research Institute, Kjeller, Norway)
- Fine-Tuning Geospatial Foundation Models for Automated Captioning of Earth Observation Data in Small-Scale Mining Areas by Zappacosta et al. (Deutsches Zentrum Für Luft- Und Raumfahrt (dlr))
- Application of SATLAS Foundation Model to increase productivity on European Small Woody Features detection by Augot et al. (CLS (Collecte Localisation Satellites))
- GreenerCotton for the sustainable textile industry: A cotton classification in a data-scarce environment by Schlenz et al. (Geocledian Gmbh)
- Leveraging Few-Shot Learning and Data Augmentation for Scrap Metal Segmentation in Satellite Imagery by Ko et al. (TelePIX)
- Semantic Segmentation of Super Resoluted Sentinel-2 Images for Urban and Agricultural Surface Mapping in Soil Erosion Studies by Fazzini et al. (MEEO Srl)
- Comparative Analysis of Prithvi v1, Prithvi v2, and U-Net Architectures for Burn Scar Segmentation in European Satellite Imagery by Moreno Ortega et al. (E.on Digital Technology Gmbh)

- Foundation Models for enhanced change detection in Very High Resolution satellite imagery by Schenck et al. (LiveEO)
- Mapping the Risk of Child Labour from Space with Geospatial Foundation Models and socio-economic datasets. By Roman et al. (Masae Analytics)
- Using SAMLoRA to Segment Construction Sites in Orthophotos by Stolle et al. (Bkg)
- AI Foundation Model Framework for improving Crop Yield Prediction Using Satellite Imagery by Paramanik et al. (University of Southampton)
- Optimized Forest Characterization and Monitoring with Deep Learning by Bartiaux et al. (Spacebel)
- Pleiades Neo foundation model for environmental use cases by Châtel et al. (DISAITEK)
- Large-scale pretraining for individual tree detection by Gominski et al. (University Of Copenhagen)
- Using AI to analyse InSAR data and support geological interpretation by Hourston et al. (British Geological Survey)
- Foundation models for monitoring volcanic emissions using EO satellites by Torrisi et al. (INGV Catania)
- Leveraging Self-Trained Foundation Models for Marine Earth Observation: Applications in Harmful Algal Bloom Detection and Ocean Primary Production Quantification by Moffat et al. (Plymouth Marine Laboratory)
- Leveraging Foundation Models for Landslide detection in cascading disaster events: a remote sensing approach by Di Stasio et al. (University of Sannio)
- A Comparison of Model Complexity, Representative Capabilities, and Performance on Various Encoders for Algal Bloom Monitoring Using Self-Supervised Segmentation and Tracking by Lahaye et al. (Spatial Informatics Group, Llc.)
- Rapid Burn-Severity Assessment Using Earth Observation Foundation Models by Demilt et al. (Spatial Informatics Group)
- Cohabitating with Fire: AI Foundation Models, Citizen Participation, and Earth Observation in Wildfire Resilience by Medaino-tardif et al. (University of Toronto)
- Prithvi EO Foundation Model Validation on MODIS Image Reconstruction by Padovani et al. (University of Trento)
- (TBC) Leveraging Geospatial Foundation Model to estimate Aboveground Biomass by Goel et al. (Purdue University)
- Flood Mapping with Multi-Sensor Fusion and Foundation Models by Tulbure et al. (Center For Geospatial Analytics, Nc State)

Adapting Foundation Models to geospatial data (multi-modal, multi-resolution, etc.) and specific EO tasks (13)

- Examining the Usefulness of Geospatial Foundation Models Integration in Unsupervised Change Detection for Landslide Identification by Leonardi et al. (Politecnico Di Milano)
- Rapid Adaptation of Earth Observation Foundation Models for Segmentation by Panner Selvam et al. (University Of Luxembourg)
- Dargana: fine-tuning EarthPT for dynamic tree canopy mapping from space by Smith et al. (Aspia Space)
- Adapting a Pretrained Foundation Model for Secret Runway Detection in Sentinel-2 Satellite Imagery: A Performance Evaluation by Kolokous et al. (Politecnico Di Milano)
- Towards a Multi-Resolution, Sensor-Agnostic Foundation Model for Rapid Disaster Response in Earth Observation by Ivashkovych et al. (Vito)
- Object Detection in Large Satellite Imagery by Perino et al. (MathWorks)
- Neural Representation based Foundation model for Satellite Images Pansharpening by Heo et al. (Telepix)
- Towards Multi-sensor self-supervised learning for EO by Ait Ali Braham et al. (German Aerospace Center (DLR))
- Geospatial Foundation Models for Wildfire Monitoring and Assessment by Nascetti et al. (KTH)
- Artificial Intelligence foundation model for geospatial impact evaluation with earth observation data by Singh et al. (William & Mary)

- Prediction of NIR Satellite Image Bands Using Denoising Diffusion Models by Schulte Strathaus et al. (Technical University of Munich)
- CrossPatch: A Flexible Patch Embedding Strategy for Foundation Models in Remote Sensing by Hong et al. (Aerospace Information Research Institute, Chinese Academy of Sciences)
- SeaMo: A Multi-Seasonal and Multimodal Remote Sensing Foundation Model by Hong et al. (Aerospace Information Research Institute, Chinese Academy of Sciences)

Interactive ideation session

Earth2Vec Xchange: Embeddings for Earth Observation - Kick-Off Meeting

14.30 – 16.00, Room 15111

Moderators – Isabelle Wittmann (IBM Research Europe), Conrad Albrecht (DLR), Thomas Brunschwiler (IBM Research Europe)

This session launches the Earth2Vec Xchange, a community-driven initiative dedicated to accelerating research and real-world applications of Earth Observation (EO) embeddings. Participants will review the current state-of-the-art in EO embeddings, including published embeddings, demonstrated applications, and emerging community activities. An ideation session will explore the transformative potential of embeddings, identify current limitations, and propose a collaborative roadmap for future developments. The session will also outline Earth2Vec's supporting activities, such as knowledge exchange, embedding space exploration, benchmarking efforts, and moves toward community-wide alignment and standardization. Attendees will help shape the next steps for the Earth2Vec Xchange, contributing to building a dynamic, open ecosystem that enhances the role of embeddings in EO science and applications.

Join us at this kick-off meeting to help shape the next steps of the Earth2Vec Xchange community with your contributions!

Wednesday 7 May

Invited sessions

Deep dives in Prithvi-EO/-W&C, TerraMind, INDUS and EVE LLMs

9.15 – 10.45, Big Hall

Conveners – *Rahul Ramachandran (NASA),* Nicolas Longépé (ESA Φ-lab),

- 9.15 Dual Forces of Earth AI: Prithvi WxC and Prithvi-EO-2.0 (title TBC) by Sujit Roy (University of Alabama / NASA), Johannes Schmude (IBM Research)
- 9.45 TerraMind, the first any-to-any generative, multimodal Foundation Model for EO by Benedikt Blumenstiel (IBM Research Europe), Thomas Brunschwiler (IBM Research Europe), and Valerio Marsocci (ESA Φ-lab)
- 10.15 - AI Assistants for Earth: How INDUS and EVE Extend EO Capabilities by Alex Ramirez Atrio (Pi School) and *Muthukumaran Ramasubramanian (NASA)*

What's next for Infrastructure?

11.15 – 12.15, Big Hall

Convener – Anca Anghelea (ESA)

- Featuring invited speakers from ESA, NASA, academic and industry, about future HPC infrastructure and quantum computing
  - Next-Generation SuperComputing in Europe: a Community in Action Advancing Hardware, Software, and Application Performance for the Exscale Era by (Gabriele Cavallaro Julich SuperComputing Center)
  - Space HPC - ESA's new High Performance Computing system by Peter Gabas / Sean Quin (ESA)
  - Title TBD by Maciej Krzyżanowski (Cloud Ferro)

Closing session

12.15 – 13.30, Big Hall

Conveners – *Rahul Ramachandran (NASA), Nicolas Longépé (ESA Φ-lab)*

- **Wrap-up by session chairs, 5-10 mins per session**
  - (10 min) Latest advances in AI Foundation Models
  - (10 min) Adapting Foundation Models to geospatial data (multi-modal, multi-resolution, etc.) and specific EO tasks, from adaptation to adoption of FM for EO
  - (10 min) Dataset, benchmarking and evaluating Foundation Models in EO
  - (5 min) Embedding, Geospatial Semantic data mining and data volume reduction
  - (5 min) Computational challenges in training / running large-scale Foundation Models
  - (10 min) Utilization of FMs for downstream use cases, commercial applications, and geospatial Digital Twins
  - (10 min) Advances in Earth science, weather prediction and climate using Foundation Models
  - (5 min) Agent AI, Digital Assistant, LLM

- **Final words**

Hands-on sessions

Setting Infrastructure for hands-on participants

14.30 – 15.00, Big Hall

Conveners – *Muthukumaran Ramasubramanian (NASA), Gabriele Cavallaro (Julich SuperComputing Center)*

This session prepares participants for the hands-on activities scheduled for later in the afternoon. It will cover setting up cloud accounts, configuring the environment, and installing all necessary libraries. By the end, participants should have a fully configured Python notebook(s) ready for use in the afternoon session.

Using Geospatial AI FM

15.00 – 18.00*, Magellan*

Instructors – *Sujit Roy (NASA), Benedikt Blumenstiel (IBM Research)*

This hands-on session focuses on utilizing different types (e.g. multitemporal and multimodal) Foundation Models (FM) for Earth Observation (EO) applications and Earth Science.

Participants will explore various capabilities of the NASA-IBM Prithvi-EO (based on Harmonized Landsat Sentinel-2), working with both single and multi-temporal datasets. In addition, attendees will gain in-depth understanding and hands-on experience with the ESA FAST-EO TerraMind FM, the first any-to-any generative, multimodal foundation model for Earth observation (EO), which has shown beyond SOTA performance when compared to previous models. Finally, the session will also include Prithvi-WxC, a FM for Weather and Climate, showcasing zero-shot learning techniques and their applications in Earth Sciences.

Through these exercises, delivered via the terratorch library, participants will gain insights into how FMs can enhance EO workflows, EO Science, Productivity and ultimately improve decision-making processes.

LLMs Use in EO

15.00 – 18.00, Room 15111

Instructors – *Àlex Ramírez Atrio (Pi School), Antonio Lopez (Pi School), Marcello Politi (Pi School), Muthukumaran Ramasubramanian (NASA)*

This hands-on session focuses on using Large Language Models (LLMs) for Earth Observation (EO) and related sciences. Some key use cases include enabling natural language interaction with large technical document databases, assisting researchers with tasks such as article comprehension, summarization, structured data extraction, and writing support, and providing conversational explanations of technical EO topics. Additionally, LLMs can be integrated with external tools to enhance their capabilities, enabling more advanced applications through agentic AI. Some highlights:

- INDUS: A NASA embedding model for efficient document retrieval.

- EVE: An ESA fine-tuned instructed model with an external RAG database for EO applications.

- Hands-on use cases, including QA, summarization, and structured text extraction.

- Comparisons between general and domain-specific LLMs and their impact on EO research.

This session is ideal for EO professionals, AI researchers, and data scientists looking to harness LLMs for improved analysis, automation, and decision-making.

FM4EO benchmark

15.00 – 18.00, James Cook

Instructors – Valerio Marsocci (ESA Φ-lab), Andrea Nascetti (Royal Institute Of Technology), Yuru Jia (KU Leuven), Paolo Fraccaro (IBM Research)

This two-hour hands-on session will guide participants through benchmarking geospatial foundation models using leading frameworks.

One half will focus on PANGAEA, a comprehensive benchmark designed to standardize the evaluation of geospatial models across diverse datasets and tasks. The session will demonstrate how easily new models and datasets can be integrated, showcasing PANGAEA's role in enabling rigorous, transparent, and flexible benchmarking.

The other half will introduce GEO-Bench, highlighting its latest updates and enhanced usability. As GEO-Bench is integrated within TerraTorch, the session will also provide an overview of TerraTorch's capabilities, demonstrating how it streamlines the benchmarking and training of geospatial AI models.