NEANIAS WP06 – Core Services

Attila Farkas, SZTAKI
attila.farkas@sztaki.hu

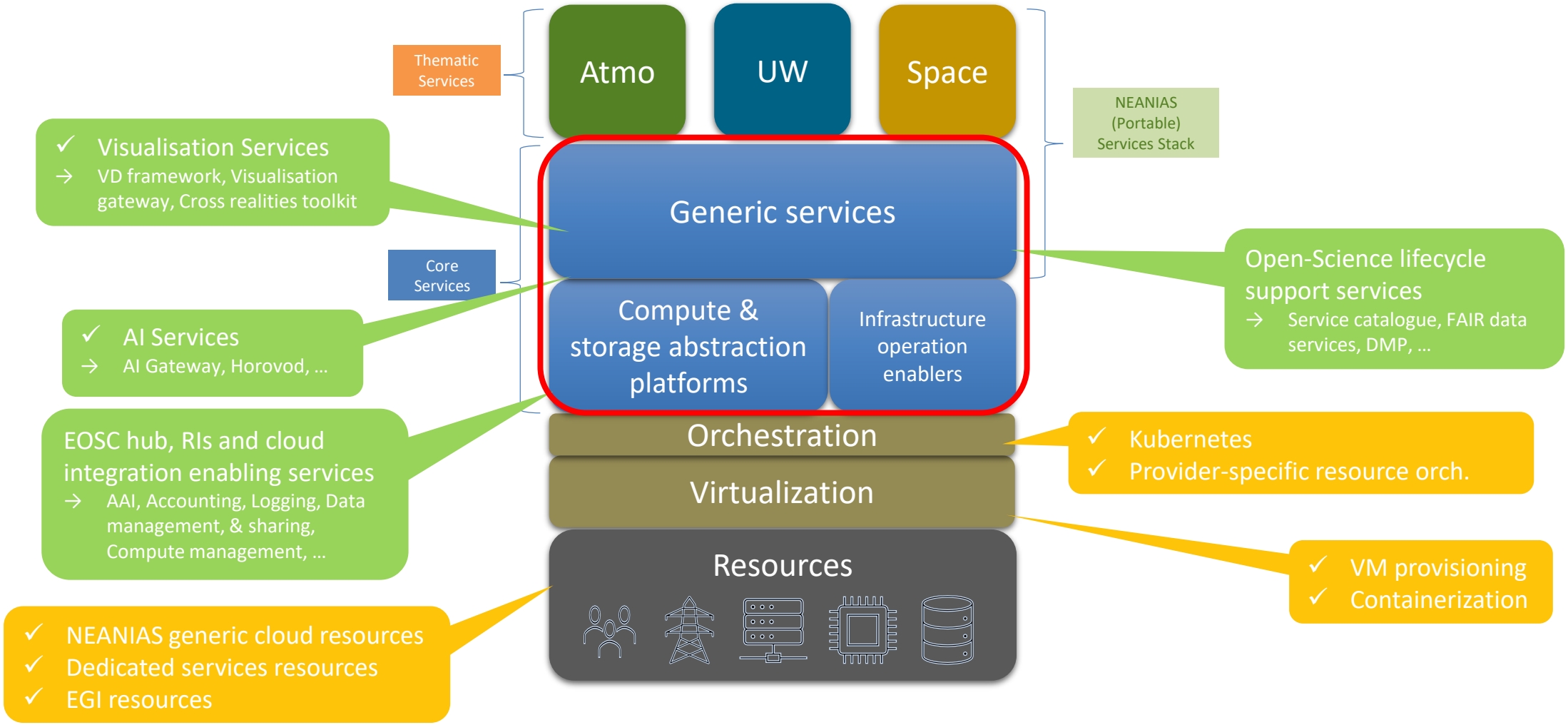
SZTAKI

NEANIAS

Novel EOSC Services for Emerging Atmosphere, Underwater & Space Challenges

NEANIAS receives funding from European Union under Horizon 2020 Research and Innovation Programme under grant agreement No. 863448

The NEANIAS stack



WP06 Core service groups

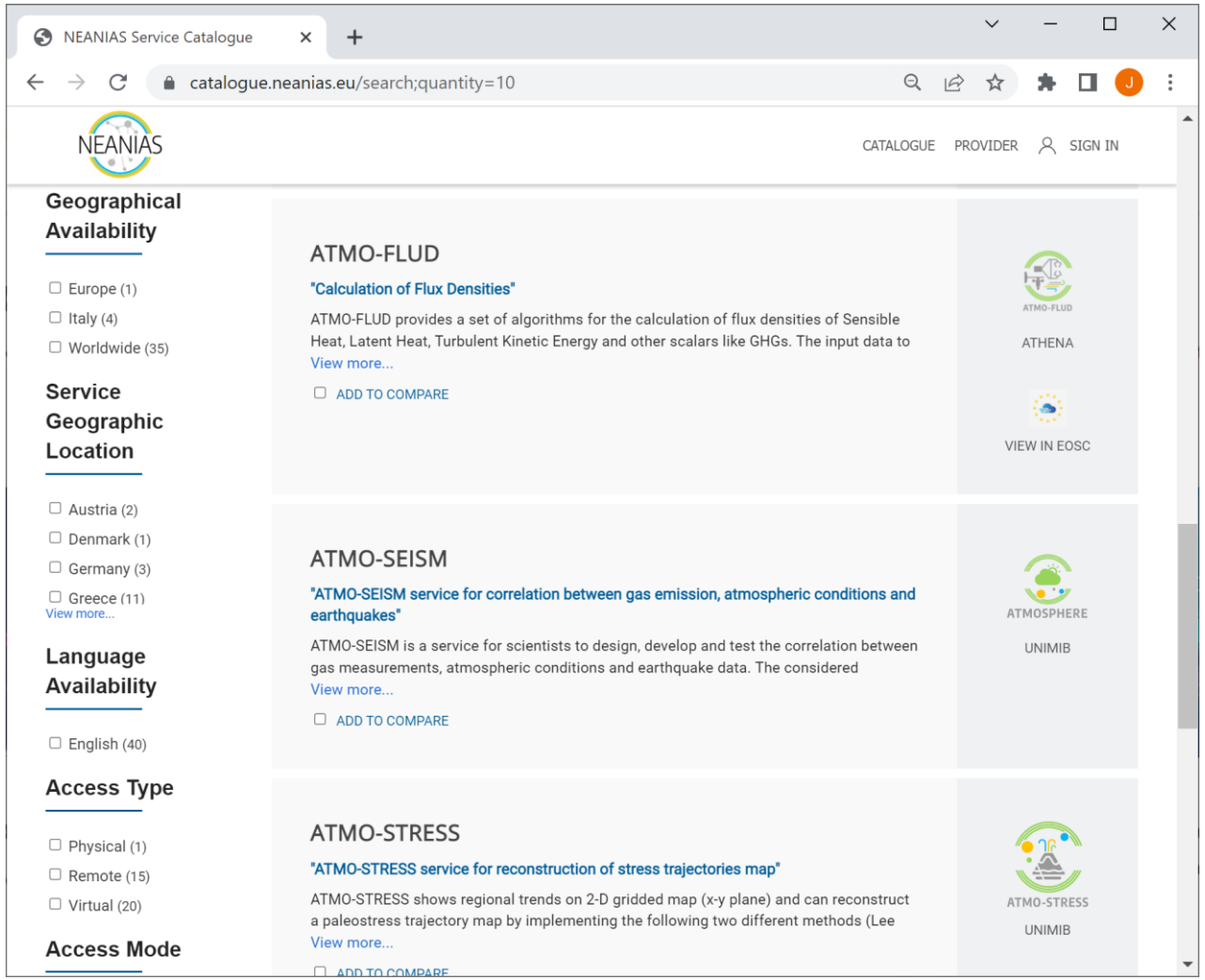
- C1 - Open-Science lifecycle support services (ATHENA)
  - Integration of the NEANIAS services into the EOSC ecosystem
- C2 - EOSC hub, RIs and cloud integration enabling services (CITE)
  - Lower-level services in the NEANIAS ecosystem for resource access
- C3 - AI services (SZTAKI)
  - Upper-level core services providing a typical machine learning workflow lifecycle
- C4 - Visualisation services (INAF)
  - Upper-level core services providing a typical visualization workflow lifecycle

T6.3 – C1 services

- C1.1 NEANIAS Catalogue Portal
- C1.2 NEANIAS Catalogue Service
- C1.3 NEANIAS Research Product Catalogue
- C1.4 NEANIAS Data Validation Service
- C1.5 NEANIAS web toolkit
- C1.6 OpenDMP/ARGOS
- C1.7 Data Publishing Service
- C1.8 PID service for publications and research products

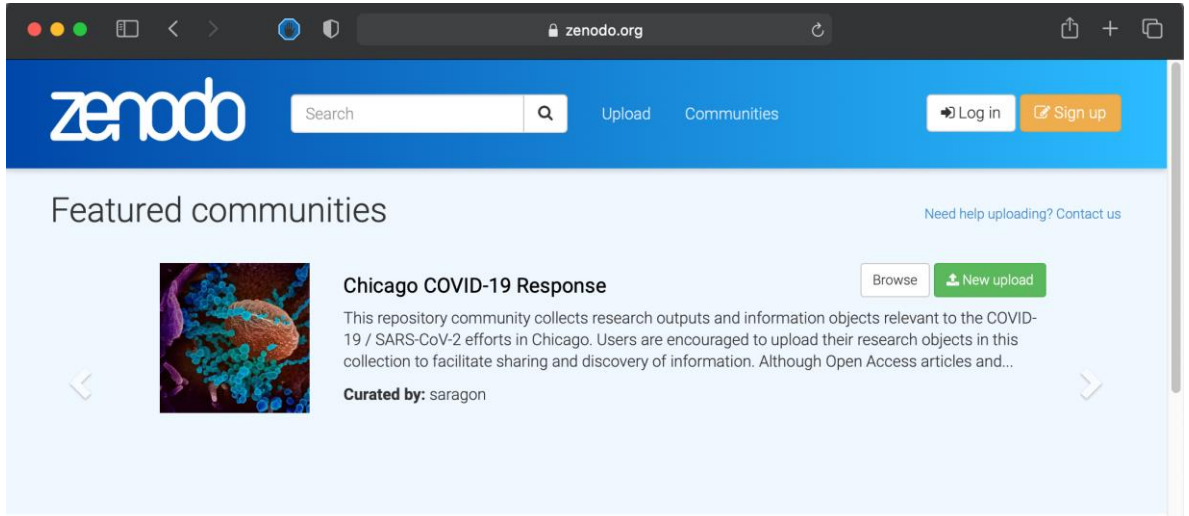
C1.1 NEANIAS Catalogue Portal and Service (ATHENA)

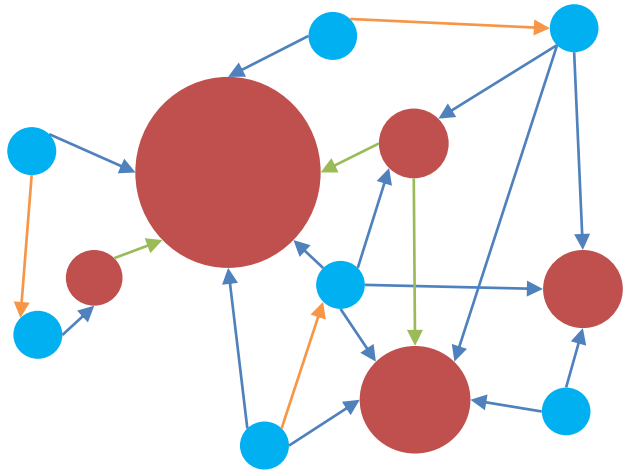
- Main entry point for all NEANIAS service offerings
- Functionalities for
  - thematic service providers to manage their service portfolio
  - end users to search, compare, browse all service characteristics
- http://catalogue.neanias.eu/
- External REST APIs for the NEANIAS registry for:
  - register and update the service metadata in the NEANIAS catalogue
  - monitor the usage of their services.
  - 3rd party systems including EOSC portal to synchronize the service metadata with the service catalogue of NEANIAS.
  - http://catalogue.neanias.eu/developers

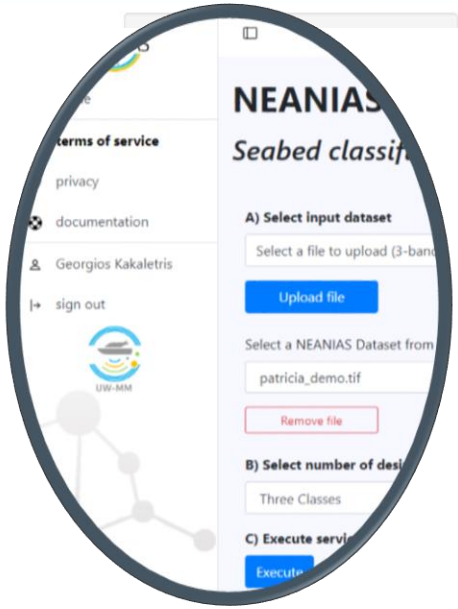


NEANIAS C1 Services

- C1.3 NEANIAS Research Product Catalogue (ARC/ATHENA)
  - Based on Zenodo
  - https://zenodo.org
- C1.4 NEANIAS Data Validation Service (CITE)
  - Validate data from a user perspective from multiple standpoints:
    - Fairness, compliance, validity, completeness etc
    - Human driven with hooks for future automations.
- C1.5 NEANIAS web toolkit (CITE/INAF)
  - Web templates and materials

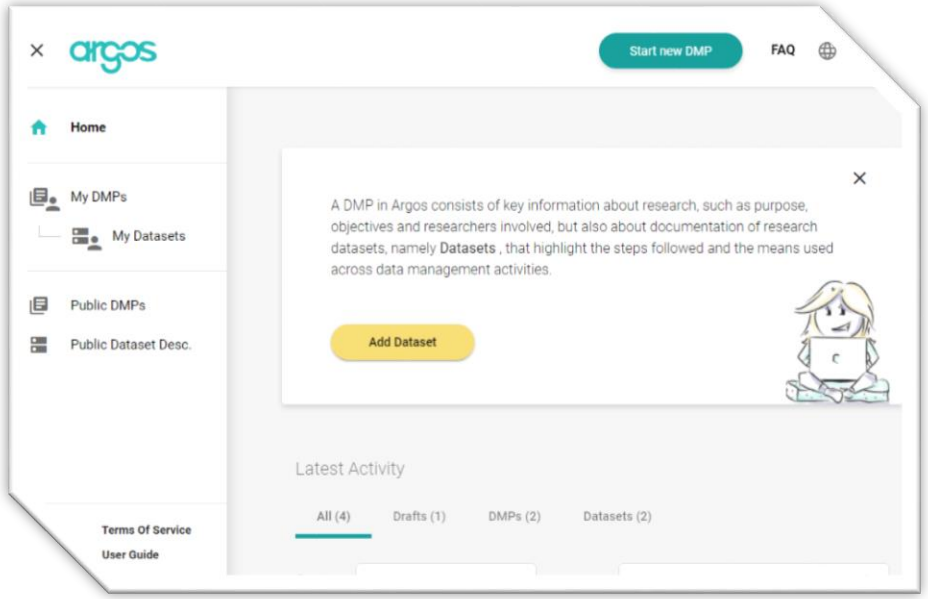






NEANIAS C1 services #2

- C1.6 OpenDMP/ARGOS (CITE)
  - Based on Argos
  - Data Management Planning and validation
  - https://argos.openaire.eu/splash/
- Zenodo Bridge (CITE)
  - Simplified access to Zenodo
- C1.7 Data Publishing Service (NKUA)
  - Based on Zenodo
- C1.8 PID service for publications and research products (NKUA)
  - Based on Zenodo

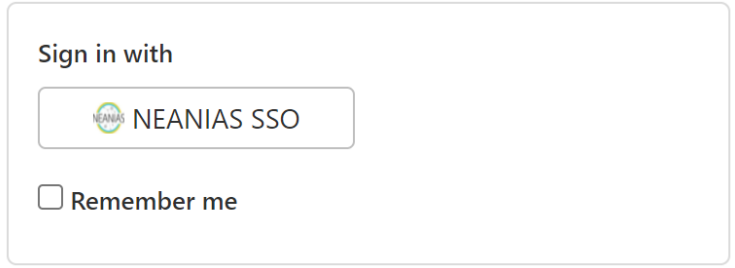


T6.4 – C2 services

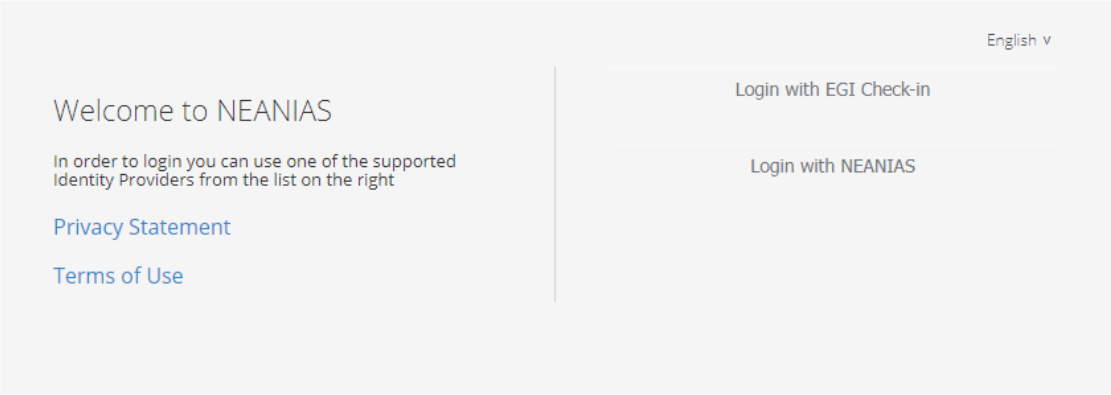
- C2.1 NEANIAS AAI
- C2.2 NEANIAS Configuration Service
- C2.3 NEANIAS Service Registry
- C2.4 NEANIAS Logging
- C2.5 NEANIAS Accounting
- C2.6 NEANIAS Notification
- C2.7 NEANIAS Object Storage
- C2.8 NEANIAS Data Sharing Service
- C2.9 Data Exploration Service
- C2.10 SMTP email Service
- C2.11 GARR Cloud Platform
- C2.12 GARR Container Platform
- C2.13 GARR DaaS

C2.1 NEANIAS AAI (CITE)

- Based on Keycloak
- Horizontal AuthN solution for all NEANIAS services
- Role based AuthZ provided
- Environments:
  - Prod / Dev / Staging
- Logging & Accounting integrations
- Custom UI theme to facilitate login process across realms and providers
- AuthZ & registration support
- Access Granting process
  - User group / (composite) role restructuring
  - Assignment process
  - Align with SMS
- https://sso.neanias.eu/

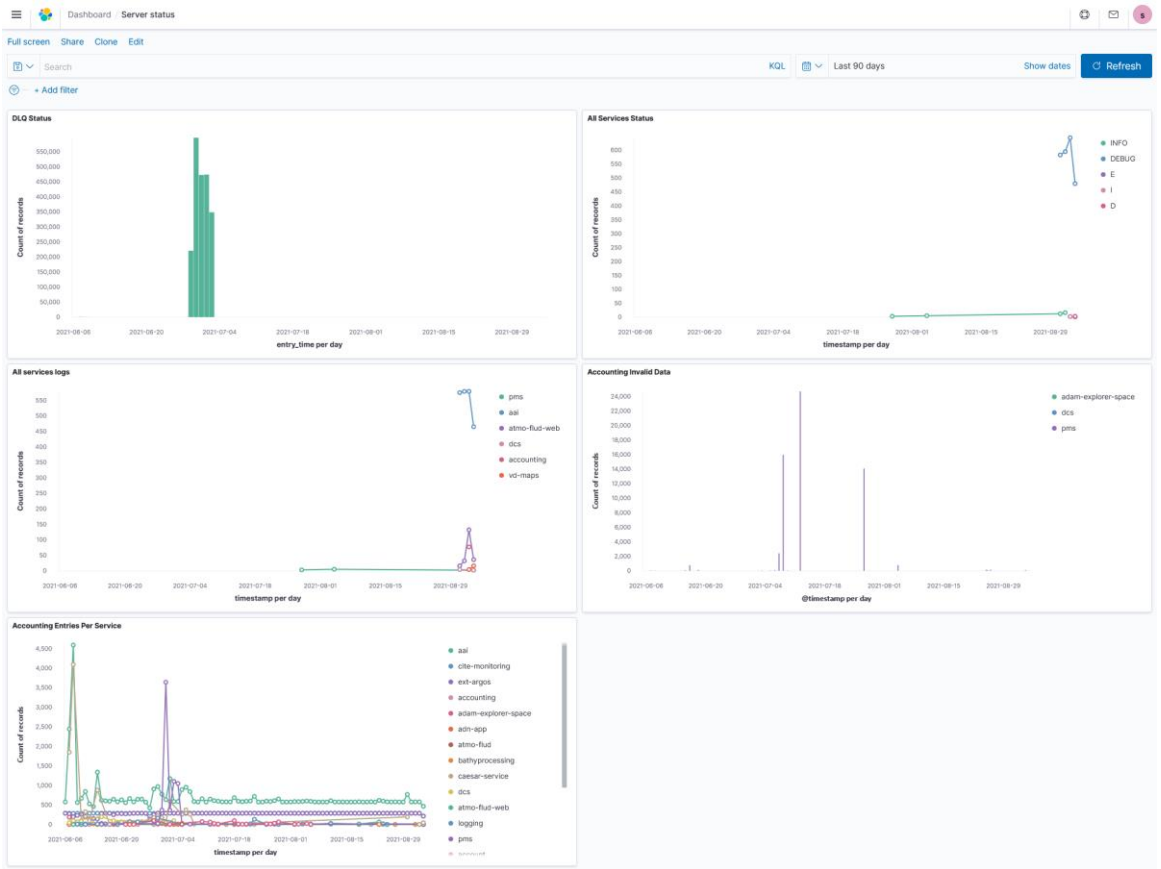


NEANIAS



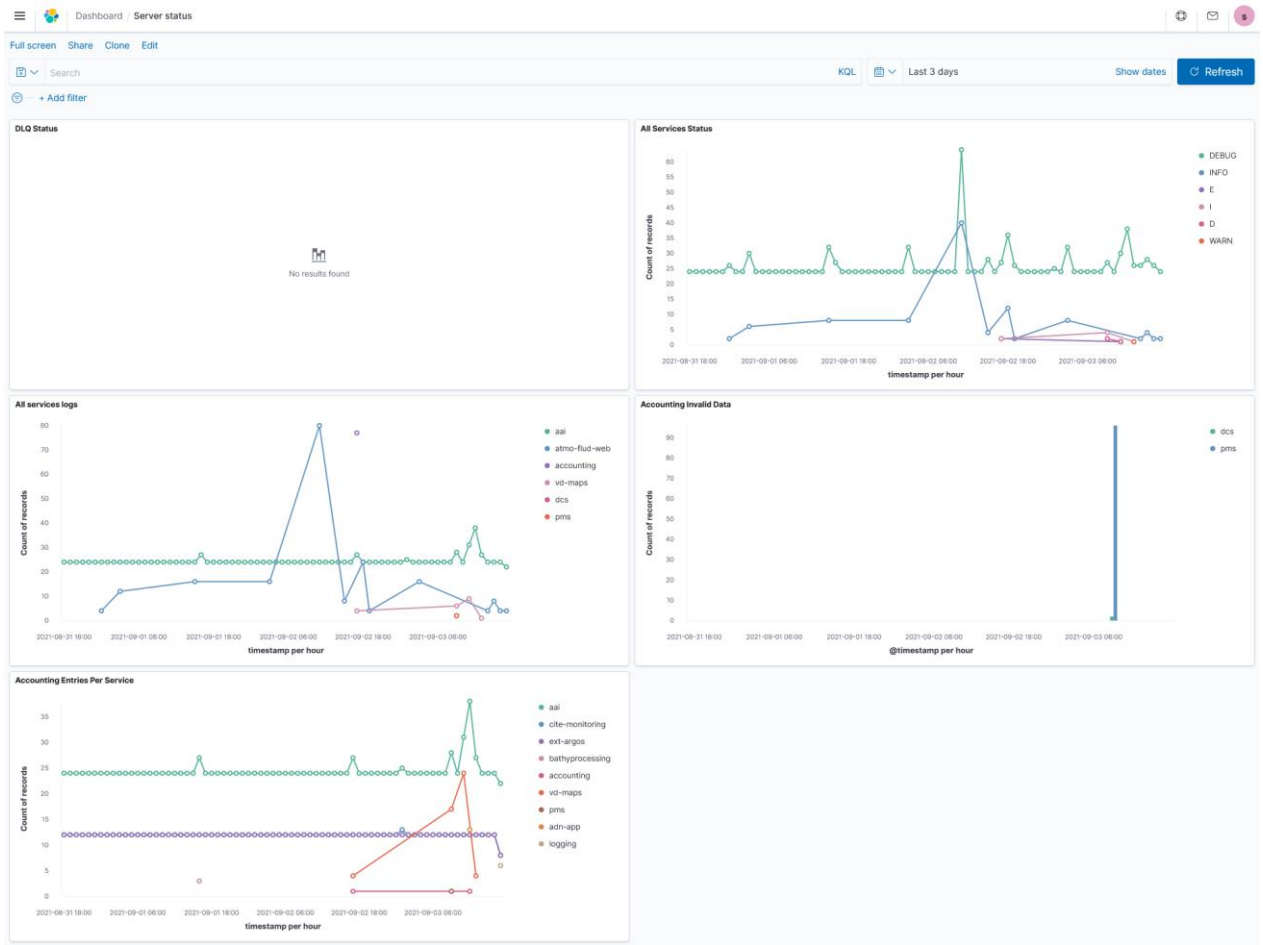
C2.4 NEANIAS Logging (CITE)

- Based on ELK Stack
  - Elasticsearch
  - Logstash
  - Kibana
  - Beats
- Horizontal Log Aggregator
  - Distributed, heterogeneous systems
  - Central Monitoring of Troubleshooting & Higher-level information
- Versatile approach to allow configuration-based extensibility
  - Log Templates
  - Permissive Log Model
- AuthN & AuthZ
  - NEANIAS AAI + Client level Identification
- https://logging.neanias.eu



C2.5 NEANIAS Accounting (CITE)

- Centrally register accounting information
- Gradually accumulate through service usage
- Configuration and log-processing based integration
- Authorized access and separation of data
- Distributed and scalable across all layers
  - Data storage
  - Processing
  - Visualization
- https://accouting.neanias.eu

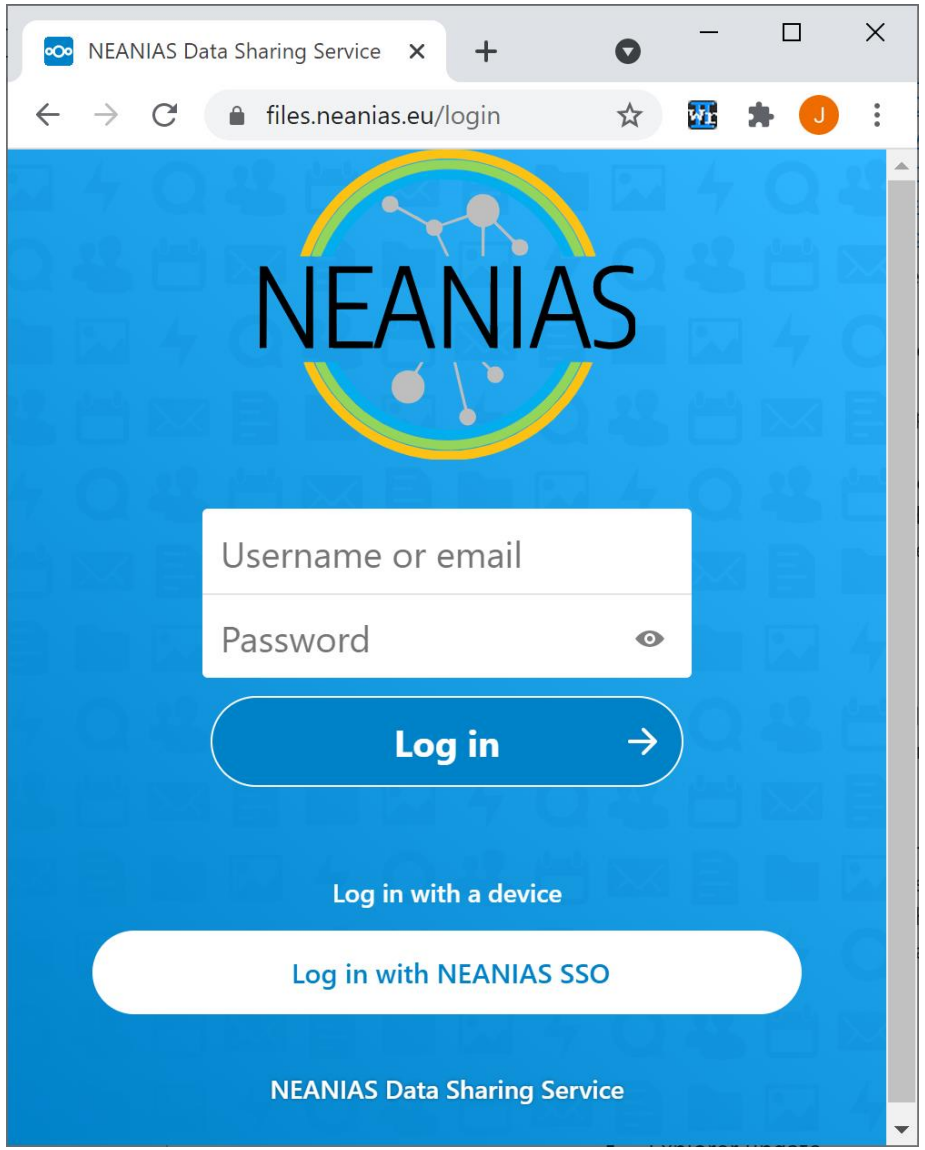


NEANIAS C2 services

- C2.2 NEANIAS Configuration Service (CITE)
  - Based on Zookeper
  - Key Value store for storing NEANIAS service configurations
  - https://configuration.neanias.eu
- C2.3 NEANIAS Service Registry (CITE)
  - Based on Zookeper
  - Provides service discovery and health status
  - https://registry.neanias.eu
- C2.6 NEANIAS Notification (CITE)
  - HTTP API
  - Notification channel: email
  - Template and Ad-hoc based notifications
  - https://notification.neanias.eu

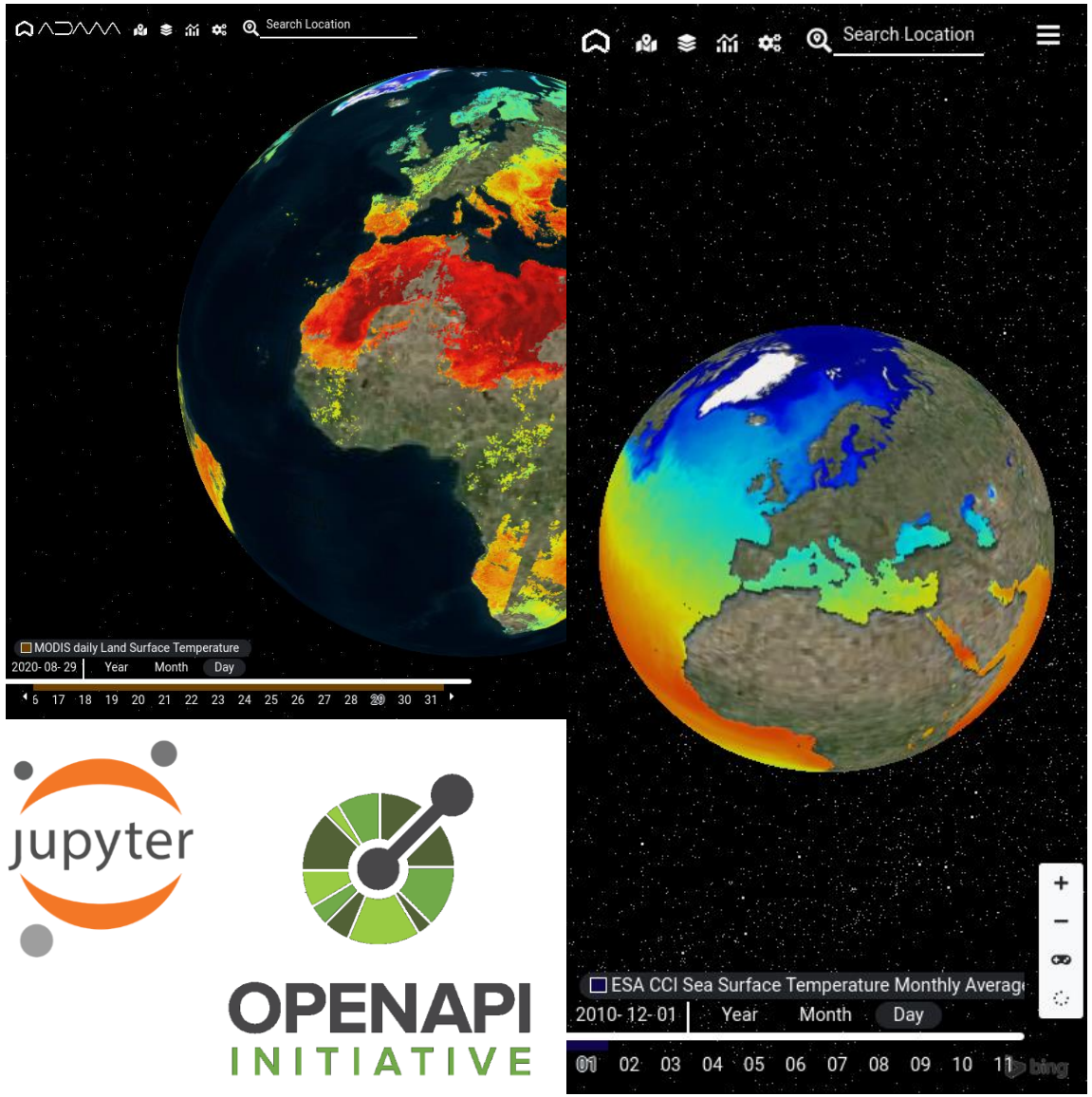
C2.8 NEANIAS Data Sharing Service (NKUA)

- Based on Nextcloud
- Allows end-users to share files with the NEANIAS services
- Allows inter and intra service communication via file sharing.
- Quota management
- Utilized by Thematic and Core services
- https://files.neanias.eu



C2.9 Data Exploration Service (MEEO)

- Based on adamapi (2.0.8)
- Supports the visual browsing and searching of Planetary Data
- Continuous registration of new datasets and products
- Integration with C4.4
- Onboarded on EOSC
- https://explorer.adamplatform.eu



jupyter

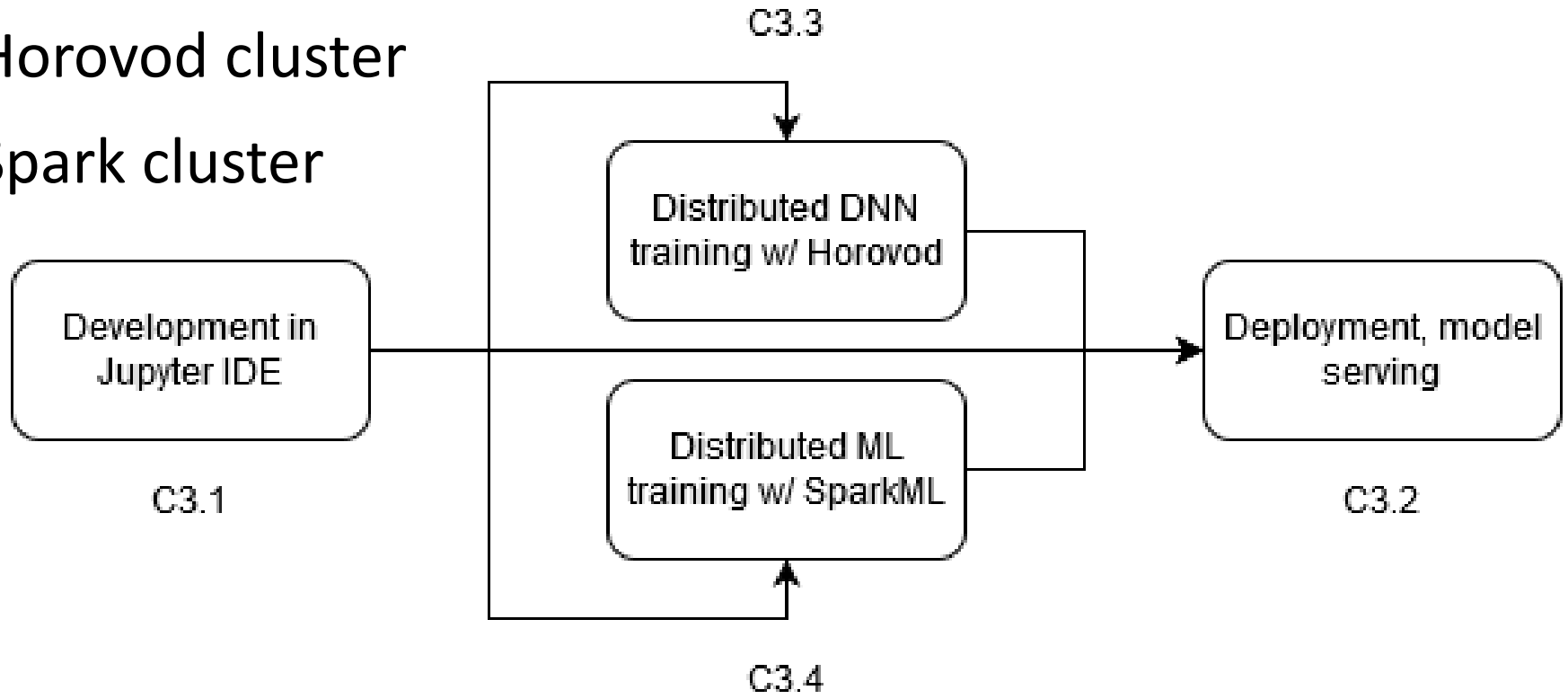
OPENAPI INITIATIVE

GARR Cloud and Container platform (GARR)

- C2.11 GARR Cloud platform
  - Based on OpenStack
  - In production on three geographical regions
- C2.12 GARR Container platform
  - Based on Kubernetes
  - Several instances deployed: NEANIAS production cluster, NEANIAS staging cluster
- C2.13 GARR DaaS
  - Based on Juju
  - In production in three regions
  - Used to deploy and manage GARR Container Platform (Kubernetes) instances

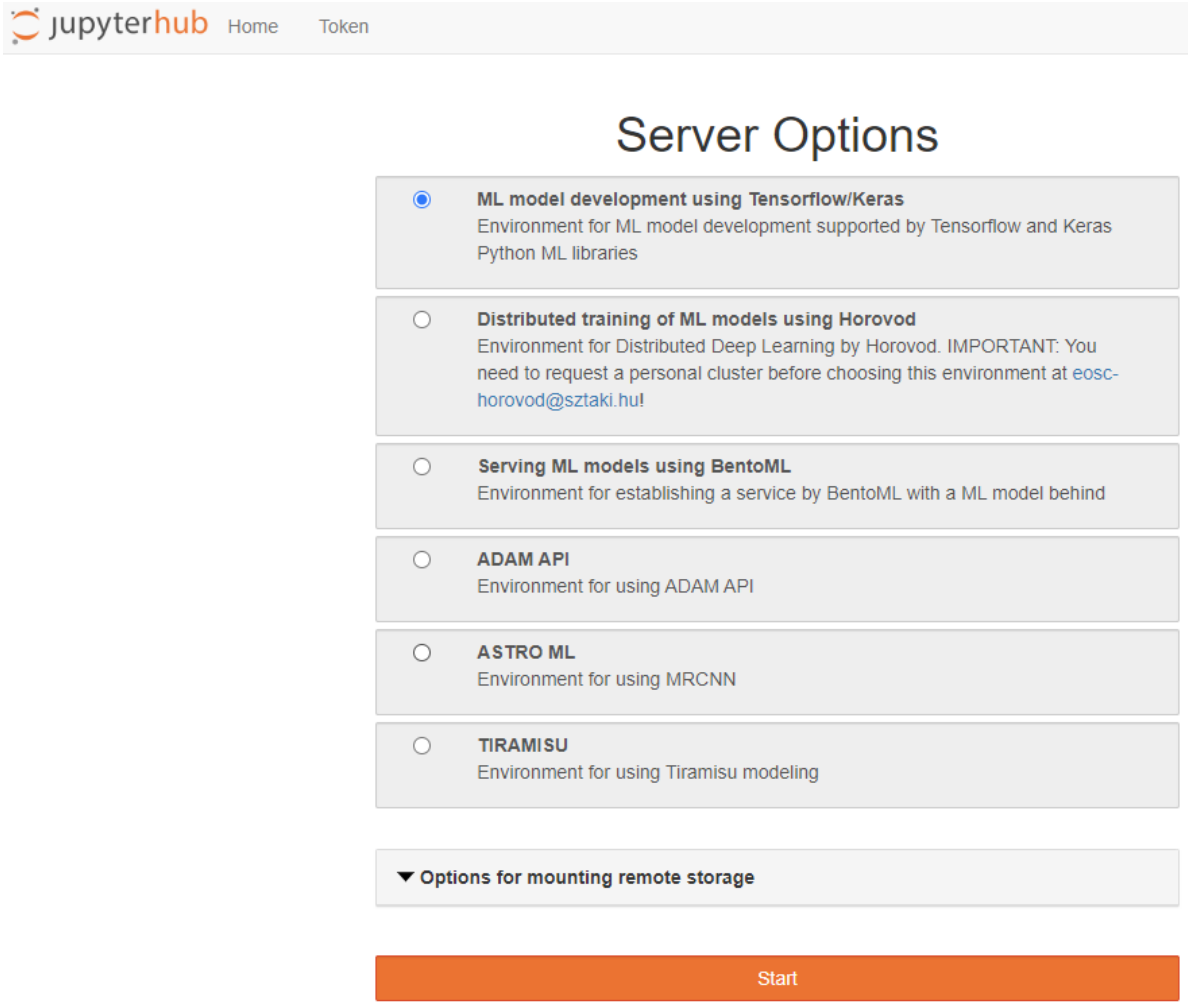
T6.5 – C3 services

- C3.1 AI Gateway
- C3.2 Model serving
- C3.3 Horovod cluster
- C3.4 Spark cluster



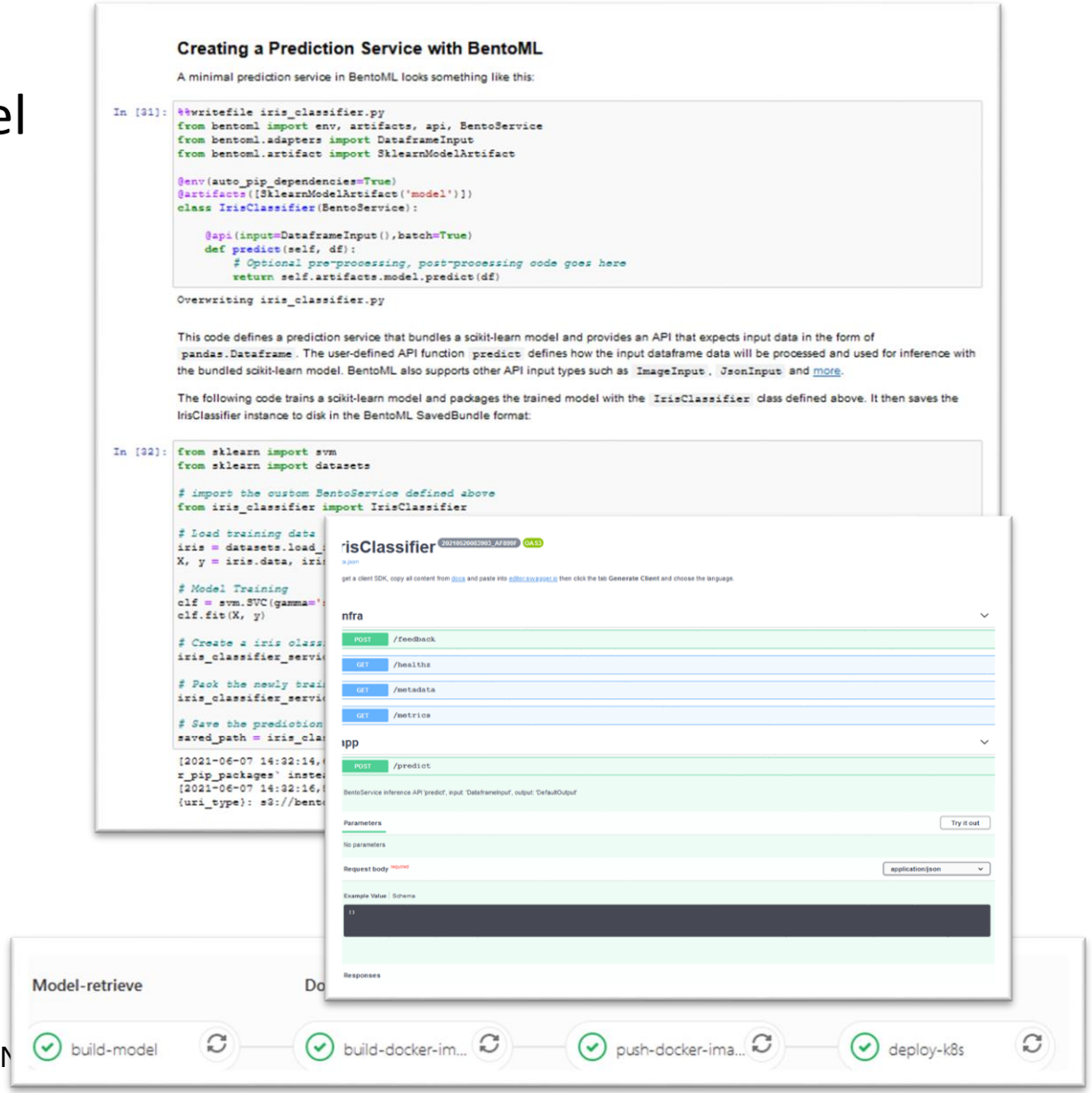
C3.1 AI Gateway (SZTAKI)

- Based on JupyterHUB
- Supports machine learning related environments
- Production environments:
  - Tensorflow/Keras
  - Distributed Training with Horovod
  - Model serving with BentoML
  - Adam API
  - ASTROML
  - TIRAMISU
- Integrated
  - AAI
  - Logging and Accounting
  - Data Sharing Service
- Deployed on the NEANIAS Kubernetes cluster
- https://ai-gateway.neanias.eu



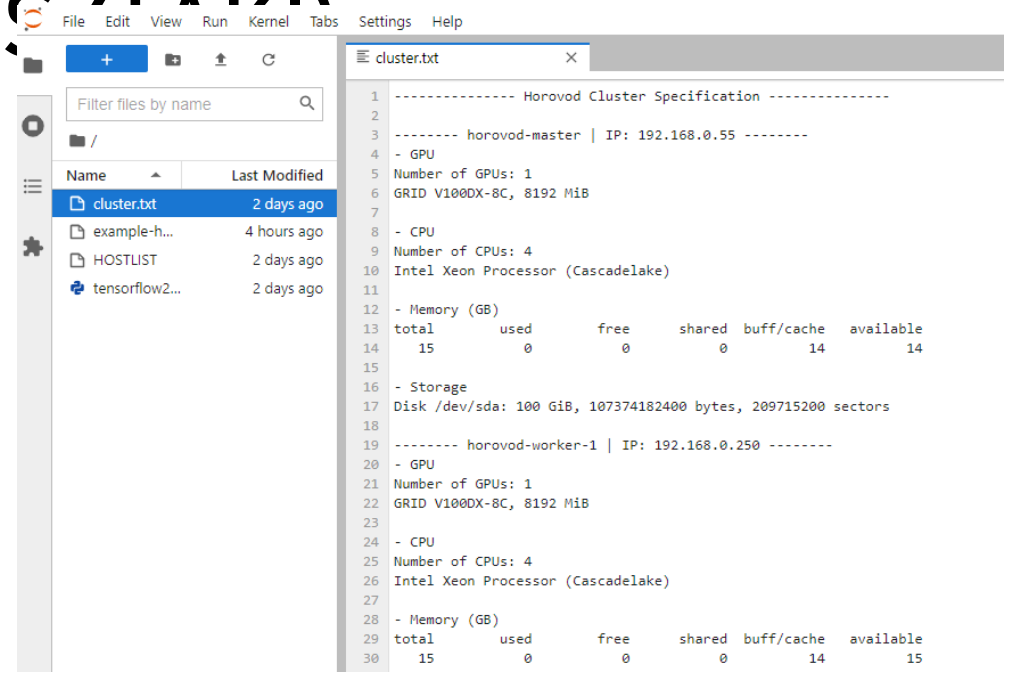
C3.2 Model serving

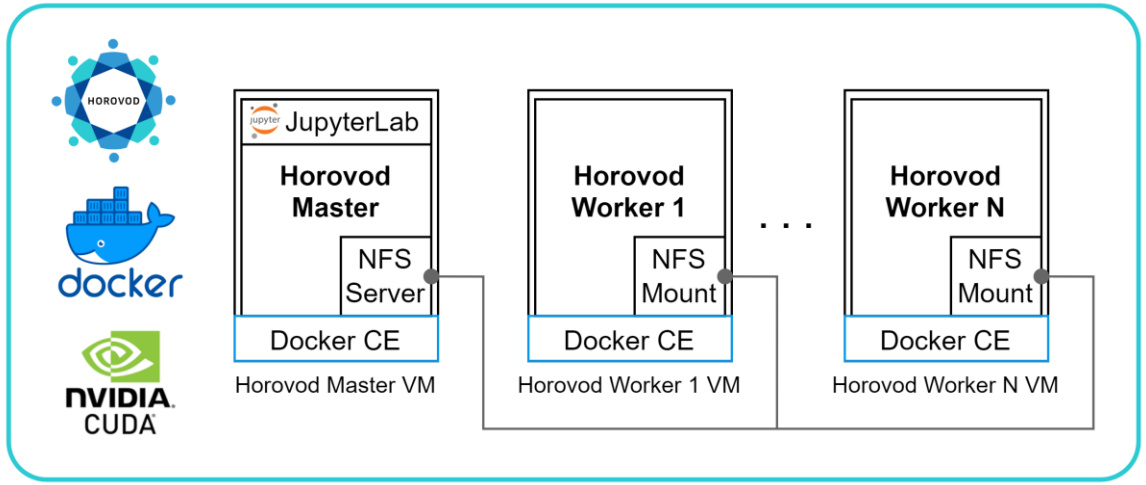
- Based on BentoML, supports model serving
- Support exposing the trained ML models as services
- Simplifies machine-learning model deployment
- Runs high-performance model serving at scale;
- Deployed on NEANIAS Kubernetes cluster
- Integrated with C3.1 AI-Gateway



C3.3 Horovod cluster (SZTAKI)

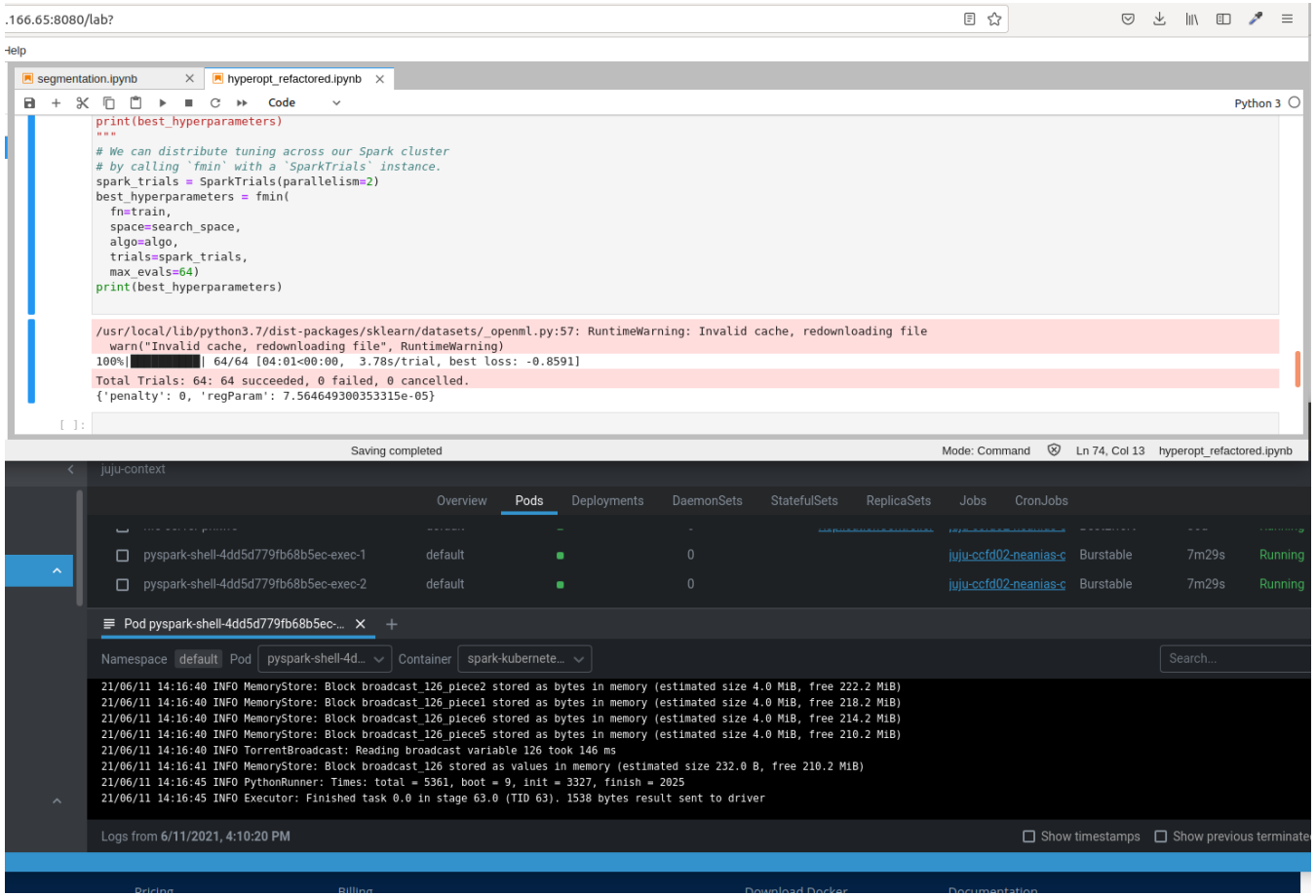
- Distributed Deep Learning based on Horovod
- Accessible through JupyterLab
- Shared storage inside the cluster
- Demo examples for distributed training
- Automatic deployment method based on Terraform and Horovod for EGI-ACE
- CI/CD based automatic testing
- Internal monitoring system based on Prometheus and Grafana
- Integrated with C3.1 AI-Gateway
- Onboarded on EOSC





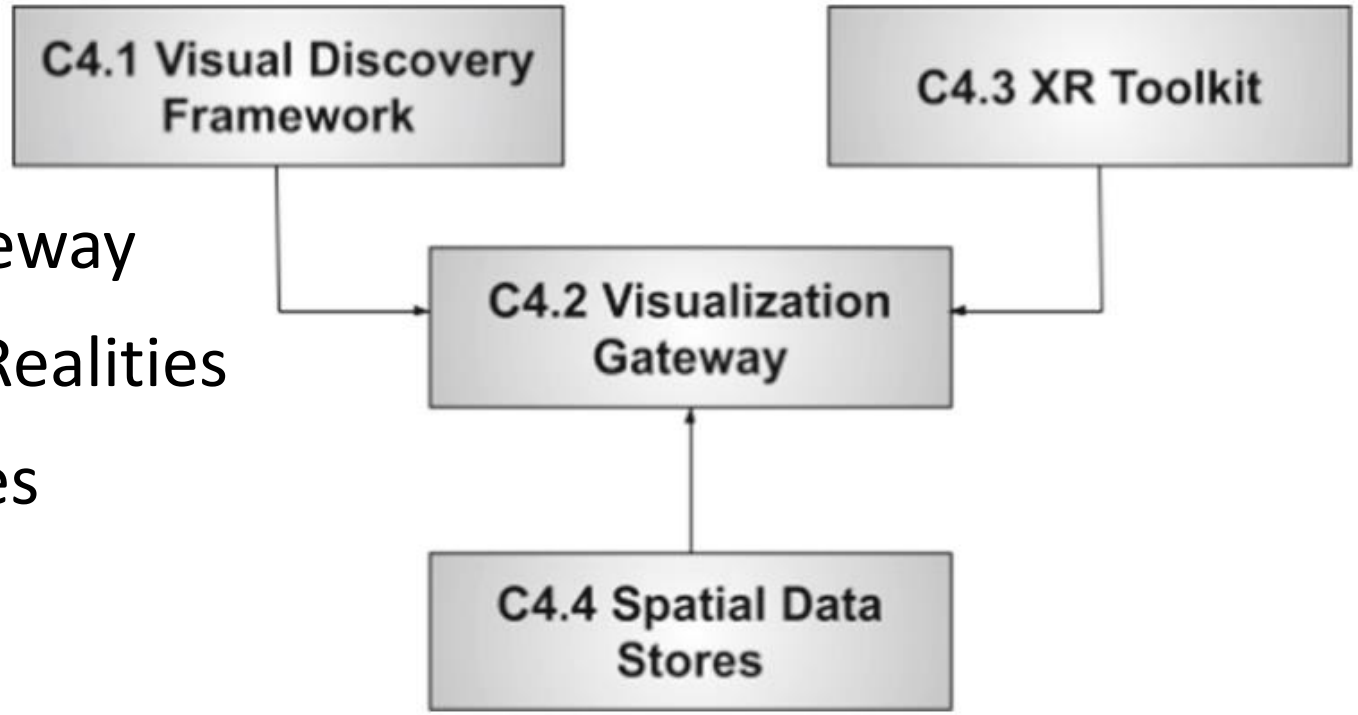
C3.4 Spark cluster (UNIMIB)

- Distributed ML on Kubernetes
- Example use cases implemented
- Split Spark cluster in multiple namespaces to manage resources
- Jobs could be spawned remotely with right k8s config file
- Tested successfully on EGI ACE resources



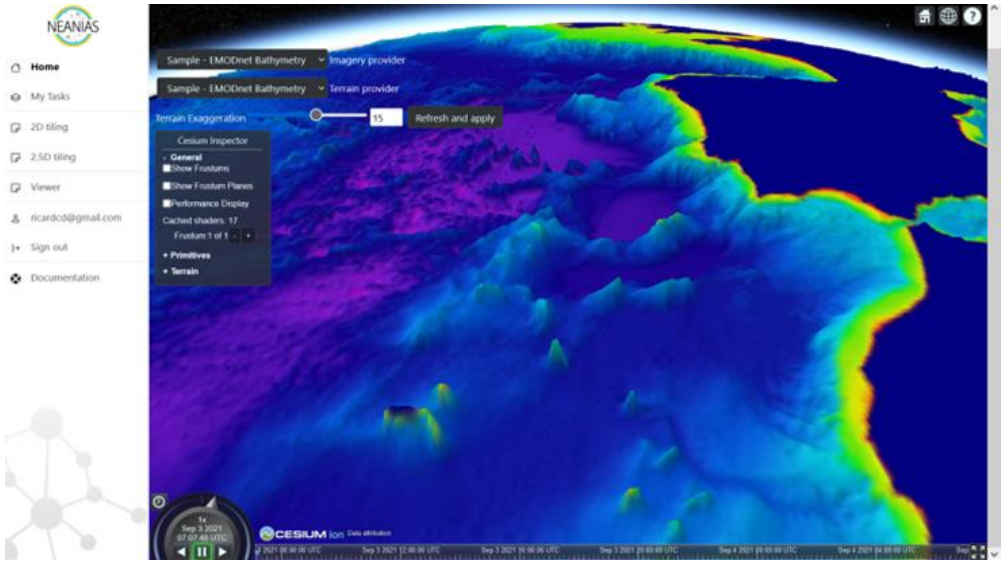
T6.6 – C4 services

- C4.1 Visual Discovery Framework
  - C4.1.1 VD-Visivo
  - C4.1.2 VD-Splotch
  - C4.1.3 VD-Maps
- C4.2 Visualisation Gateway
- C4.3 Toolkit for Cross Realities
- C4.4 Spatial Data Stores



C4.1 Visual Discovery Framework (INAF+UoP+CORONIS)

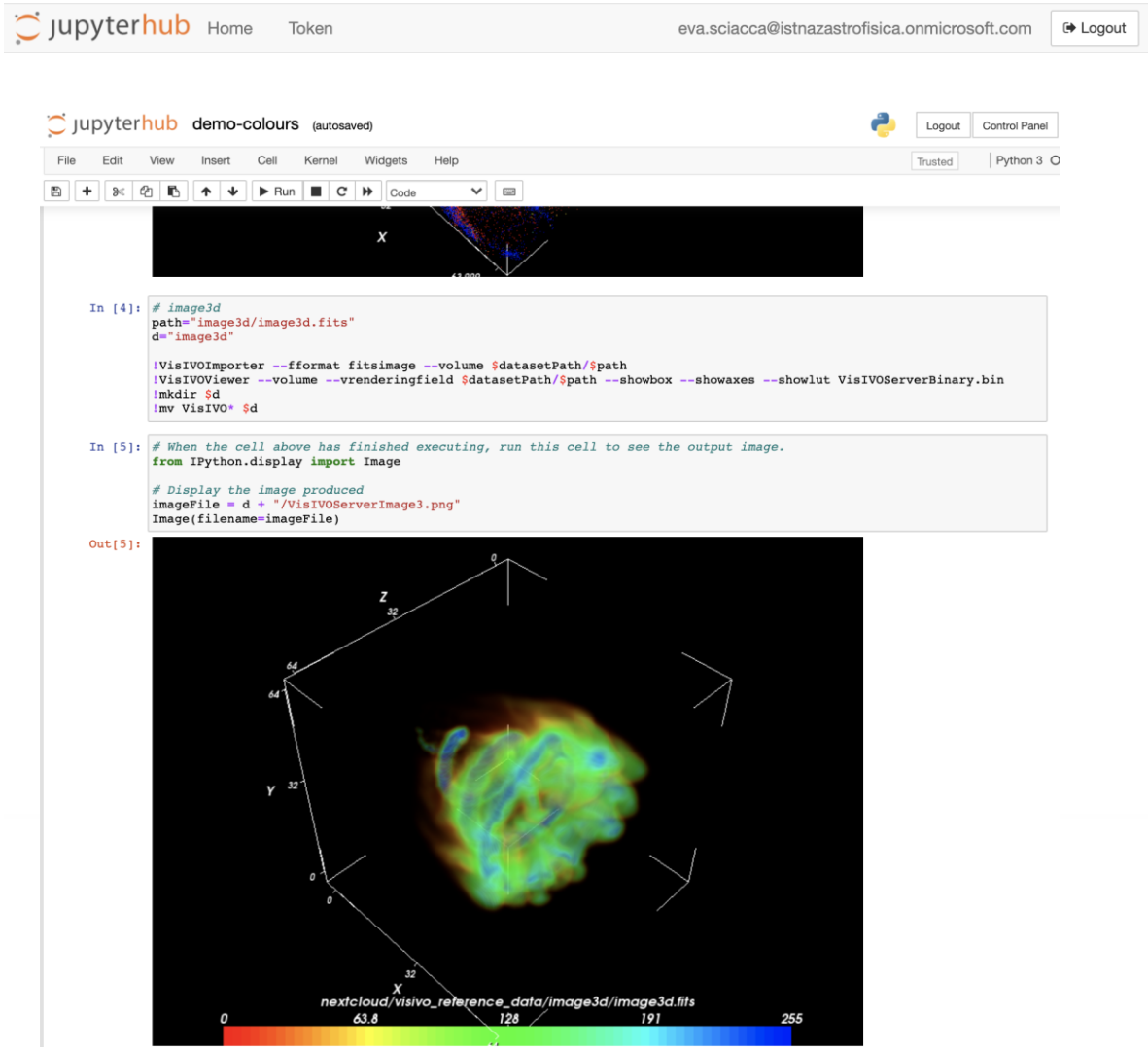
- **VD-VisIVO**
  - framework for data intensive visual discovery for experiments and data analysis
  - data processing and visual discovery the suite of tools provided by VisIVO
  - available using the Visualization Gateway
- **VD-Splotch**
  - data processing and visual discovery the suite of tools provided by Splotch
  - available using the Visualization Gateway
- **VD-MAPS**
  - create, serve and visualize imagery (2D images) or terrain-based (elevation and/or bathymetric maps) hierarchical tiled maps
  - Onboarded on EOSC



VD-Maps

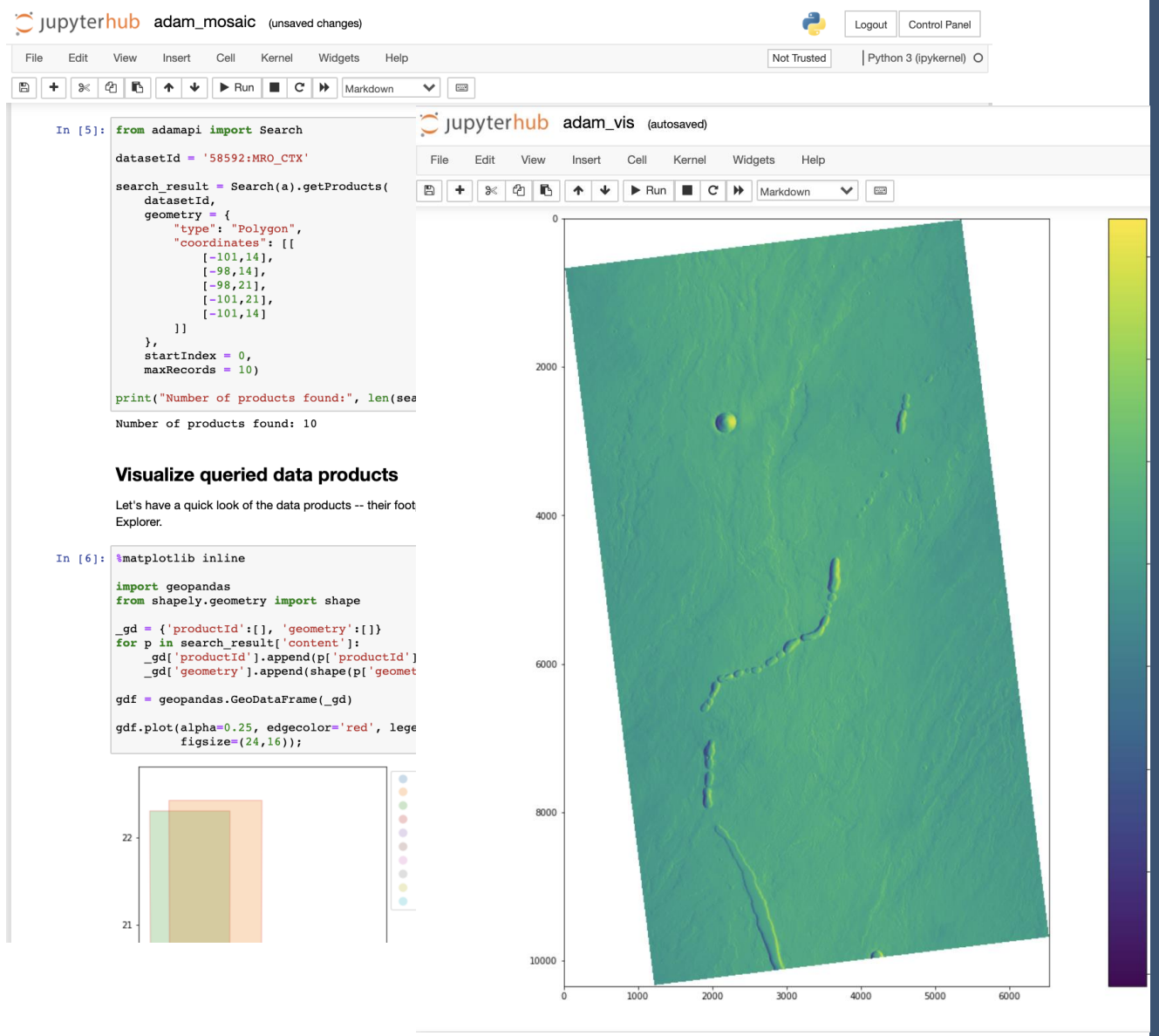
C4.2 Visualization Gateway (INAF+UoP)

- Fully based on JupyterHub framework with
  - C4.1 VD-VisIVO
  - VD-Splotch
- Running on the NEANIAS Kubernetes Cluster
- HPC Testing on Services on the HPE HPC
- Integrated
  - AAI
  - Logging and Accounting
  - Data Sharing Service
- https://vis-gateway.NEANIAS.eu



NEANIAS C4 services

- C4.3 Toolkit for Cross Realities (ALTEC)
  - Environment complex visualisation solutions exposed to end-users via Cross Realities (XR) mechanisms like VR, AR
- C4.4 Spatial Data Stores (JACOBS+MEEO)
  - Spatial data stores allow data to be referenced, query and retrieved, based on a given location
  - Accessible through ADAM interface



Summary

- Almost **30 core services** are being developed and maintained by **12 partners**
- **3rd release** has been issued in Feb 2022
- Focus shifted towards operation and maintenance (WP7)
- Next presentations & demos:
  - NEANIAS Accounting - Giorgos Papanikos
  - Horovod with AI-Gateway - Krisztián Póra
  - VD-MAPS - Ricard Campos

NEANIAS

Novel EOSC Services for Emerging Atmosphere, Underwater & Space Challenges

NEANIAS receives funding from European Union under Horizon 2020 Research and Innovation Programme under grant agreement No. 863448

Thank you for the attention!

Attila Farkas (SZTAKI) – attila.farkas@sztaki.hu

- Jozsef Kovacs WP6 leader (SZTAKI)
- George Papastefanatos, T6.1, T6.3 leader (ATHENA)
- Giorgos Papanikos, T6.2, T6.4 leader (CITE)
- Gabor Kertesz, T6.5 leader (SZTAKI)
- Eva Sciacca, T6.6 leader (INAF)
- WP6 partners: NKUA, ATHENA, INAF, SZTAKI, CORONIS, CITE, UOP, UNIMIB, JACOBSUNI, MEEO, GARR, ALTEC

Follow us:

http://www.NEANIAS.eu

https://twitter.com/NEANIAS_eu

https://www.facebook.com/NEANIAS.eu/

https://www.linkedin.com/groups/13786081/