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Building Cloud-Based Data Services to Enable Earth Science Workflows

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Weather forecasts produced by ECMWF and environmental services by the Copernicus programme act as a vital input for many downstream simulations and applications. A variety of products, such as ECMWF reanalyses and archived forecasts, are additionally available to users via the MARS archive and the Copernicus data portal. Transferring, storing and locally modifying large volumes of such data prior to integration currently presents a significant challenge to users. The key aim for ECMWF within the H2020 HiDALGO project (<https://hidalgo-project.eu/>) is to migrate these tasks to the cloud, thereby facilitating fast and seamless application integration by enabling precise and efficient data delivery to the end-user. The required cloud infrastructure development will also feed into ECMWF's contribution to the European Weather Cloud pilot which is a collaborative cloud development project between ECMWF and EUMETSAT.

The HiDALGO project aims to implement a set of services and functionality to enable the simulation of complex global challenges which require massive high performance computing resources alongside state-of-the-art data analytics and visualization. The HiDALGO use-case workflows are comprised of four main components: pre-processing, numerical simulation, post-processing and visualization. The core simulations are ideally suited to running in a dedicated HPC environment, while the pre-/post-processing and visualisation tasks are generally well suited to running in a cloud environment. Enabling and efficiently managing and orchestrating the integration of both HPC and cloud environments to improve overall performance and functionality is the key goal of HiDALGO.

ECMWF's role in the project will be to enable seamless integration of two pilot applications with its meteorological data and services (such as data exploration, analysis and visualisation) delivered via ECMWF's cloud and orchestrated by bespoke HiDALGO workflows. The demonstrated workflows show the increased value which can be created from weather forecasts, but also derived forecasts for air quality which are provided by the Copernicus Atmospheric Monitoring Service (CAMS).

This poster will give a general overview of HiDALGO project and its main aims and objectives. It will present the two test pilot applications which will be used for integration, and an overview of the general workflows and services within HiDALGO. In particular, it will focus on how ECMWF's cloud data and services will couple with the test pilot applications thereby improving overall workflow

performance and enabling access to new data and products for the pilot users.