



FF4EuroHPC Success Story

# AI and HPC for Reservoir Monitoring

## Organizations

**ARESYS** is an Italian SME designing and developing ad-hoc monitoring solutions, using microwave Radar/SAR imaging, seismic surveys, and vibroacoustic sensors.

**GGD-DICEA-SAPIENZA** is the largest university in Europe. The Geodesy and Geomatics Division (GGD) is part of the Sapienza University of Rome.

**SORICAL** is a public institution that oversees the management of water resources and reservoirs for the Calabria region.

**CINECA** is the largest Italian HPC centre and cooperates with academia and industrial partners.



End User



Domain Expert



Technology Expert



HPC Provider



CINECA is part of the Italian NCC.



## The Challenge

Aresys has identified entry into the environmental management sector, which is largely composed of publicly owned local agencies, as a strategic direction for the company. In particular, high-performance data analytics of optical satellite imagery is performed to develop a novel approach for the continuous monitoring of water reservoirs as water shortage and perduring periods of droughts interspersed with extreme weather events make the correct management of water resources a critical issue in any European country.

The systematic exploitation of optical imagery from the Sentinel-2 constellation, belonging to the EU Copernicus Programme, assures both the availability of new measurements every five days and the access to historical datasets starting in 2015. Moreover, these data are provided at no additional charge, making them the ideal data source to lower overall monitoring costs compared to direct access to reservoir sites.

However, the amount of data and the required processing sequence calls for on-demand HPC resources to build the added value information required by customers.





Industry Sector  
**Environment**

Technology used:  
**HPC,**  
**AI**

## The Solution

Aresys designed and developed a new service where Sentinel-2 optical images are used to identify reservoir water surface variation over time, without the need for in-situ measurements. Water surface is estimated based on proper geometric and radiometric processing using the latest Deep Learning results to cope with the Sentinel-2 data resolution.

The seasonal variations of the reservoir water storage allow the definition of a continuously evolving 3D model of the reservoir itself, using historical data-sets, which is available as soon as a new reservoir is monitored. HPC resources are necessary for the AI-assisted processing steps and to provide the starting 3D reservoir model.

## The Impact

Smart monitoring and the space economy are both growing sectors in Europe. Moreover, as significant risks are caused by water scarcity conditions and drought events, especially in southern Europe, better management of freshwater has a significant social and environmental impact.

The new Aresys SaaS service targets customers involved in the freshwater management cycle allowing them to improve the management of their reservoirs, thus reducing the threat of water scarcity in Europe.

The ability to exploit on-demand computing power from HPC providers makes the business suitable for a consulting SME such as Aresys, allowing it to sustain a highly variable number of customers while providing historical data analysis promptly.

Aresys plans to sell the demonstrated service to 20% of Italian reservoirs of which there are about 110 according to the Italian Dam Registry, with a revenue of €550,000 for the first year. The value of the addressable European overall market, i.e. the current expenditures for reservoir monitoring, could be estimated at more than €200 million.

## Benefits

- Aresys now offers a new, profitable SaaS service for reservoir monitoring.
- The service – using on-demand HPC resources – can handle many customers efficiently.
- Sorical lowers monitoring costs for reservoirs by €15,000 per reservoir.
- Aresys set up a dedicated group (3 new jobs) for satellite optical data processing and exploitation.