COPERNICUS SENTINELS HELP VESSEL TRAFFIC MONITORING

Sentinel satellites imagery is used by local authorities to monitor navigation and manage traffic in Southeastern Europe, on the Romanian Danube sector.

The challenge

Navigation on the Danube river is limited by the presence of sand banks (dry summer periods) and ice banks (very cold winter time), phenomena that have an important impact on navigation safety, continuity and effectiveness of goods and passengers transport operations.

In July–August 2015, most of the European continent experienced daily temperatures above 34 - 35° C and absolute maximum values above 40° in many areas (e.g. 46.2° C in southern Romania). Combined with a significant reduction of rainfall, this led to atmospheric and soil drought and low water levels of the Danube River. The low water level advanced the narrowing of the navigation path at Zimnicea (567 kilometer), causing ships to wait in a row before crossing the area.

The space based solution

During the hot summer of 2015, the Romanian Lower Danube River Administration (AFDJ) and Romanian Space Agency (ROSA) were in contact and worked closely to find a reliable solution for characterizing the ship traffic on the Danube. Everything started from the notice sent by the authorities relating to the long time needed by the ships to cross the Romanian channel.

With the help of the European Space Agency (ESA) experts and mission managers, the first available Sentinel 1 and Sentinel 2 (still in the commissioning phase at that time) were processed and sent to AFDJ. Image data was mainly used for identifying the crowded points and to count the ships queuing on the Danube. Thanks to the satellite images of 2nd and 9th of August, it became immediately obvious that many more ships were on the Danube than initially reported based on the AIS (Automatic Identification System) data (some 100 or more ships).

The combined use of Sentinel-1 and Sentinel-2 information allowed the Romanian Lower Danube River Administration to monitor navigation at critical points such as those close to Zimnicea until the end of the drought period.

The results have been published on the European Space Agency and Romanian Space Agency websites.

The User Maturity Level is represented by the ad-hoc use phase, where the Copernicus-based solution has been used with no explicit interest from the regional authority to trial consistent usage.

Ships queuing along the Danube due to low water level.
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Benefits to Citizens

In 2017, AFDJ reported a significant increase in the number of ships transporting goods on the Danube – 1863 ships in 2017 compared with 1771 ships in 2016, which also translates into an increase of revenues for both the administration and the commercial sector.

Earth Observation satellite data proved to be very useful for helping continuous monitoring of the ship traffic in order to avoid navigation problems. They can further improve the functionality of existing navigation systems, accuracy of sailing management information and dissemination of information.

Thematic Area: TRANSPORTS, CIVIL INFRASTRUCTURE AND SAFETY

Region of Application: SOUTH MUNTENIA - TELEORMAN COUNTY

Sentinel mission used: S1 S2

Copernicus Service used: –

Usage Maturity Level: 2

Ships queuing along the Danube river near the Romanian town of Zimnicea. Captured by Sentinel-1A on 2 August 2015.
Credit: Contains modified Copernicus Sentinel data [2015]/ESA

Outlook to the future

Integration of Copernicus data into RIS will contribute to better vessel traffic monitoring considering the inland waterway and the main navigation operations such as, lock operation, port operation, bridge operation and others.

The integration and use of Sentinels together with inland vessel traffic services would prevent the development of dangerous vessel traffic situations by managing traffic movements, providing safety and efficient movement of vessel traffic within the VTS area.

> "The main purpose was to identify the ships that are not equipped with Automatic Identification System, and the Sentinel images have proved extremely useful."
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> ***Ion Nedelcu,***
> ***Romanian Space Agency***

Where appropriate, selecting SAR (Synthetic Aperture Radar) sensors take opportunities disregarding the day / night or weather conditions, reducing the effort on the delineation of navigation obstacles over the river surface. It is possible to grant multiple daily opportunities for acquisitions and in so doing widen the portfolio of higher value products available.

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ABOUT COPERNICUS4REGIONS

This Copernicus User Story is extracted from the publication "**The Ever Growing use of Copernicus across Europe's Regions: a selection of 99 user stories by local and regional authorities**", 2018, Edited by NEREUS, the European Space Agency and the European Commission.
The model cases focus on local and regional authorities who successfully applied Copernicus data in 8 major public policy domains.

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