

# Evaluation of the STEREO III Programme

## Summary

Since 1984, a series of programmes have been implemented at federal (national) level in Belgium with the primary aim to build up the national earth observation (EO) or remote sensing (RS) research capacity<sup>1</sup>. STEREO III (Support To Exploitation and Research in Earth Observation), the seventh earth observation research programme of the federal authorities, ran from 2014-2021 and had a budget of €28.3 million. It supported 1) scientific research via project funding; 2) made available tools and data to the research community, and; 3) promoted valorisation (dissemination) and support of the wider community (potentially) interested in EO/RS. This report presents the results of the evaluation of the scientific and societal impact evaluation of STEREO III and identifies elements within the programme that can be adapted or improved in a possible successor to the STEREO III programme.

### Approach adopted for this evaluation

The ex-post evaluation, which took place from June 2021 till December 2021, applied a mixed-method approach. In a first step, the evaluation team created a comprehensive overview of the activities and direct results of the overall STEREO III programme through a structured analysis of the administrative data (portfolio-analysis) and user statistics (website statistics, twitter data newsletter subscribers, data on purchases of satellite data). In a second step, a comprehensive electronic survey aimed at both researchers involved in STEREO III as well as wider users was carried out. In parallel, the evaluation teams analysed both the scientific and wider societal impact of STEREO III. The former was performed using bibliometrics methods and provided insight into the quantity and quality of the scientific publications (and underlying research networks) of STEREO III financed research during the evaluation period. The bibliometrics analysis gave a detailed insight into author-based networks in Belgium and worldwide using the STEREO III themes. The societal impact was assessed using the impact pathways approach. The impact was sketched out using 10 pathways spread over three broad impact areas: human capital, the wider public and the economy and innovation. The societal impact was assessed based on desk research, participants and end-users survey, interviews as well as a dedicated impact pathway workshop.

Based on the results of the abovementioned research, we drew up a SWOT-analysis and formulated draft conclusions and recommendations. The results were presented to an independent expert workshop moderated by the evaluation team. A group of eight international peer experts assessed the impact and quality of the STEREO III programme (see Annex 9) and validated the results of the evaluation performed by the Dialogic/EFIS consortium. Part of this expert workshop was a session in which a selection of 13 Belgium earth observation researchers shared their experiences with and views on STEREO III. The Dialogic/EFIS consortium performing the evaluation also benefitted from frequent interaction and discussions with the STEREO III programme management.

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<sup>1</sup> Earth observation is the collection of information about the physical, chemical and biological systems of the earth via remote-sensing technology. According to the definition of the leading association for earth observation GEO (Group on Earth Observations), the technology includes space-bound as well as ground-based and in situ data (drones, aerial photos, sensors on masts). In STEREO III, the broader definition of GEO is followed.

## Main conclusions

First and foremost, STEREO III is a successful and varied (in terms of types of funding, support, themes covered and application domains) scientific programme that plays a central role in Belgian EO research and supports in general high-quality and innovative earth observation research. The programme is perceived by its prime users (scientists) as a successful, well managed, but also a demanding programme (in terms of application procedures, dissemination and communication requirements that comes with the funding). The programme makes an important contribution to the European capability in EO science and the creation of innovative EO applications. Secondly, STEREO III has been successful in putting Belgium on the map as a country where high quality EO research is being carried out in various domains. By design it has a built-in international character which helps in linking Belgian EO-research to international knowledge networks and top researchers in EO. The programme further plays a key role in attracting and training Belgian EO researchers and has allowed numerous EO-scientists to not only perform state of the art EO-research, but also to attract additional funding (e.g. from European programmes). The STEREO III programme has also contributed to a large extent to the creation of a Belgian EO infrastructure, not least through successfully and systematically making available datasets and software tools to the scientific community which helps in not only illustrating the potential of EO to a wider audience (scientific disciplines, application areas) but also in developing more EO-applications. It is a precursor to a real open science approach to EO research. The STEREO III programme management places a strong emphasis on dissemination activities and communicates in varied ways (website, newsletter, twitter, workshops, and conferences) to a growing community of professionals as well as the wider public. However, the uptake of EO applications in both industry and policy domains remains limited due the fact that industrial participants cannot be funded directly through the programme and that application in policy domains is first and foremost a responsibility of the regional authorities in Belgium. Hence, the programme's potential wider industrial and societal impact is not realised to the full yet.<sup>2</sup>

## Recommendations

Based on the analysis performed the evaluation team formulated the following recommendations (which are explained in more detail in section 6.3):

1. Maintain a programme focused on funding high quality EO research in Belgium that is well connected to international EO-research. Retain the various types of funding and make sure there is funding available not only for the usual suspects (EO research groups that already participate in STEREO), but also newcomers i.e. research groups that start from an application domain.
2. Avoid fragmentation of the Belgian EO research teams working on related EO topics. Assess to what extent research groups have enough critical mass to survive and do not spread the funds too thinly.
3. Keep the international character of the funded research projects by including international experts in steering committees and other advisory capacities and reconsider the limited budget for international partners in order to sustain the global knowledge linkage.

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<sup>2</sup> More detailed conclusions on the effectiveness of the programme, scientific and societal impact are given in section 6.1.2 and chapters 2-5. Also a SWOT-analysis has been performed which is included in section 6.2.

4. Prevent long gaps between funding periods of EO research. There is a need for long-term funding for EO in Belgium and the uncertainties between various phases with potential gaps in funding should be prevented as much as possible.
5. Continue investing in dissemination activities (e.g. through investing in use or impact cases) as it helps in paving the way for both reinforcing the Belgian EO sector and making policymakers and the wider community aware of the huge potential of EO.
6. Reinforce science communication actions within the STEREO programme.
7. Continue sharing of datasets and software tools as open science is increasingly the standard and it encourages more research groups to view EO as a new tool for their research and scientists and policymakers in application domains to experiment with using EO-based applications.
8. Acknowledge that STEREO is a driver for human resources development for the Belgian EO community, manage it as such and adapt where needed including the required coordination of investments with the Flemish and French-speaking authorities and agencies (FWO and FNRS).
9. Reduce the gap between STEREO as a scientific programme and creating new to the world and new to Belgium EO applications (including using EO as a tool for other disciplines). Link EO research explicitly to societal challenges by focusing on issues such as climate change and environmental degradation to put the potential of EO research on the map.
10. Make sure the STEREO programme is well aligned with and can function as a precursor for international research and operational programme from ESA and the European Commission. Another option is to increase the links of the STEREO programme with space agencies such as CNES, DLR and ESA so as to make knowledge transfer easier and make sure the results of STEREO projects help teams qualify for international follow up projects.
11. Address the current lack of industrial participation in the programme and look for possibilities to link industrial partners more firmly to the programme, for instance, by inviting industry to participate in BEODAYS.
12. More actively involve policymakers from specific domains in which EO can help in creating innovative applications with a considerable societal impact. That also means that not always the technologically most advanced projects are selected, but also projects that provide innovative applications in various policy domain in Belgium (that is start from a policy issue or societal concern).
13. Limit the administrative burden where possible e.g. by reducing the detail required for smaller project proposals (e.g. maximum number of words for a proposal), limit the time between project acceptance and kick-off of projects, lighter reporting requirements.

All in all, STEREO III has developed into effective and well managed programme to support earth observation in Belgium. Although there are certainly ways to further improve the scientific and wider societal impact of such a programme a continuation of the STEREO-tradition in the form of a STEREO IV programme is money well spent in a scientific domain that supports important policy insights and whose societal impact will most likely be even more widespread as it is already today.