

Probing VEGETATION conference: concluding remarks

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At the end of these two intense days of exchange and discussions it is time to draw some conclusions.

The attention was particularly focussed on the successful launch of the PROBA-V satellite and the promising results of the in-flight commissioning phase. Belgian industry is rightly proud of these impressive results. As pointed out during the meeting technical excellence can of course be achieved in the lab, but for what regards space technology the ultimate proof is made when the satellite is launched and accurately injected into its orbit and the embarked instruments demonstrate to work properly. Yet this is not the end of the story. An Earth Observing Satellite is made to provide information on the environmental conditions of our planet. As illustrated in several presentations during the conference the world is changing rapidly, population currently increases but at a pace that is expected slow down, the planet is apparently greening globally as well as at more local scales, which is not necessarily in contradiction with the current climate evolution.

As a matter of fact our planet requires thorough attention and observing instruments are needed to monitor and understand all these changes and their possible impact on living conditions. Therefore, beyond the technological demonstration achieved with the launch of PROBA-V, the usefulness of this satellite to accomplish the societal benefits defined by the Group on Earth Observation (GEO) is evident, but also particularly demanding for this mission.

Various presentations showed that it is critical for the validity of the scientific conclusions drawn from EO data analysis to build consistent long-term time series. This requires on one hand continuity in data acquisition (a one-shot experimental satellite is not enough!), and on the other hand careful attention to inter-calibration activities. Moreover other presentations have shown that time is needed to develop environmental monitoring methods and systems, and ultimately to convince the decision-makers of the validity of the observations made. This is an additional reason to encourage considering the development of future PROBA-V missions. Otherwise operational users might limit themselves to the use of data from, for instance, weather satellites, mainly because in this case they have typically a 20 year visibility on their investment.

Several presentations have underlined the critical issue of cloud contamination. This problem is known since the launch of the VEGETATION instrument, which like PROBA-V, acquires in the worst-case basis 5 observations over 6 days at the Equator. Reducing Equator crossing

frequency would adversely impact the system capacity for seasonal monitoring. On the other hand the combined operation of VEGETATION 1 and 2 tested on an experimental basis lead to a significant cloud cover reduction and data radiometric quality improvement. This exploitation mode could also be considered for the future, either with a second PROBA-V, or in combination with Sentinel 3 satellites.

Several presentations have pointed out data processing algorithm evolution on one hand and the impact of having a frozen data processing chain for a long time. A stable processing chain in principle provides stable products. On the other hand it does not take stock of advances in research, even for "simple" issues, such as cloud screening. Some increased agility in the system architectural design would be most welcome, so as to allow for regular updates of the processing chains.

Along the same token, user feedback is a key element of successful mission and service evolution. Scientific conferences will tell us if there is a user take-up among this community. Besides this it would be good to identify a few "champion users", i. e. first-hand users and data analysts who can provide feedback to the programme in particular on data quality. The International User Community, inherited from the VEGETATION programme and re-activated in the framework of PROBA-V, should also play a useful role in particular during the first years of operation, to report on data quality and processing methods, and to discuss about possible evolution.

Continuity is sometimes opposed to evolution. This is valid for the space segment, for data processing as well as for environmental applications.

Regarding the space segment, extensive discussions took place during the last International User Committee meeting about the possibility to increase the resolution to 100 m. This issue was also mentioned during the conference: the current PROBA-V satellite embarks a nadir instrument with a 100 m ground resolution capacity potentially offering a 5-day repeat cycle at Equator. Engineers are confident about their capacity to build in a similar configuration a full system with 100 m resolution over the whole swath, possibly with additional spectral channels. Both scientists and operational users are interested by such a perspective, which, provided that the data are made available for a sufficiently long period of time, could allow the development of new applications for new potential users, possibly more from the private sector than it is currently the case. Such an evolution should in the meantime also ensure continuity for the reasons mentioned before.

Data processing capacity evolution was discussed during the meeting: with 1/3 km resolution PROBA-V will generate 10 times more data than VEGETATION. A 100 m resolution instrument would generate 100 times more. Besides the hardware and software engineering issues raised by this evolution, some opportunities should be looked at, as illustrated during the

conference, along the lines of the multi-resolution, multi-frequency, multi-sensor combination.

On the side of environmental applications, although adaptation of existing methods can be quick, it can be expected that new data properties will trigger new ideas and new concepts, which will require time for development and testing, and, as already mentioned, even more time to convince potential end-users and beneficiaries.

For what regards the Copernicus land service, the launch of PROBA-V comes just in time, so as to ensure continued production of a range of biogeophysical parameters and the end of operation of VEGETATION 2. This will nevertheless require extensive tests to be carried out during the combined operation of VEGETATION 2 and PROBA-V. It is therefore critical that not only all the technical work of the commissioning phase is completed as planned, but also that all the administrative and IPR issues are solved quite in advance, both for the 1km and 1/3 km products. It took 3 years to build PROBA-V, but we will have less than six months to adapt and validate the Copernicus processing chains so as to ensure continuity of operations during the 2014 growing season! There is a strong interest for 1/3 km data for several products related to vegetation condition, burned surfaces and water bodies. These two latter rely on algorithms which are very demanding on geometry, particularly of the SWIR channel: this will be a critical test for the new satellite.

Finally, the audience of this conference and the content of the presentations confirmed the international interest that was already clearly demonstrated during the last International User Committee. PROBA-V offers an exceptional opportunity for reinforced international cooperation, not only in research and development of applications, but also potentially for the development of future missions. This opportunity shouldn't be missed...

Before we leave the room, I would like, on behalf of all participants to express our gratitude to the organizers of this conference, in particular Ann, Evelyn, Kristine, Hilde, Nancy, IIs, Sharon, Marc, June and many others at VITO, and Emmanuelle, Chantal, Nadine, Joost and their colleagues at BELSPO. A particular thank to Ann Tubbeckx and Evelyn Stynen who ensured the programme secretariat. Thanks to all of them the conference was smoothly organized and was really an enjoyable event.