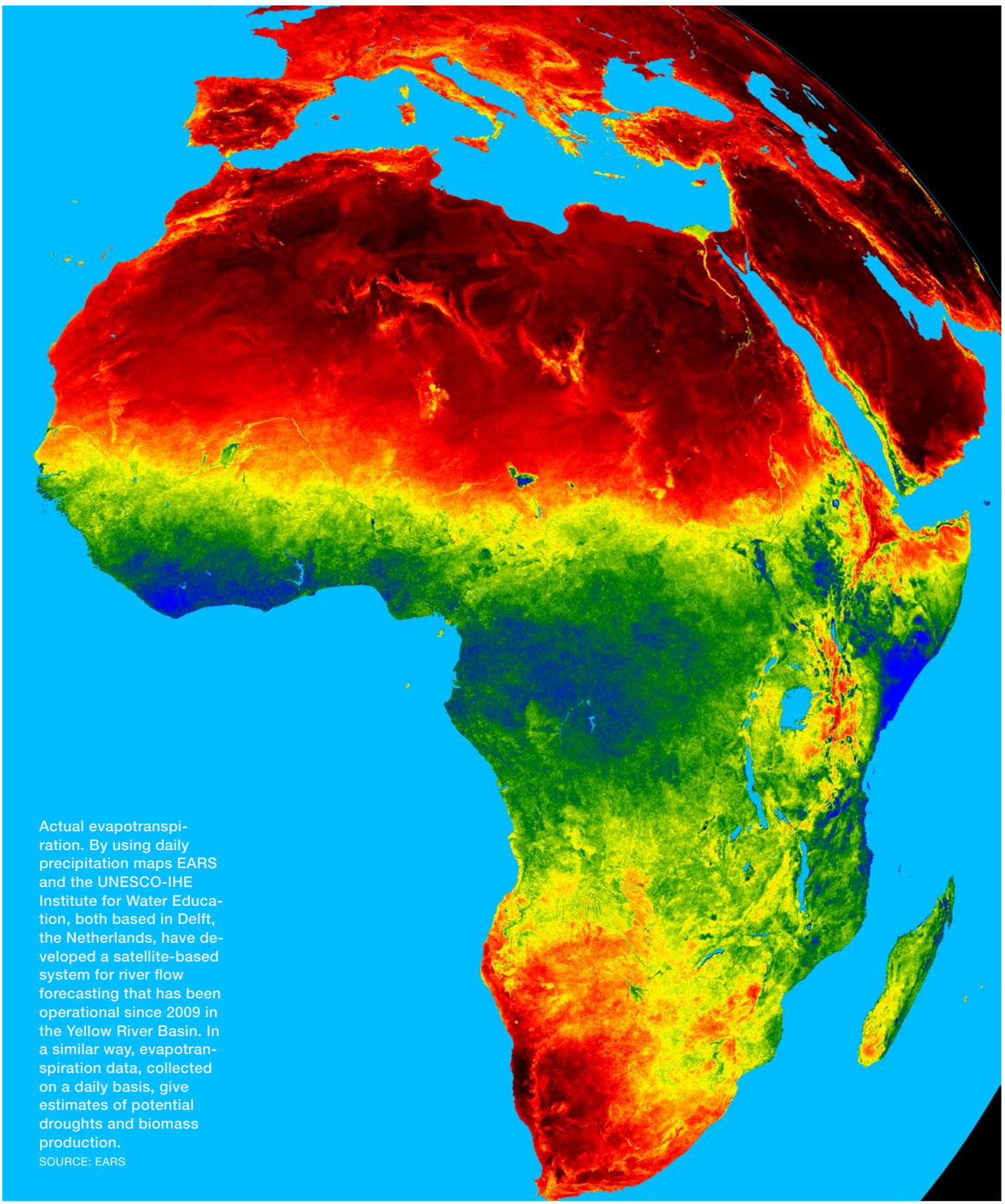


Actual evapotranspiration. By using daily precipitation maps EARS and the UNESCO-IHE Institute for Water Education, both based in Delft, the Netherlands, have developed a satellite-based system for river flow forecasting that has been operational since 2009 in the Yellow River Basin. In a similar way, evapotranspiration data, collected on a daily basis, give estimates of potential droughts and biomass production.
SOURCE: EARS

THE SPACE TECHNOLOGY COMES DOWN TO EARTH

Deltas in space

When unprecedented rainfall hit Pakistan in the summer of 2010, aid organizations worldwide urgently needed real-time data about the extent of the flooding, rainfall predictions and population concentrations. A dozen international organizations worked 24/7 on mapping this information. It was a Dutch website, www.hydrology.nl, that provided a comprehensive overview of information sources, such as maps, satellite images and other geographical data, and attracted hundreds of unique visitors daily from Pakistan alone.

BY MICHAEL VAN DER VALK

"Good interdisciplinary cooperation is key." Ruud Grim knows all about it. As Senior Advisor at the Netherlands Space Office (NSO) he is one of the key people working on broader application of data services. NSO's research indicates that there is still an enormous potential for unused current space technology. "Even though Dutch infrastructure is well developed, space technology is mostly put to use either in science or just goes back into more space technology. Other markets could make far more use of this technology, especially international cooperation projects, for example when it comes to achieving the Millennium Development Goals for food, water and biodiversity." According to Dr Grim, present end users of space technology are mainly governments and universities, whereas data assimilation techniques – using a variety of sources of information – can add more users to the chain. "Optimizing the information chain for water and climate could surely add value for everyday end users, whether they be Bengal farmers who need evaporation and water availability forecasts, or regional water management authorities in the Netherlands."

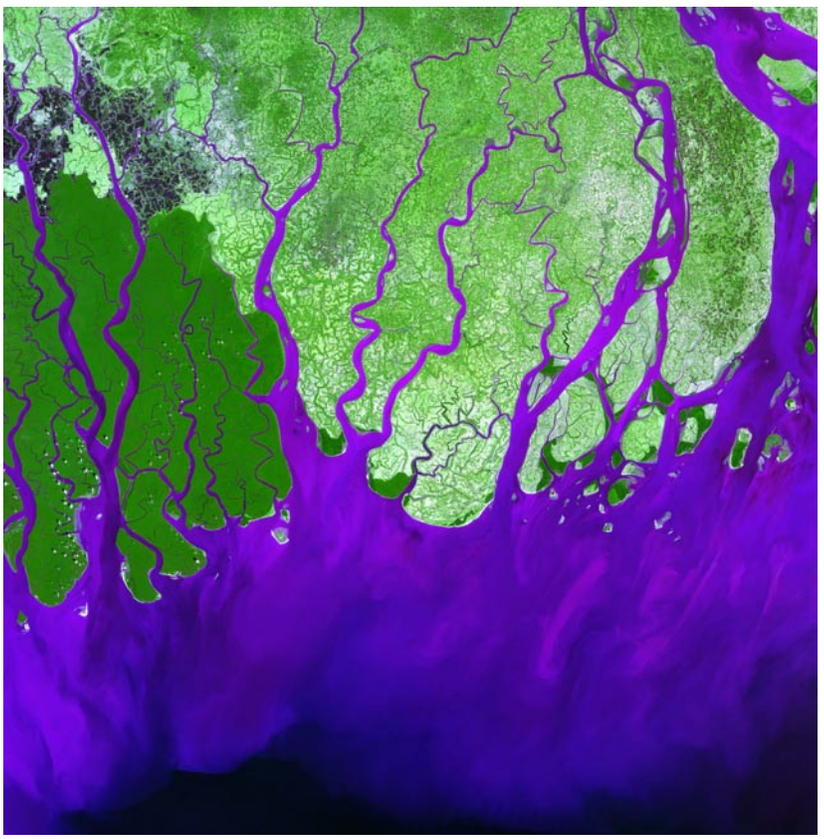
Room for improvement

Bas van der Peet, Marketing Manager Space at the Netherlands National Aerospace Laboratory NLR, confirms that many countries could benefit from the Dutch expertise in conversion of space data for everyday use. "But there's room for improvement in the Netherlands too", he adds. "There is a distinct difference in thinking between the space sector and the water sector. While the space experts are used to decades of research and development – involving hundreds of millions of euros – before a satellite becomes operational, we see that more short-term thinking prevails in the water management sector. We are now looking at how to bring these two streams together." Mr Van der Peet envisages a community of practice, where water and space specialists work together to define future data requirements: "We see a need for international coordination, for example through an umbrella organization that establishes and maintains chains with real-time satellite data for operational water management."

Despite the goodwill, Dr Grim says, "Space specialists and water managers often have little idea of the everyday problems each faces. Operational problems can be solved by improved cooperation between sectors. The solutions have to be translated in terms of sensors, spatial and temporal resolution and geographical coverage. This, of course, will lead to interesting discussions on responsibilities for the different parts of the data delivery chain, including the costs."

Both Grim and Van der Peet agree that facilitation of services should go beyond mere demonstrations: "We can't just show that it works, we need to include training, build capacity and involve hydrologists to demonstrate real world applications."

One of the organizations that could benefit from the developments is BRAC, a large organization working to alleviate poverty in Bangladesh and nine other countries in South Asia, Africa and Haiti. Based in Dhaka, Bangladesh, BRAC not only provides access to financial services but also to health, education, water and sanitation services. Dr Babar Kabir, BRAC's

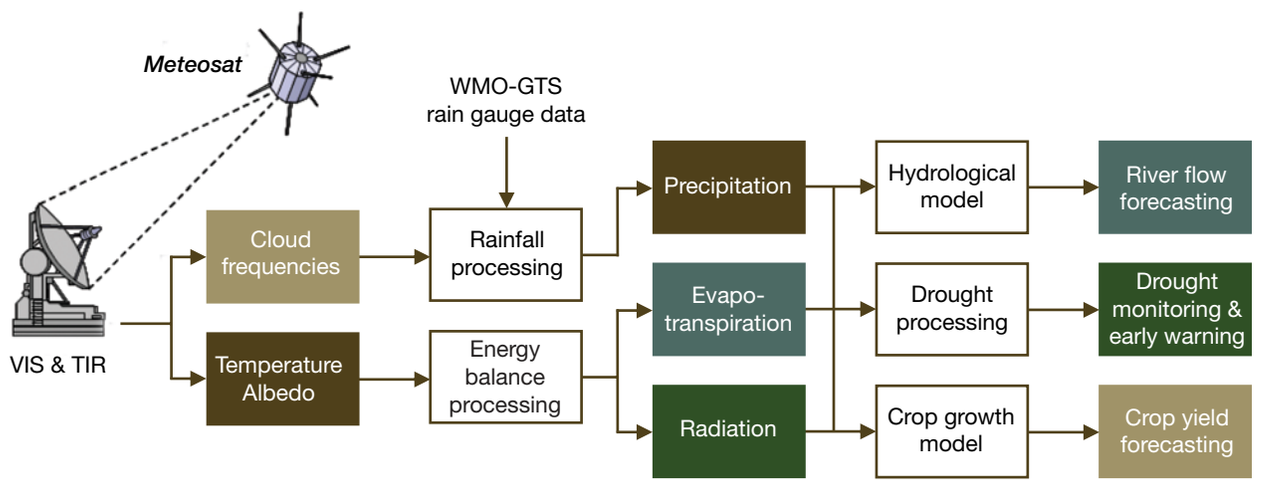


Ganges River Delta. This is a false-color composite image made using green, infrared, and blue wavelengths. . SOURCE: NASA

Director for Water and for Disaster, Environment and Climate Change, explains that major challenges remain: "We need to ensure food security and reduce vulnerability to natural disasters. It is here that science (from satellite data downwards) can play a significant role, by providing early warnings and help us to better understand weather variability resulting from climate change." Optimizing the hydrological data supply chain is important, says Dr Kabir, as it would link science to grassroots development: "Researchers have limited themselves to linking to academic institutions. They have ignored the strength of the NGOs and others who work for the development of the common people." BRAC's work focuses on the poor, especially women and children, and better understanding of variations in the weather through reliable and advanced predictions will mean less loss of lives and crops.

Uncovering expertise

Dr Raimond Hafkenscheid, director of the Co-operative Programme on Water and Climate (CPWC), was one of the initiators of the initiative. "It is all about the chain: space and sensor technology – GIS and remote sensing – geomatics – hydraulics – water management. The Dutch partners are ready for this. It is an important step towards strengthening the application of space science in local, regional, national and international water-related decision-making." The consortium of initiators – CPWC, NLR, Geomatics



An example of the data processing line of the Energy and Water Balance Monitoring System (EWBMS). "EARS produces climatological data for the entire hemisphere on the basis of hourly Meteosat data: temperature, radiation, evapotranspiration and precipitation. The company has developed a 30-year database with full spatiotemporal coverage, thus enabling the provision of long data series for every desired location", says Mr Andries Rosema, EARS' director.

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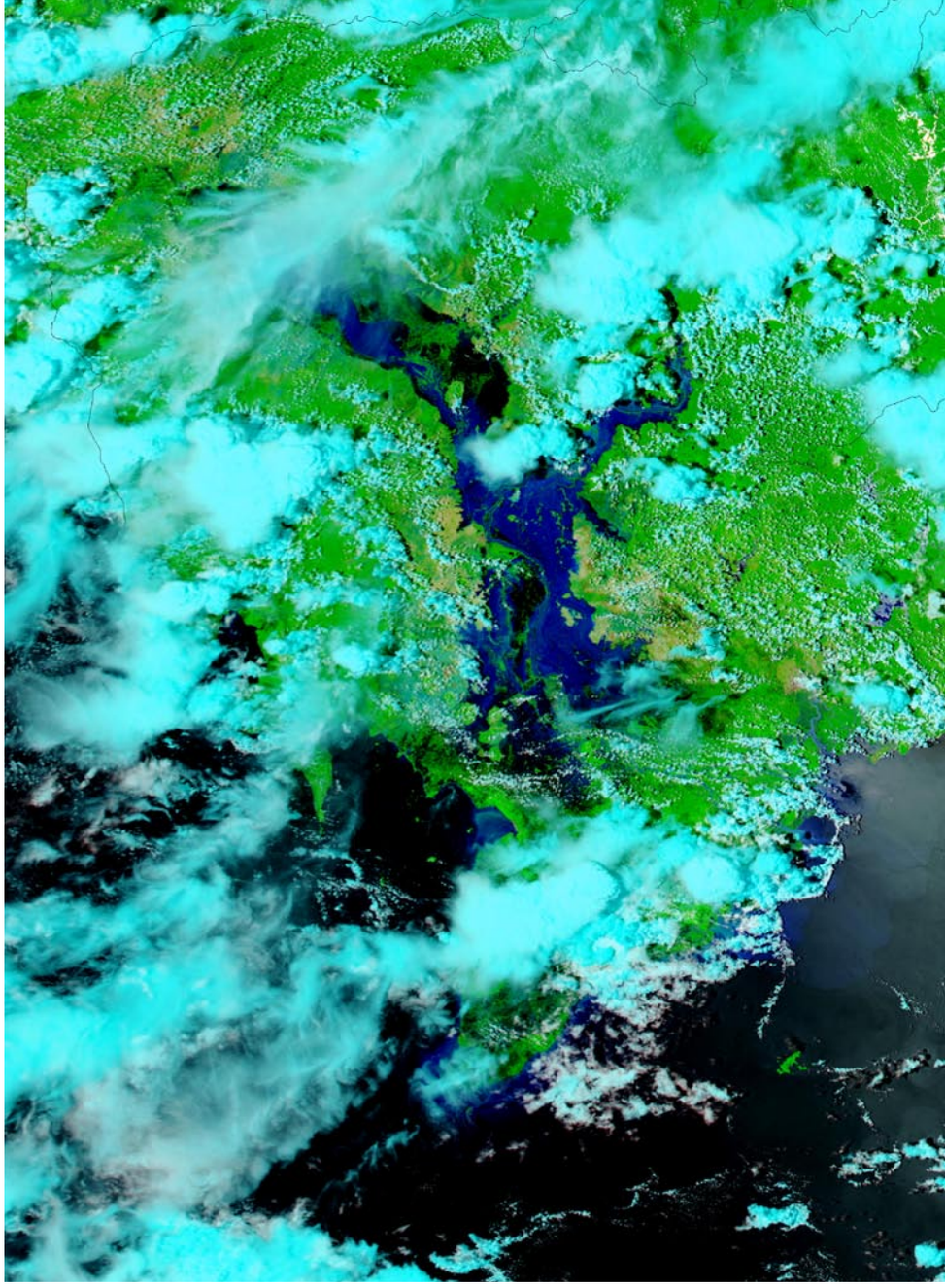
There is a distinct difference in thinking between the space sector and the water sector

Business Park, NSO and Deltares – aims for fast delivery of strategic output and key deliverables, explains Dr Hafkenscheid enthusiastically: "We would like to cooperate along the total chain in order to tackle the issues and are actively seeking international cooperation. This field of business will be a new focus area for the Netherlands, in addition to water technology and delta technology. In the end it will be organizations like BRAC that will be able to issue better seasonal forecasts for local rice farmers, so that the premium on crop insurance can be reduced from four to three percent – a net gain of 25 percent!"

Dr Kabir agrees. "Yes, definitely. Farmers, fishermen, small-scale private entrepreneurs – all will benefit. Given that the initial focus will be on weather forecasting and event predictions, the reliability of the data will be critical, whether it is to understand that a disaster is approaching or to provide very specific rainfall prediction. Tracking of the monsoon landfall is very important for agricultural activities in Bangladesh, as many crops are rain fed. Accurate rainfall prediction, when and how much, will help farmers to increase productivity. Once disaster prediction has been perfected, farmers can then be encouraged to engage in crop insurance." Reliable data will mean that BRAC would be able to save on insurance premiums, enabling them to purchase data from the streamlined process. Nevertheless, Dr Kabir adds, "While BRAC is trying to develop its own expertise to understand the scientific data, it does not wish to duplicate efforts or expertise that already exists elsewhere. We need to find an easy way of coordinating both between and within the scientific community. We need data analysis based on client needs, and reports that are in non-scientific language."

There is a clear relation between the strategic value of cooperation and payoff for those involved, according to Dr Hafkenscheid: "The GIS and remote-sensing market is a collection of small specialized enterprises, which is hard to bundle together, but very important when it comes to results." In addition, there is currently an imbalance between data needs and data supply. "We aim to close this gap, to have the space and water communities work more closely", Hafkenscheid says. "There is a lot of information out there for policy makers that is underused or not even looked at, just because people have no idea how to make use of it. We can help to remedy this by bringing together people with different expertise." ■



This image shows flooding in the Mekong River Delta in southeast Asia. In the false-color images black represents open water, green represents land, cyan represents low-level water clouds, white represents high-level ice clouds, and bright blue represents flooding in the marshlands. The river's outflows into the sea are the same bright blue color as the flooded, inland areas. That is because in both cases, the color is the result of sunlight interacting with soil (sediment) and water. JACQUES DESCLOITRES, MODIS LAND RAPID RESPONSE TEAM, NASA/GSFC.

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