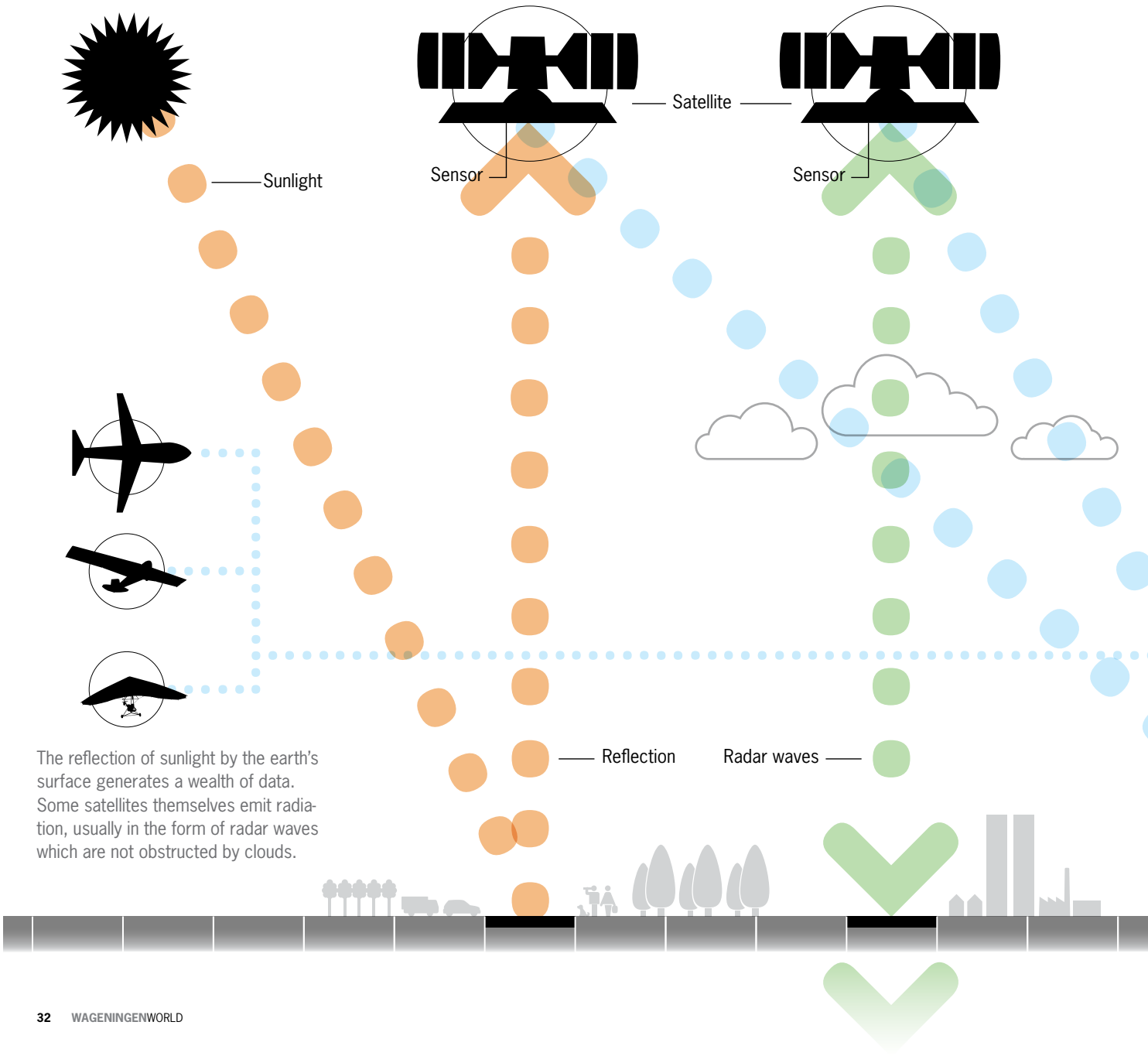
Eyes everywhere

Precise equipment and modern computers have turned remote sensing into a discipline that is making a massive contribution to the earth sciences. Now we have entered a new era, in which it can be a catalyst for public participation. **TEXT** NIENKE BEINTEMA **ILLUSTRATION** JENNY VAN DRIEL



The reflection of sunlight by the earth's surface generates a wealth of data. Some satellites themselves emit radiation, usually in the form of radar waves which are not obstructed by clouds.

There is not a corner of the earth that has escaped the attentions of remote sensing equipment. Radar installations, aeroplanes and satellites monitor tracts of land and water down to the last square metre. They record, they measure and they compare, enabling researchers to keep track of how the earth is doing. Where forests are disappearing, where deserts are spreading, where glaciers are melting, and even where single-cell organisms are accumulating in the ocean. 'Scientists have been keeping an eye on the earth's surface for a couple of centuries, of course, from air balloons and aeroplanes', says Martin Herold, professor of Remote Sensing at Wageningen University, part of Wageningen UR. 'But nowadays we can see things in far more detail and collect better quantitative data.' For example, special software makes it possible to compare digital aerial photos from year to year. Satellites also register the wavelengths of the light that bounces off the earth's surface. They look at the whole spectrum from infrared to ultraviolet. From the pattern of the peaks in that spectrum, scientists can deduce what is grassland, what is desert and what is forest. 'And if you add radar data to that too, it gives you additional information about things like the height, the three-dimensional structure and the biomass of a forest', says Herold. 'Then you can see whether it is an old, well-established rainforest or a homogeneous oil plantation.'

GOOGLE EARTH

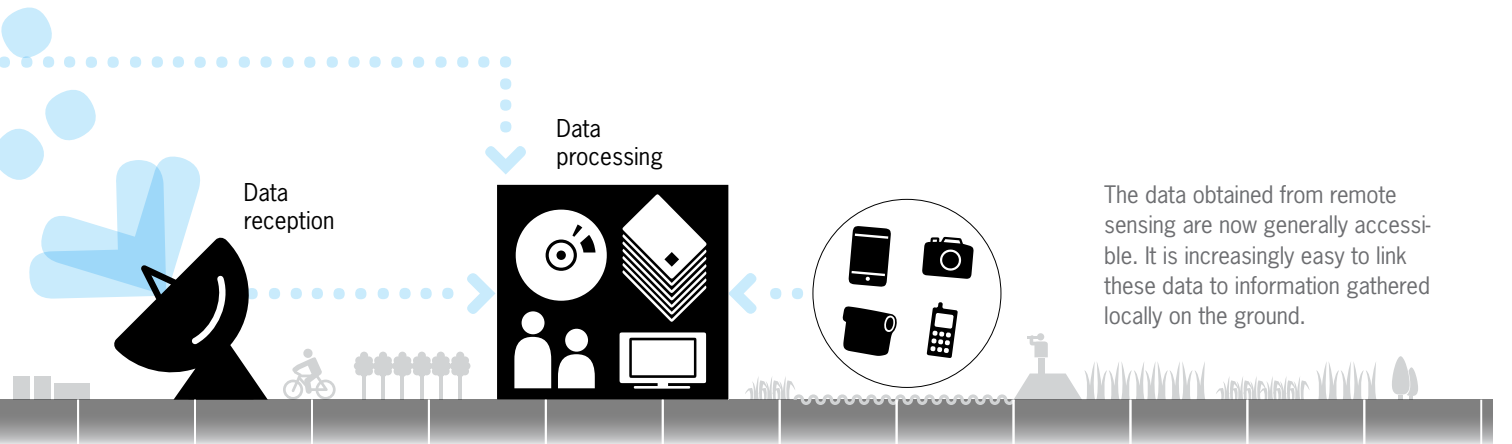
'The main application of remote sensing is for policy support', says Herold. 'If you want to do something about deforestation or climate change, or if you want to formulate a policy on urbanization or land use, then you need to register the changes over time. But especially in developing countries, such data are impossible to collect on the ground. They are too complex and too large-scale for that.'
As an example Herold sites the global REDD project: Reducing Emissions from Deforestation and forest Degradation. 'Felling rainforest speeds up the release of carbon into the atmosphere', explains the professor. 'In the framework of the climate treaty, countries therefore want to combat deforestation. REDD projects are springing up all over the world. Remote sensing is indispensable for them: you want to get a picture of the situation and monitor whether measures are effective.'

> 'Technology is no longer just in the hands of experts'

The first satellite data were collected in the nineteen sixties, but only with the arrival of more precise measuring apparatus and modern computers for data processing, roughly 20 years later, did remote sensing begin to make a real contribution to the earth sciences. The entire surface of the earth is now monitored, with brief interruptions, the resolution has been improved and modern satellites measure the spectrum of the light reflected off the earth's surface more precisely. 'Another thing that has been improved is data policy', adds Herold. 'Formerly, the data were not widely accessible and it was expensive to access them. Now everyone has free access to this constant data flow. Not only can people look at the data, but they can also use them for calculations or, for example, for making maps. Through Google Earth these are then available all over the world.'

FUKUSHIMA

A whole new era has begun, announces Herold with enthusiasm: that of 'remote sensing 2.0'. 'Thanks to the internet and modern software, we can very easily link the data we collect with data that people collect locally, on land use, biodiversity, urbanization and the environment, for example', he says. 'Like this you give new meaning to fairly abstract remote sensing data.'
Herold waxes almost philosophical once he gets onto the topic of the significance of this development. 'Technology and what comes out of it is no longer just in the hands of experts', he says. 'Remote sensing is changing the way science and society influence each other.' As an example, he mentions the recent nuclear disaster in Fukushima, Japan, when a stream of recorded observations circulated through the social media. These observations not only enhanced remote sensing data, but they steered it in certain directions, giving scientists a better idea of what they should be looking at. 'That interaction will only increase in the future', thinks Herold. And precisely this approach, using remote sensing as a link between science and society, is Wageningen's strong point, he believes. 'Remote sensing can be a catalyst for public participation.' ■



The data obtained from remote sensing are now generally accessible. It is increasingly easy to link these data to information gathered locally on the ground.