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Editorial

A Better Understanding of Our Earth through *Remote Sensing*

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We are so accustomed to seeing satellite pictures of the earth that it seems as if there is nothing left to be discovered. In the daily weather reports on television we regularly see images taken by geostationary satellites and with the help of web-based virtual globes we can zoom in from the full-earth disk to detailed views of any place on the earth in a matter of seconds. Yet, does this truly mean that all the secrets of the earth have now been disclosed? Can we extract all the information we need from existing earth observation data?

While without question tremendous progress has been made since the early days of airborne photography and the first satellite missions, we have now more open questions and needs for environmental monitoring capabilities than ever before. Where do deforestation and afforestation take place and how do they affect biodiversity loss and the global carbon balance? What is the rate of change of freshwater resources, wetlands and soil moisture and what adaptation measures have to be undertaken by water resource managers to mitigate climate change impacts? What are the growth rates of urban areas and does infrastructure development match up with the increasing localized demand for transportation, energy, water and food? What is the mass balance of glaciers and how strongly does their melting contribute to sea level rise? Are sea surface temperatures rising and will we experience more hurricanes and tropical storms as a result of that? Can we measure subtle changes in sea surface salinity and how do they affect ocean circulation? Can we accurately retrieve rainfall rates from satellite observations and use them to predict flooding, landslides, mosquito-borne epidemics and other natural hazards? These and many more question can only be answered by combining remote sensing and geophysical modeling capabilities in a process-oriented framework.

The scope of the new journal *Remote Sensing* is to publish regular research papers, reviews, letters and communications covering all aspects of the remote sensing process, from instrument design and signal processing to the retrieval of geophysical parameters and their application in geosciences. Remote sensing is understood in broad terms, encompassing a wide range of sensors that acquire data about the Earth and its environment, and other physical objects and processes [1]. These sensors operate in different regions of the electromagnetic spectrum (most importantly in the visible, infrared,

and microwave regions) and may be mounted on spaceborne, airborne and terrestrial platforms to acquire geophysical data from global to local scales. Remote sensing is a highly interdisciplinary field where electrical engineers, physicists, mathematicians, computer scientists, and surveyors meet with their colleagues from photogrammetry, GIS, and the various geosciences [2].

One important, and often the most difficult, problem in remote sensing is to find the correct relation between the remote measurements and the target parameters [3]. Due to the confounding influence of other natural parameters it may for example not be possible to achieve an unambiguous interpretation of the remotely sensed data. The limited number of independent measurements may also mean that an exact solution is unattainable or at least impracticable. Therefore, the technological challenge is to design sensors that exhibit a high sensitivity to the parameters of interest while minimizing instrument noise and perturbing impacts of other natural variables. The scientific challenge is to develop retrieval algorithms that describe the physical measurement process in sufficient detail, yet be simple enough in order to allow a robust inversion of the remotely sensed signals. Another important challenge is the exponential growth of data volumes driven by the rapid progress in sensor and computer technologies. This means that the processing of the remotely sensed data should ideally be fully automatic, requiring the development of robust and transferable algorithms and processing chains that require no human intervention.

Remote Sensing is the first international Open Access journal published in the English language. It will have all the advantages of Open Access journals, most importantly a fast review and reasonable publication costs for the author(s), and free access for all. *Remote Sensing* was started by the Publisher MDPI because of the rapidly growing number of papers in the "Remote Sensing" section of the MDPI journal *Sensors*. Therefore MDPI decided to introduce this new journal and to change the name of the *Sensors* section to "Remote Sensors". Concepts of novel remote sensors as well as comprehensive reviews may therefore either be published in *Sensors* or *Remote Sensing*.

My personal wish is that *Remote Sensing* will stimulate the exchange of scientists from around the world, may they come from rich or poor countries. This is more important than ever since climate change, continued population growth and shrinking natural resources have all become truly global problems that require, as one small part of the solution, global monitoring capabilities to better understand of how we have to act locally.

References and Notes

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