GNSS for Global Earth Observation:
The European coordination action GfG2

J. Wickert¹, C. Arras¹, M. Caparrini², A. Puig-Centelles², G. Elgered³, A. Egido², S. Fuller⁴, M. Gauss⁵, R. Jongman⁶, J. Johansson³, P. Monks⁷, S. Zolotikova⁷

¹German Research Centre for Geosciences GFZ, Potsdam, Germany
²Starlab, Barcelona, Spain
³Chalmers University of Technology, Gothenburg, Sweden
⁴University Nottingham, U.K.
⁵Norwegian Meteorological Institute, Oslo, Norway
⁶Alterra, Wangeningen, The Netherlands
⁷University Leicester, U.K.

We introduce a recent international research related activity with focus to the use of GNSS (Global Navigation Satellite Systems) for Earth Observation in a more general sense. The Gfgsquared (GfG²) activity is a three-year coordination action, which started in January 2011 and will last until December 2013. The action is funded by the 7th Framework Program of the European Commission under the Environment theme (2010). Its mission is to better assessing the value of GNSS for Global Environmental Earth Observation (GEEO) and GEOSS (Global Earth Observation System of Systems).

The main goal of the Gfg2 coordination action is to initiate the establishment of GNSS as a novel interdisciplinary field for observing the Earth and its environment. Such fields are of outstanding social importance, and may be described through contributions to the nine Social Benefit Areas to address the current crucial problems of mankind (disasters, health, energy, climate, water, weather, ecosystems, agriculture, biodiversity).

In parallel to the revolution in navigation, illustrated by the exponentially increasing use of the U.S. American GPS (Global Positioning System) also the use for other applications significant for different types of Earth observations has been realized. Extremely accurate positioning is used to monitor the Earth’s crust, e.g. in areas with high probability for earthquakes, or critical manmade structures such as bridges and dams. Other prominent examples are the use of GPS observations for remote sensing of the atmosphere (e.g. temperature, water vapour). Such data are already operationally used to improve numerical weather forecasts world-wide. Another application is to make use of GPS signals reflected by water and ice surfaces. These are examples of techniques currently in focus of international research and are regarded to have immense potential in several of the above mentioned Social Benefit Areas.

The scope of Gfg2 activities is, however, far beyond these selected examples. GfG2 brings together GNSS experts with experts from all the nine social benefit areas to establish new interdisciplinary fields with key importance for Earth observation. With the availability of the new and modernized global navigation satellite systems (e.g., GPS-M, Galileo, QZSS, GLONASS, Beijdou) in parallel with the broader and broader use of these in nearly all societal fields the importance of this field will open the doors for new exciting applications.