Geophysical Research Abstracts,
Vol. 11, EGU2009-5010, 2009
EGU General Assembly 2009

Continental hydrology from satellite multi-sensor data and in situ observations

A.V. KOURAEV (1,2) and the SMOS AO 4648 Team

(1) Universite de Toulouse; UPS (OMP-PCA), LEGOS, F-31400 Toulouse, France, (2) State Oceanography Institute, St. Petersburg branch, Russia

Continental waters represent a tiny part of the total water amount on Earth, but play a major role in climate variability and have paramount importance for terrestrial ecosystems and human needs. They are an integral part of the global climate system with important links and feedbacks generated through its influence on surface energy and moisture fluxes between continental water, atmosphere and oceans. It is important to well understand what are temporal and spatial scales of variability of continental waters, what are teleconnections, feedbacks and mechanisms responsible for the changes, what are natural and anthropogenic causes of recent and historical changes in the hydrometeorological parameters.

In this respect, continental hydrology is one of the research fields where acquired knowledge and understanding of natural processes will benefit from combination of conventional observations with data from SMOS and other Earth Observation satellites. We present studies of two key regions where SMOS data have the potential to significantly expand the potential of scientific and applied studies: a) Western Siberia and b) Euphrates-Tigris river system.

Main part of the Western Siberia is covered by Ob' river system; which will be the main object of study for this region. This river basin is characterised by large flooded areas, frequently described as the biggest world swamp. Wetlands are also an important source of methane and source/sink for the CO2. Although wetlands played a key role in the natural variations of carbon cycle during the last climatic cycles, their temporal and spatial variations are still poorly modelled. As a consequence, it is very difficult to predict the effect of their variations with climate change and the resulting effect on the carbon cycle for the next decades.

Water resources of the extensive Euphrates-Tigris (ET) river basin have vital importance for people living on its watershed, and for its ecosystems. This river basin also provides freshwater input into the Arabian Gulf, affecting fishery, marine biology and biogeochemistry. ET basin is shared by several countries and is extensively used for irrigation and other types for water consumption. Cascades of large reservoirs are constructed in each of the four countries. Information on hydrological regime of the ET basin (water level in the reservoirs, amount of diverted water, river level and discharge) has paramount importance for studies of natural and anthropogenic influence on ET river system, and freshwater input into the Arabian Gulf.

We present the results of studies for these two regions basing on our existing experience of using in situ data together with remote sensing techniques such as radar altimetry (TOPEX/Poseidon, Jason-1, GFO, ENVISAT), radiometry (SMMR, SSM/I), optical data (MODIS, Landsat) and space gravimetry data (GRACE). We analyse several parameters: a) water level in reservoirs and wetlands, b) river level and river discharge, c) water abundance and flooded area extent, and d) snow and ice cover (for Western Siberia).

Research has been done in the framework of the Russian-French cooperation GDRI CAR-WET-SIB, French ANR IMPACT-Boreal project, and SMOS AO No. 4648.