Satellite Data and Hydrological Model to Asses Water Quantity and Quality in the Yangtze River Basin

European PI(s)
Prof. Marco MANCINI, marco.mancini@polimi.it

Chinese PI(s)
Prof. LI Jiren, lijiren@iwhr.com

The main objective of the project is to assess water quantity and quality under natural and human pressure on the Yangtze River basin (1'800'000 sq. km.) to support politics of sustainable development.

Two distributed hydrological models coupled with satellite and ground data will analyse the behaviour of the main components of water balance for the whole basin area considering also hydropower and agriculture water use. The proposal presents an innovative way to write the energy and water balance system as function of the land surface temperature (representative equilibrium temperature), so that remote sensing LST can be directly compared with modelled ones. This approach offers the possibility to control evapotranspiration fluxes at pixel scale, opening a new vision to control the mass balance not more based only on the discharge measures (generally few at the basin scale), but for any pixel in which the basin surface is discretized. A distributed hydrological model, FEST-EWB, will be used for these analyses. The conceptual hydrological model Xinanjiang will also be used and compared to the physically based FEST-EWB model according to remote sensing data input. In fact in this project several different sensors will be used spanning from the visible, thermal infrared to microwave wavelengths for the retrieval of vegetation parameters, snow coverage, land surface temperature and soil water content. The water quality analysis will be focused on the detection of suspended solid sediments in the three gorges dam reservoir and along the river network from satellite data and eventually ground data. An erosion distributed model for the Upper Yangtze River basin closed at the Dam. Detection from satellite of other quality parameters (e.g. chlorophyll and turbidity as well as surface water temperature, organic matter) will be used to test the satellite information capability to monitor water quality in a controlled environment such as the three gorges reservoirs.

Objectives:
1. Definition of a data base of European and Chinese remotely sensed products at different temporal and spatial resolutions;
2. Definition of a data base of ground data including meteorological and hydrological data and channel river geometry;
3. Calibration/validation of hydrological water balance model for water resources assessing using satellite data of land surface temperature and river height;
4. Comparison between conceptual and physically based hydrological models according to remote sensing data input;
5. Soil moisture monitoring through remote sensing data and hydrological models;
6. Retrieval of water quality parameters from satellite data;
7. Calibration/validation of erosion distributed model;
8. Small cases study: water resources analysis for Daning river basin or upper basin of the Huaihe River and Tibetan plateau;
9. Interaction with other Dragon3 projects in the framework of water resources.

Deliverables:
1. GIS database of satellite and ground data;
2. Flow duration curves for different river cross sections for hydropower and agricultural potential use;

3. Distributed maps of daily and monthly evapotranspiration from the hydrological model using ground and satellite data;
4. Distributed soil moisture maps for flood forecast and irrigation time management
5. Maps of flooded area
6. Distributed maps of soil erosion from distributed model
7. Maps of suspended solid sediments, chlorophyll and turbidity and surface water temperature

:　.　　　　Marco.mancini@ polimi.it
:　　　　　lijire.@ iwhr.com

1　800　000

LST

FEST-EWB
　　　　　　-　　　　　　FEST-EWB

1.
2.
3.
4.
5.
6.
7.
8.
9.

1.　　　GIS
2.
3.
4.
5.
6.
7.