

From wetland monitoring to epidemiology application: characterisation and mapping of the Schistosomiasis japonica vector's habitat and human activities, in the Poyang Lake area (Jiangxi Province, PR China) exploiting DRAGON ENVISAT times series and TRM data

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The Yangtze reaches are threatened by a major public health importance in Southern China, the Schistosomiasis Japonicum and, some predictions forecast a relative important expend with the flooding of the Three Gorges reservoir connecting the lower and upper part of the Yangtze River. This parasitic disease is endemic as Yangtze River reaches and on the connected monsoon lakes such as on the Poyang and Dongting lakes. In Poyang lake area, Schistosomiasis Japonicum is not totally controlled. Hundreds of villages are threatened, involving 2.5 millions of people with 83 000 contaminated. Located in the Jiangxi Province, Poyang Lake is the largest freshwater lake in China. It extends in a hollow depression at very low elevation, only a few tens of meters above sea level, surrounded by mountains. Poyang Lake undergoes very significant seasonal water level variations, between 9 and 18 m and its size fluctuates from less than 1,000 km² during the dry winter period to more than 4,000 km² during the wet summer season.

Thanks to the very rich and dense Earth Observation database that has been set up through the DRAGON projects, characterization of the habitat of the intermediate host of the larva, a snail named *Oncomelania hupensis*, has been done funded by ESA training grant and CNES Epidemiology project. Within antecedent rain fall, air and water temperatures, the flood duration and the vegetation community are two major identified parameters controlling the development of the intermediate host. To construct a snail presence indicator based on flood duration, ENVISAT and Beijing 1 time series covering the period 2003-2008 were exploited. This indicator was generated with three levels of potential presence, low, intermediate and high from the extracted water validated at lake level by the exploitation of Beijing 1 set. Maps were produced on a monthly to yearly basis, and on an averaged basis. Obtained results highlight the high inter annual spatial variability, and also the identification of sectors having the highest potential presence of the snail based on the submersion time parameter (Gan Jiang Delta, Dalianzi Hu – Poyang Hu; XI He). Presence of the *Oncomelania hupensis* is also depending of the type and height of the vegetation. Exploiting in a first step a set of 5 SPOT4 images, maps of vegetation community of the low lying areas have been produced and validated by field survey. Furthermore, based on a set of 5 Beijing 1 images same approach has been applied in order to derive at the lake scale. Validated from field survey carried in November 2008 and 2009, the obtained vegetation map highlighting the *Carex* and *Miscanthus* as well as in some place *Cynodon* communities. The combination of submersion time and vegetation indicators has been done providing 3 versions of maps with 6 or 8 levels of potential presence of the snail. Monthly maps obtained from December 2005 to December 2008, are combined with the water level of concerning month to refine the snail potential presence areas.

In a parallel step, ALOS merged Prism-AVNIR data settlement mapping over Poyang Lake vicinity is done with a focus on isolated settlement and floating villages. These urban areas are validated with 6 Kompsat-2 data at 1m of resolution. In addition fishing nets mapping has been produced, with more than 500 km of fishing traps identified. Next steps correspond to the crossing of the environmental information of snail potential presence and human activities areas. Final aim is in addition of the identification of the most favourable areas for the development of the disease vectors, is to generate risk maps of disease transmission in order to identify the priority areas for disease control.

Key words: DRAGON, Poyang, Schistosomiasis, ENVISAT time series, epidemiological indicators, vegetation, floods, human activities