EARTH OBSERVATION AND SPATIAL ANALYSIS FOR AN EARLY WARNING SYSTEM FOR MENINGITIS OR MALARIA

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1. INTRODUCTION

Sometimes information is worth their weight more than gold, especially when the border between health and deadly diseases can be redrawn.

When in Africa epidemics outbreak, more often then not, there are no useful maps for the support of the health service organizations, let alone, be able to identify environmental factors that influence and cause the diseases.

About 500 million people will be infected by Malaria every year; more than 1 million of them die. Young children (less than 5 years old) are more affected by such devastating diseases than other people.

2. EPIDEMIO AND RESPOND

Within the scope of the EPIDEMIO project, satellite data are evaluated, analysed and processed in order to get a better basis to predict, monitor and prevent epidemics.

Jena-Optronik and its partners started within the ESA founded project EPIDEMIO to use satellite images for the fight against infectious diseases like Malaria, Meningitis, Schistosomiasis or Ebola.

Within the ongoing GMES Services RESPOND the experiences of EPIDEMIO are used now. The objective of the project is the development of a method to integrate environmental information, derived from satellite images, into an early warning system for Meningitis and Malaria in Niger.

3. HOW CAN SATELLITE DATA FIGHT AGAINST DIESEASES

Example: Malaria is still the most devastating infectious disease on earth, with a mortality rate of 2 million people yearly. The epidemic outbreaks depend on a various factors. The Malaria Mosquitoes breeding increase strongly if water bodies prevail, if humans or animals live nearby, if it is warm and the humidity is high, and if the breeding area is beneath a specific elevation. The survival of the mosquito depends e.g. on the temperature. Temperature also determines the duration of the mosquito life cycle. The mosquito fly range and bite rate depends on the species on the temperature or the geographical elevation. With the EPIDEMIO and RESPOND - products it is possible to monitor potential breeding areas of the malaria carrier and weight each individual environmental factor. Based on this information early warning methods and measures against malaria can be installed.

Remote sensing data can deliver important inputs to fill the information gaps and to deliver models for different diseases and different local areas..

4. DEVELOPMENT OF AN EARLY WARNING SYSTEM FOR NIGER

For Malaria investigations in Sahel CERMES in Niger needs a precise definition of bioclimatic areas. So far e.g. isohyets (A line joining locations of equal precipitation on a map) are used for the definition of those areas, but soils type, surface basins and slope, temperature, rainfall, vegetation dynamics are needed in addition.

For this purpose RESPOND following ESA EPDIEMIO will delivers useful maps and spatial statistics.

Atmospheric conditions seem to be important factors for the development and outbreak of meningococcal Meningitis in Sahel. Mechanisms are yet unknown. Dust, humidity, lack of rainfall, temperature is suspected to be triggers, humans and bacterial population are known as the main factors.

Integrating different environmental and population information like vegetation dynamics, slope and surface basins, LST dynamics and dust – temperature thresholds delivered by EPIDEMIO/ RESPOND CERMES could now build a first model.