

**2009 Meeting  
Geneva, 7-11 December 2009**

**Meeting of Experts  
Geneva, 24-28 August 2009**

Item 5 of the provisional agenda

**Consideration of, with a view to enhancing international  
cooperation, assistance and exchange in biological  
sciences and technology for peaceful purposes, promoting  
capacity building in the fields of disease surveillance,  
detection, diagnosis, and containment of infectious diseases**

## **ENHANCING EPIDEMIC PREPAREDNESS WITH SPACE SATELLITE OBSERVATIONS**

Submitted by the United States of America

1. Earth-observing space satellites record data on environmental and climate conditions that influence infectious disease epidemiology, affording opportunities to predict, mitigate, prevent, and understand epidemics.
2. Examples of environmental and climate factors that affect disease dynamics include rainfall and flooding, which led to the emergence of a new rodent-borne virus (Sin Nombre) in the Southwestern United States, and increase the risk of malaria, dengue, and cholera epidemics in many parts of the world; unusually warm conditions, which have been linked to food-borne disease outbreaks in Europe; and environmental modifications such as encroachment on previously forested area, which can facilitate emergence of previously unknown zoonotic diseases, such as Lyme disease in the northeastern United States.
3. The World Health Organization, in a 2004 report, encouraged development of climate-based early warning systems for several infectious diseases (including malaria, dengue, cholera, yellow fever, and others) in areas where climate is an important driver of epidemics. The report is available at: <http://www.who.int/globalchange/publications/infectdiseases/en/index.html>
4. The U.S. Government, through the National Aeronautics and Space Administration (NASA) and National Oceanic and Atmospheric Administration (NOAA), has launched dozens of Earth-observing satellites during the past 30 years that record data on factors related to

infectious disease epidemics, with approximately 20-30 satellites in operation during the past 10 years.

5. Vast amounts of environmental and climate data recorded by these satellites is freely available on the Internet. For people using these data for the first time, a good starting point is a tool developed by NASA to access, analyze, and visualize many satellite datasets. The tool, “Giovanni”, is available at: <http://disc.sci.gsfc.nasa.gov/giovanni>

6. Several operational public health systems supported by the US Government use data from NASA and NOAA satellites to improve preparedness for epidemics, and regularly provide risk maps on the Internet. Two examples are:

- (i) A malaria early warning system for Africa (<http://earlywarning.usgs.gov/>). This system is operated in collaboration with national meteorological offices in Africa. Public health officials in areas at risk can use the forecasts of malaria epidemics to target surveillance, prevention, and control measures.
- (ii) A Rift Valley fever early warning system for East Africa (<http://www.geis.fhp.osd.mil>). This system is operated by the U.S. Department of Defense-Global Emerging Infections Surveillance and Response System (DOD-GEIS) and NASA in collaboration with the U.S. Centers for Disease Control and Prevention, the World Health Organization, and the Government of Kenya. In 2006, the system accurately predicted an epidemic months in advance, allowing targeted surveillance and early detection of initial cases.

7. Health officials and researchers interested in using data from U.S. Government satellites to improve epidemic preparedness in their countries can begin by studying the relationship between previously collected satellite data and epidemiological data, such as case counts over time or outbreak occurrences.

8. U.S. scientists with experience using satellite data in epidemic surveillance-response programs may be contacted to explore collaboration and technical assistance possibilities. Points of contact include:

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