



G. Robert Brakenridge, Director

<http://floodobservatory.colorado.edu/>

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### ***For Research, Humanitarian, and Water Management Applications***

The Flood Observatory's mission is to:

- 1) *Acquire and preserve for public use a digital map record of the Earth's changing surface water, including changes related to floods, droughts, wetlands, shorelines, lakes, and reservoirs.*

Surface water changes dramatically on a seasonal basis in areas such as monsoonal South Asia and the Arctic, and from year to year everywhere as major floods and droughts occur. Aquaculture and dam construction is causing ongoing changes in some areas; water abstractions for agricultural purposes also have altered surface water geography. DFO's "Online Atlas of the Earth's Changing Surface Waters" observes these changes in near real time, and records these changes for posterity.

- 2) *Conduct remote sensing-based water measurement and mapping in "near real time" for humanitarian purposes.*

The same data needed for research can have major practical applications if acquired and published immediately. The Flood Observatory is commonly the first to map major flooding and over its entire extent. Other organizations may provide more detailed coverage, as higher resolution sensors are targeted to the task. The GIS files underlying our maps are also made available, so that relief organizations can incorporate such information into their own decision-support systems.

- 3) *Support and encourage operational uses of remote sensing-based surface water information.*

Routine surveillance of surface water via orbital remote sensing is relatively new (since early yr 2000); it has been made possible by frequent-repeat, wide-area coverage sensors, such as MODIS and VIIRS, and by innovative use of passive microwave sensors that also provide frequent global coverage (the [River Watch](#)

[processor](#)). As these records accumulate, it is increasingly possible to assess today's surface water extent in context with its observed long-term means and extremes.

4) *Conduct scientific research making use of these data products.*

An active area of current research is the use of microwave sensors to [monitor river discharge changes](#).

We use coupled MODIS (optical) water extent mapping and the microwave information to address flood causation and flood risk reduction. Damaging storm surges along critical delta shorelines are another focus. Here are links to three representative publications: Pakistan, in [GSA Today](#); Myanmar, in [Earth Science Reviews](#); and coastal storm surge flooding, in [Natural Hazards](#).

An increasing human population and also climate variability directly affect flood frequency, severity, and societal damage. Future changes cannot be accurately predicted without knowledge concerning present status and rate of change. *The Observatory helps meet this observational need by using orbital sensors to gather information concerning surface water variability, especially since yr 2000.*

The Flood Observatory also partners with operational water organizations for development of technical capabilities, and to participate in meeting their operational needs. We actively collaborate with relief agencies, emergency managers, the insurance industry, and the media during major flood events. Flood disaster locations and needs are not known in advance; donations to the [Flood Observatory's Research Fund](#) help sustain this resource for future disasters.

Staff:

*Prof. Robert Brakenridge* founded (in 1993) and directs the Observatory. It was originally part of the Department of Geography, Dartmouth College, Hanover NH USA. In 2010, it moved to the Community Surface Dynamics Modeling System (CSDMS), which is part of the Institute of Arctic and Alpine Research (INSTAAR) of the University of Colorado. Dr. Albert Kettner is Flood Observatory Co-director.

*Research Collaborators* have been instrumental in the continued development of the Observatory and its capabilities. These include:

Dr. Son Nghiem, Jet Propulsion Laboratory, Pasadena CA;  
Dr. Tom De Groot, Joint Research Centre of the European Commission, Ispra, Italy;  
Mr. Fritz Policelli, NASA Goddard Space Flight Center, Greenbelt, MD;  
Dr. Dan Slayback, Science Systems and Applications, Inc, Greenbelt, MD.  
And many others.

*Research Associate/Assistant staffing* varies with the financial support and has included student volunteers. Since its founding, the Observatory has benefitted from the assistance of 32 such individuals (names listed on the web site).

*Funding since 1993 has been from:* NASA, the U.S. Geological Survey, the World Bank, the Development Bank of Latin America, the UN-ISDR, and from the European Commission's Global Disaster Alert and Coordination System (GDACS) at its Joint Research Centre (Italy). Data support has also been provided by NASA and the European and Japanese space agencies (ESA and JAXA). The Observatory has no "baseline" support to accomplish its mission. It relies instead on a variety of grants and contracts, on the infrastructure provided by its not-for-profit, major research university home and on donations. The Flood Observatory actively seeks new projects that are compatible with its mission and capabilities.

The Flood Observatory is a formal partner of the European Commission's "Global Disaster Alert and Coordination System" (GDACS), and also of ITHACA ("Information Technology for Humanitarian Assistance, Cooperation, and Action"), a non-profit organization in Torino, Italy. It is engaged in collaboration with the Global Change & Vulnerability Unit, UNEP/DEWA/GRID-Geneva, and the Biennial Global Assessment Report on Disaster Risk Reduction (GAR), part of the UN International Strategy for Disaster Reduction (UNISDR). We helped found the Global Flood Partnership. Finally, we are participating in the Hydrologic Extreme Common Platform, GEOSS (Global Observation System of Systems), sponsored by [GEO, Group on Earth Observation](#).