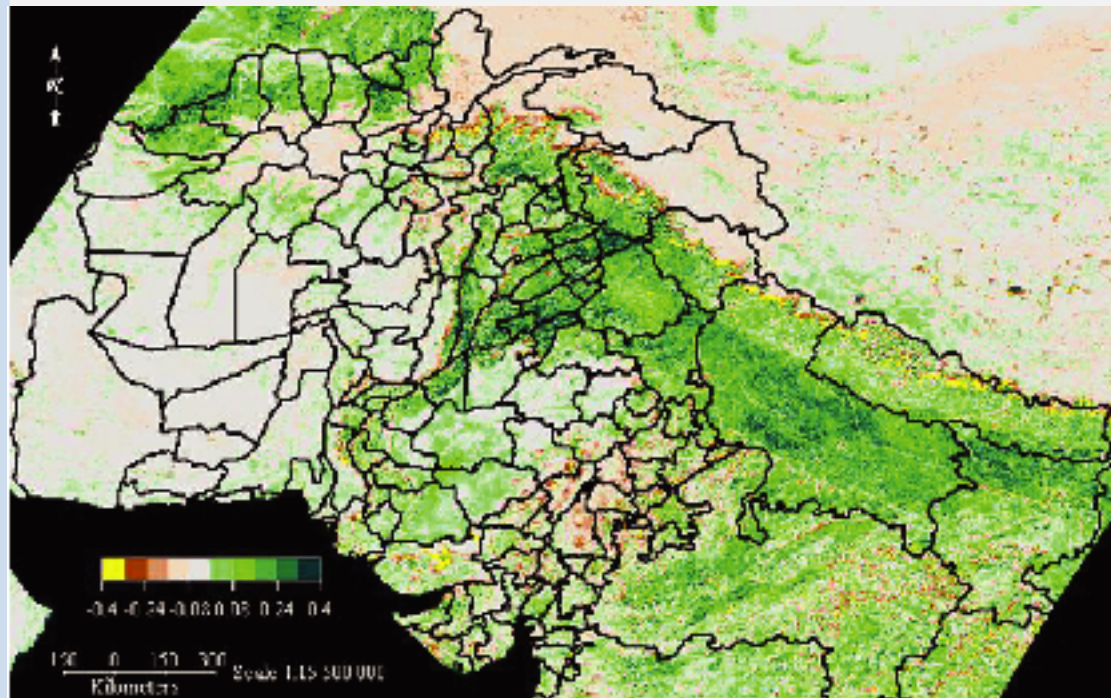


The Use of Remote Sensing Data for Drought Assessment and Monitoring in Southwest Asia

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Research Report 85

The Use of Remote Sensing Data for Drought Assessment and Monitoring in Southwest Asia

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Abbreviations

AVHRR	Advanced Very High Resolution Radiometer
DAAC	Distributed Active Archive Centers
EDC	EROS Data Center
EROS	Earth Resources Observation Systems
GIS	Geographic Information System
GPS	Global Positioning System
GSFC	Goddard Space Flight Center
DS	Drought Severity (NDVI deviation from long-term mean)
ISRO	Indian Space Research Organization
IWMI	International Water Management Institute
MIR	Mid-Infrared
MODIS	Moderate-Resolution Imaging Spectro-Radiometer
NASA	National Aeronautics and Space Administration
NDVI	Normalized Difference Vegetation Index
NESDIS	National Environmental Satellite Data and Information System
NGDC	National Geophysical Data Center
NIR	Near-Infrared
NOAA	National Oceanic and Atmospheric Agency
NPOESS	National Polar Operational Environmental Satellite System
NPP	NPOESS Preparatory Project
TBVI	Two Band Vegetation Indices
TCI	Temperature Condition Index
Terra	Earth Observing System (EOS) satellite-NASA flagship satellite under Earth System Enterprise
VCI	Vegetation Condition Index
VNIR	Visible and Near-Infrared
VIIRS	Visible and Infrared Imaging Radiometer Suite
NRSA	National Remote Sensing Agency

Summary

Droughts are recurring climatic events, which often hit South Asia, bringing significant water shortages, economic losses and adverse social consequences. Preparedness for drought should form an important part of national environmental policies. At present, countries of the region have limited institutional and technical capacity to prepare for a drought and to mitigate its impacts. Information on drought onset and development is not readily available to responsible agencies and to the general public. This report describes the first results of the development of the near-real-time drought-monitoring and reporting system for the region, which includes Afghanistan, Pakistan and western parts of India. The system is being developed using drought-related characteristics (indices), which are derived from remote-sensing data. The indices include a deviation from the normalized difference vegetation index (NDVI) from its long-term mean and a vegetation condition index (VCI).

The study first investigated the historical pattern of droughts in the region using monthly time-step AVHRR satellite data for 1982–1999. Droughts in recent years were studied using 8-day time-interval MODIS satellite images available

from year 2000 onwards. The unique feature of the study is the development of regression relationships between drought-related indices obtained from MODIS and AVHRR data, which have different pixel-resolution and optical characteristics. These relationships were established for each month of the year separately, as well as for the pooled data of all months, and explained up to 95 percent of variability. The relationships were validated in randomly chosen districts outside the study area. The results ensure the continuity of the two data sets and will allow the reports on drought development in the region to be made in near-real time with a spatial resolution of 500 meters and at 8-day intervals. A continuous stream of MODIS data is available free of charge, on the Internet, from the USGS EROS data centre. The operational mode for the MODIS-AVHRR-based drought-reporting system is currently being developed. The goal is to make the system available, via Internet, to all stakeholders in the region, including government agencies, research institutions, NGOs and the global research community. It may be used as a drought-monitoring tool and as a tool for decision support in regional drought assessment and management.

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