



SATELLITE REMOTE SENSING-BASED FIRE DANGER RATING SYSTEM TO SUPPORT FOREST/LAND FIRE MANAGEMENT IN INDONESIA

• Background

For the past several decades, forest/land fire and its associated haze have increasingly affected economies, health and environment in Indonesia. Forest/land fire represents a natural hazard which, in many cases, can be predicted, controlled and prevented. To mitigate these fire-related problems, forest/land management agencies require an early warning system to assist them in implementing fire prevention and management plans before fire problems begin. One of the systems for implementation is Fire Danger Rating System (FDRS).

Fire danger rating has long been used as a tool to address a wide range of fire management problems because it is a means of quantifying the ability or potential of a fire to start, spread, and cause damage. The core of the FDRS is Fire Weather Index (FWI) system. The FWI system consists of codes that rate the moisture content of the fuels and that indicate the relative fire behavior that based solely on weather observations of air temperature, relative humidity, wind velocity, and rainfall.

The utilization of satellite remote sensing data provides comprehensive and multi-temporal coverage of large areas in real-time and at frequent intervals and thus has become valuable in areas where there is no adequate or sparse data available. The revisiting period of NOAA and MODIS allows a daily fire danger monitoring.

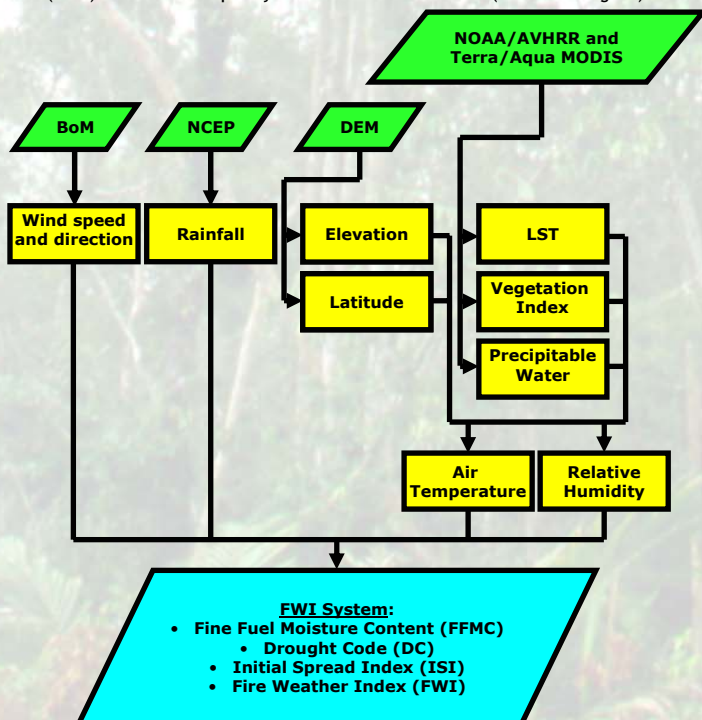
• Objective

This study presents the development of the Indonesian FWI system using the satellite remote sensing data. Two codes and two index of the FWI system: Fine Fuel Moisture Code (FFMC), Drought Code (DC), Initial Spread index (ISI), and Fire Weather Index (FWI) which respectively represent ignition potential, smoke potential, difficulty of control, and general fire danger are the main products of this study.

• Data and Method

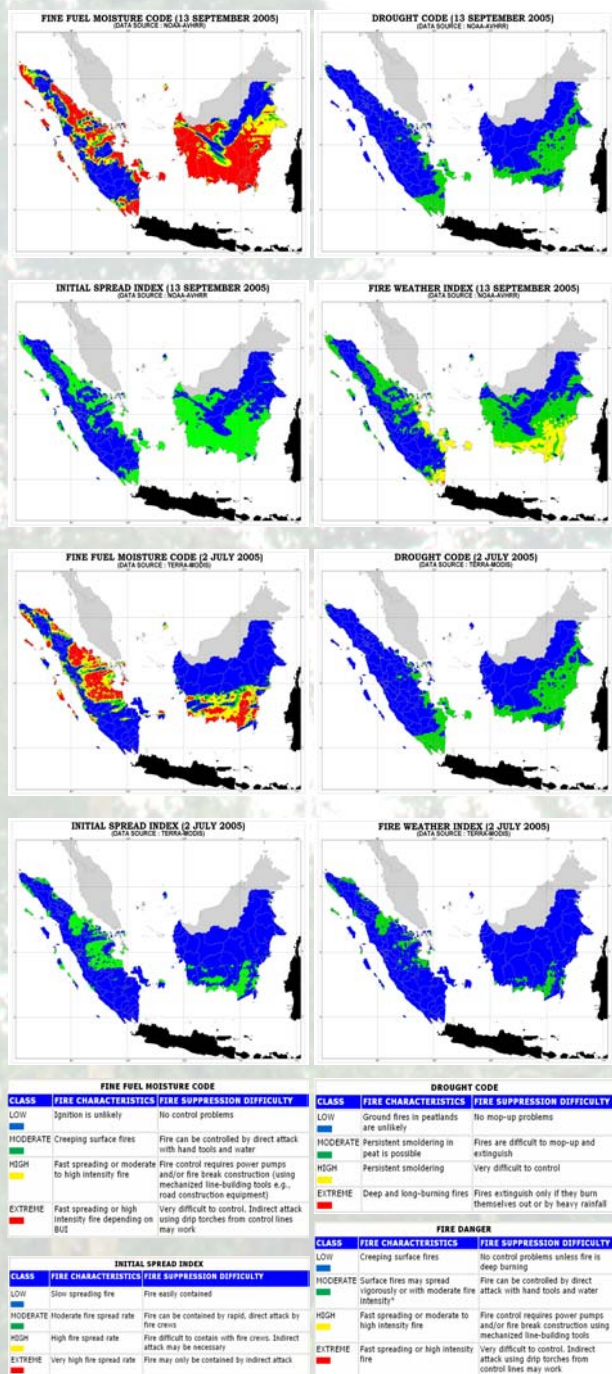
Using thermodynamic and statistical equations, daily air temperature and relative humidity are derived from the NOAA/AVHRR (National Oceanic and Atmospheric Administration/Advanced Very High Resolution Radiometer) and Terra/Aqua MODIS (Moderate Resolution Imaging Spectroradiometer) data combined with the Digital Elevation Model (DEM) data. Meanwhile, daily wind speed/direction and 24-hour accumulated rainfall are obtained respectively from the Australian Bureau of Meteorology (BoM) and the USA National Centers for Environmental Prediction (NCEP).

The Inverse Distance Weight (IDW) method, firstly, is performed for all inputs to result in data with a spatial resolution of 2.5 km x 2.5 km. The FWI System codes and indices are then obtained by running the spatial Fire Management System (sFMS) software developed by the Canadian Forest Service (see below diagram).



• Results

Examples of daily FDRS maps showing FFMC, DC, ISI and FWI over Sumatera island and Kalimantan along with their interpretations are presented below. The FDRS are proposed to be used by the forestry, agriculture, environment, and fire and rescue agencies in Indonesia to develop and implement fire prevention, detection, and suppression plans.



FOR MORE INFORMATION:

VISIT : <http://www.rs.lapan.go.id/SIMBA>
 CONTACT: Orbita Roswintarti and M. Rokhis Khomarudin
 Natural Resources and Environmental Monitoring Division
 Indonesian National Institute of Aeronautics and Space (LAPAN)
 Jalan LAPAN no. 70, Pekayon - Pasar Rebo, Jakarta 13710, Indonesia
 Tel./Fax: (+62 21) 8722733/8710274