The potential of the SEVIRI instrument on-board the MSG series, for applications related to a wide range of fire processes, has long been recognized. Applications vary from pre-fire signal and fire detection to fire monitoring and burnt scar discrimination.

EUMETSAT’s Satellite Application Facility for Land Surface Analysis (LSA SAF) is currently committed to develop an algorithm capable of detecting and monitoring active fires, particularly over Africa, that will lead to the operational generation, archiving and dissemination of the so-called Fire Detection and Monitoring (FD&M) product.

The major contribution of MSG/SEVIRI to the question of fire in Africa lies in the reduction of uncertainties in biomass burning estimation, and in the analysis of its diverse environmental consequences. It is also expected that active fire monitoring at high frequency will allow characterizing the diurnal fire cycle.

In southern Africa the burning season coincides approximately with the boreal summer, and fires progress in a West-East direction, from northern Angola and southern Congo in June-July, to Tanzania and Mozambique in September-October.

We present the first results obtained with a contextual algorithm for active fire detection based on information from MSG/SEVIRI. The algorithm was applied to a set of Meteosat-8 images covering the month of July 2005, with intervals of 15 minutes.

We have paid special attention to the diurnal fire cycles over southern Africa as well as over four different types of vegetation cover. We have also looked at the duration of fire events on each fire pixel and the obtained exponential-type distribution is worth being noted.

**Background and Main Objectives**

**FIRE DETECTION ALGORITHM**

1st step - Masks
- Mask of inland water bodies including rivers and lakes
- Mask of desert regions

2nd step – Selection of potential fire pixels
- Day time: \([T_B(3.9) \geq 318K] \cap [T_B(3.9) - T_B(10.8) \geq 10K]\)
- Night time: \([T_B(3.9) \geq 308K] \cap [T_B(3.9) - T_B(10.8) \geq 3K]\)

3rd step – Rejection I (clouds)
- Day time: \([R(0.6) + R(0.8) > 1.2] \cap [T_B(12) < 265K]\)
- Night time: \([T_B(12) < 265K]\)

4th step – Rejection II (high reflective surfaces)
- Day time only: \([R(0.8) > 0.25]\)

5th step – Rejection III (sun glint)
- Day time only: \([R(0.6) + R(0.8) < 1.2]\)

6th step – Confirmation of potential fire pixel
- Day time: \([T_B(3.9) > T_B(3.9) + 0.9 - 3] \cap [\Delta T > MA(X(2.5,0.5) \cdot \Delta T)4]\)
- Night time: \([\Delta T > MA(X(2.5,4) \cdot \Delta T)4]\)

where: \(\bar{T}_B(3.9) = \frac{1}{N} \sum_{i=1}^{N} [T_B(3.9)]\)
\(\delta(3.9) = \frac{1}{N} \sum_{i=1}^{N} [T_B(3.9) - \bar{T}_B(3.9)]\)
\(\Delta T = \frac{1}{N} \sum_{i=1}^{N} [T_B(3.9) - T_B(10.8)] - \frac{1}{N} \sum_{i=1}^{N} \Delta T_i\)
\(\delta(\Delta T) = \frac{1}{N} \sum_{i=1}^{N} [\Delta T_i - \Delta T]\)

The above statistics are computed over valid (1) neighbouring (2) pixels.

(1) i.e. non-water, free-cloud, not affected by high reflection or sun glint and not potential fire pixels

(2) i.e. inside a 5x5 pixel window centered at the considered pixel

**DIURNAL CYCLE OF ACTIVE FIRES**

**DURATION OF ACTIVE FIRES**