

## Managing the changing risk of fire in the South African landscape

BW VAN WILGEN<sup>1</sup>, S ARCHIBALD<sup>2</sup> AND P FROST<sup>3</sup>

<sup>1</sup> CSIR Natural Resources and the Environment, P O Box 320, Stellenbosch, 7599, South Africa

<sup>2</sup> CSIR Natural Resources and the Environment, PO Box 395, Pretoria, 0001

<sup>3</sup> CSIR Meraka Institute, PO Box 395, Pretoria, 0001

Email: bwwilgen@csir.co.za - www.csir.co.za/biodiversity

### INTRODUCTION

Fires are a natural and common feature of many of South Africa's landscapes. They are necessary for the maintenance of healthy ecosystems and for biodiversity, but they also do extensive damage to crops, plantations, houses and livestock, and are a threat to human life. The risks associated with fires are increasing as development encroaches into fire-prone areas. In addition, these risks may increase with predicted levels of climate change.

### OUR WORK HAS THREE GOALS:

- To quantify the nature of the risks associated with vegetation fires
- To assess how these risks may change in future
- To develop early-warning systems that will help to reduce or manage these risks.



Figure 1. The combination of hot dry weather, cured grasses that form a fine fuel bed, and abundant sources of ignition combine annually to produce vegetation fires across many parts of South Africa

### QUANTIFYING PROBABILITY AND CONSEQUENCES OF FIRE

Risk is the combination of probability and consequences. The occurrence of fire depends on the simultaneous existence of three conditions: (1) sufficient fuel to burn; (2) warm, dry weather; and (3) a source of ignition. The frequency with which this happens differs across southern Africa, resulting in different probabilities of fire (Figure 2). Our interest is in whether any of these factors are changing, thus affecting the probability of fire in any given region. The consequences of fire depends on the distribution of assets and lives that would be exposed to fire, as well as on the ecological effects that fire would have. Assets and lives have to be protected, but ecosystems also have to burn to remain healthy.

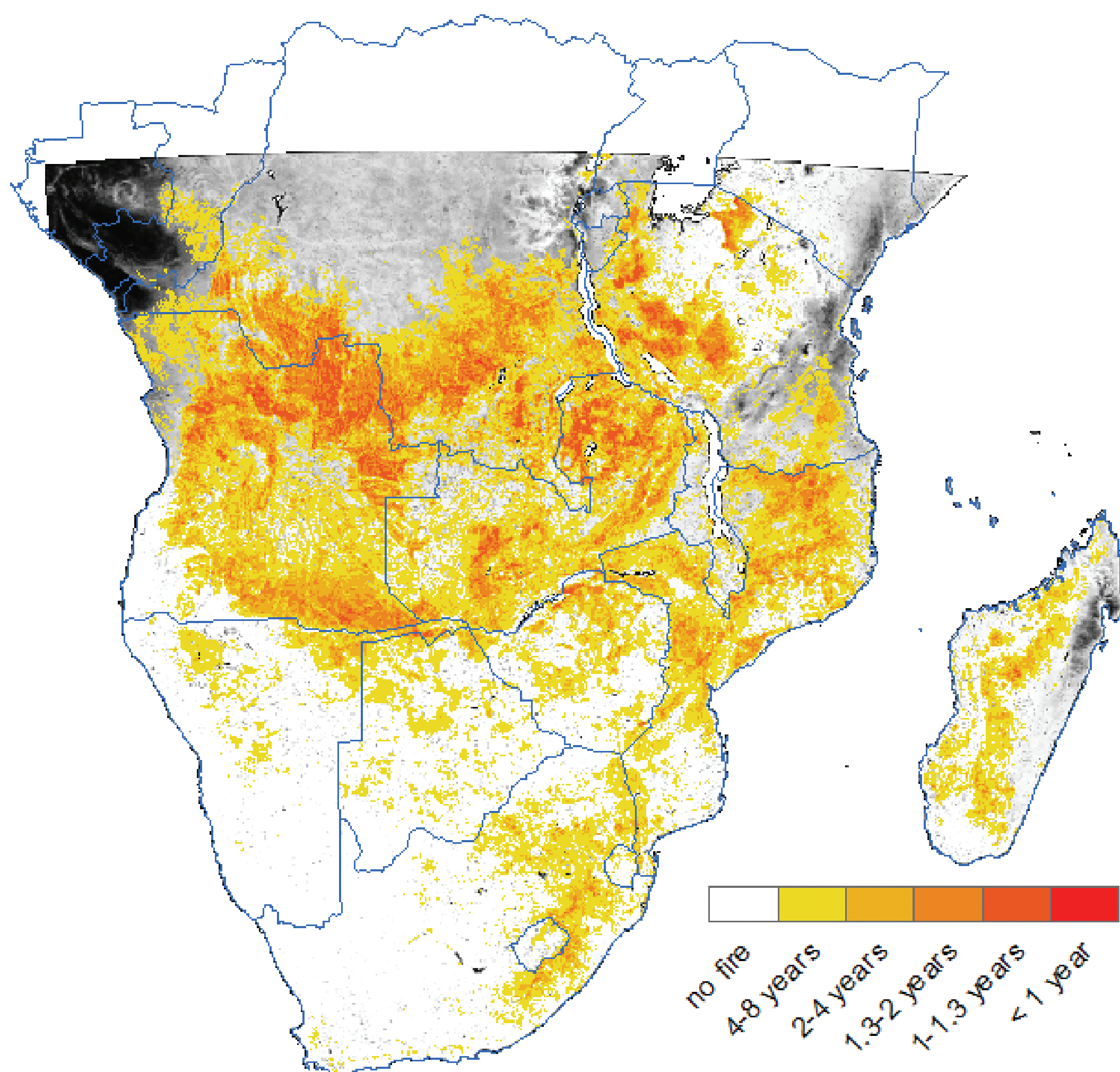


Figure 2. Fire return period for Southern Africa, determined from an eight year record of burnt area derived from satellite imagery

### ARE FIRE REGIMES CHANGING, AND WHY?

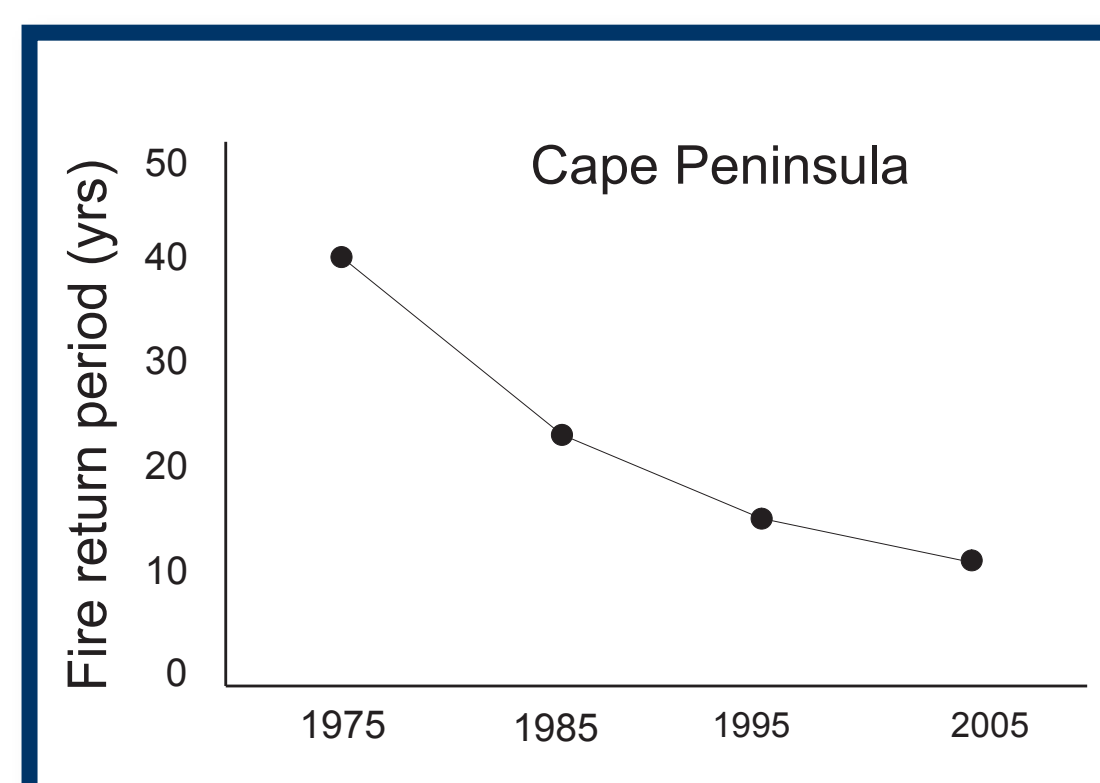


Figure 3. Mean fire return periods over the past four decades on the Cape Peninsula

In some areas, our research has shown that fires are becoming more frequent, as a result of (1) growing human populations providing more abundant sources of ignition; and (possibly) (2) changing weather patterns resulting in more and longer periods of hot, dry and windy weather.

### WHAT CAN BE DONE ABOUT IT?

We have developed early-warning systems using satellite remote sensing. This allows for the detection of active fires, and the notification of fire managers of the co-ordinates of any fire that ignites. This information, together with fire danger ratings, allows for rapid response. Research has shown that the early detection and suppression of wildfires can save substantial amounts of damage.

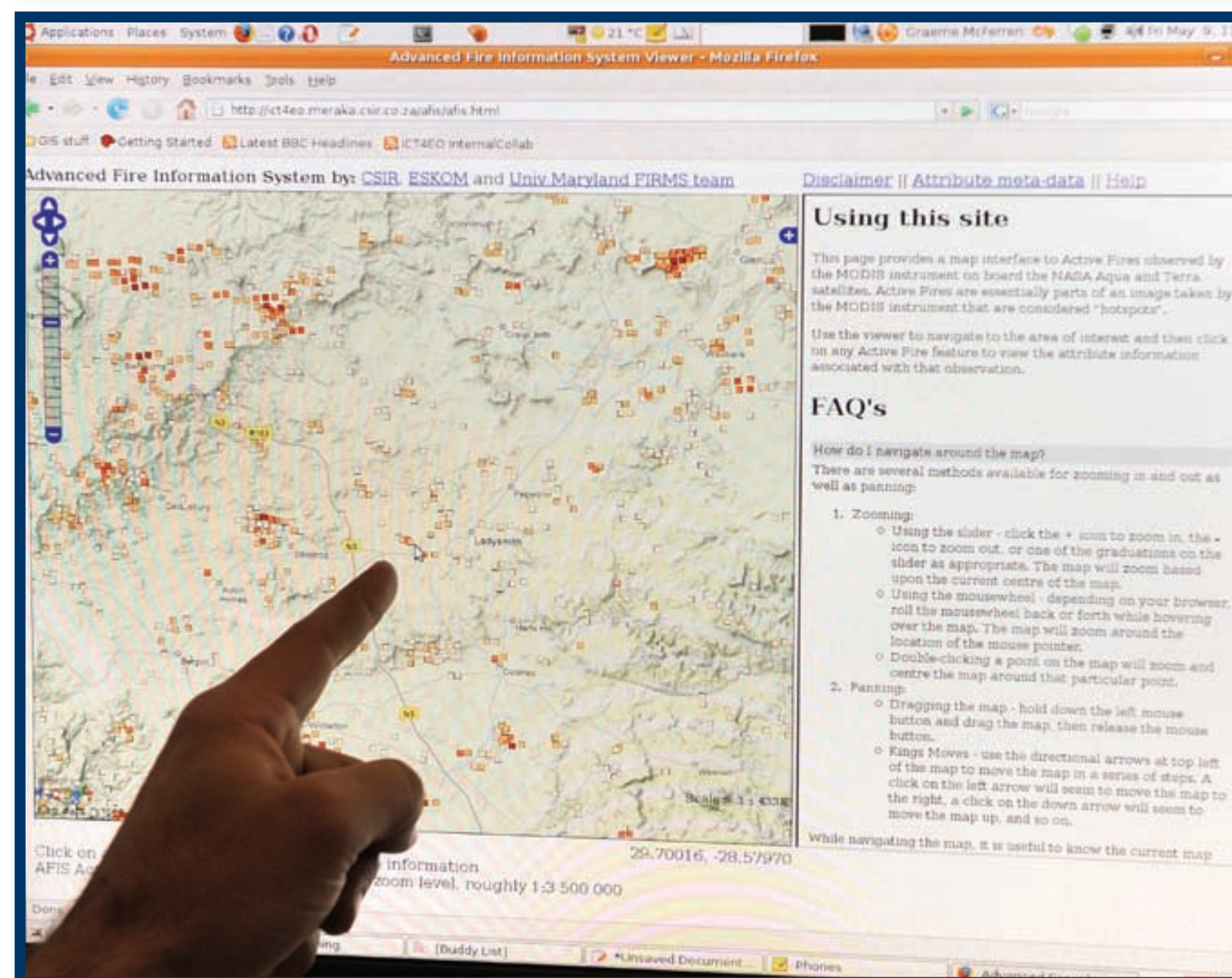
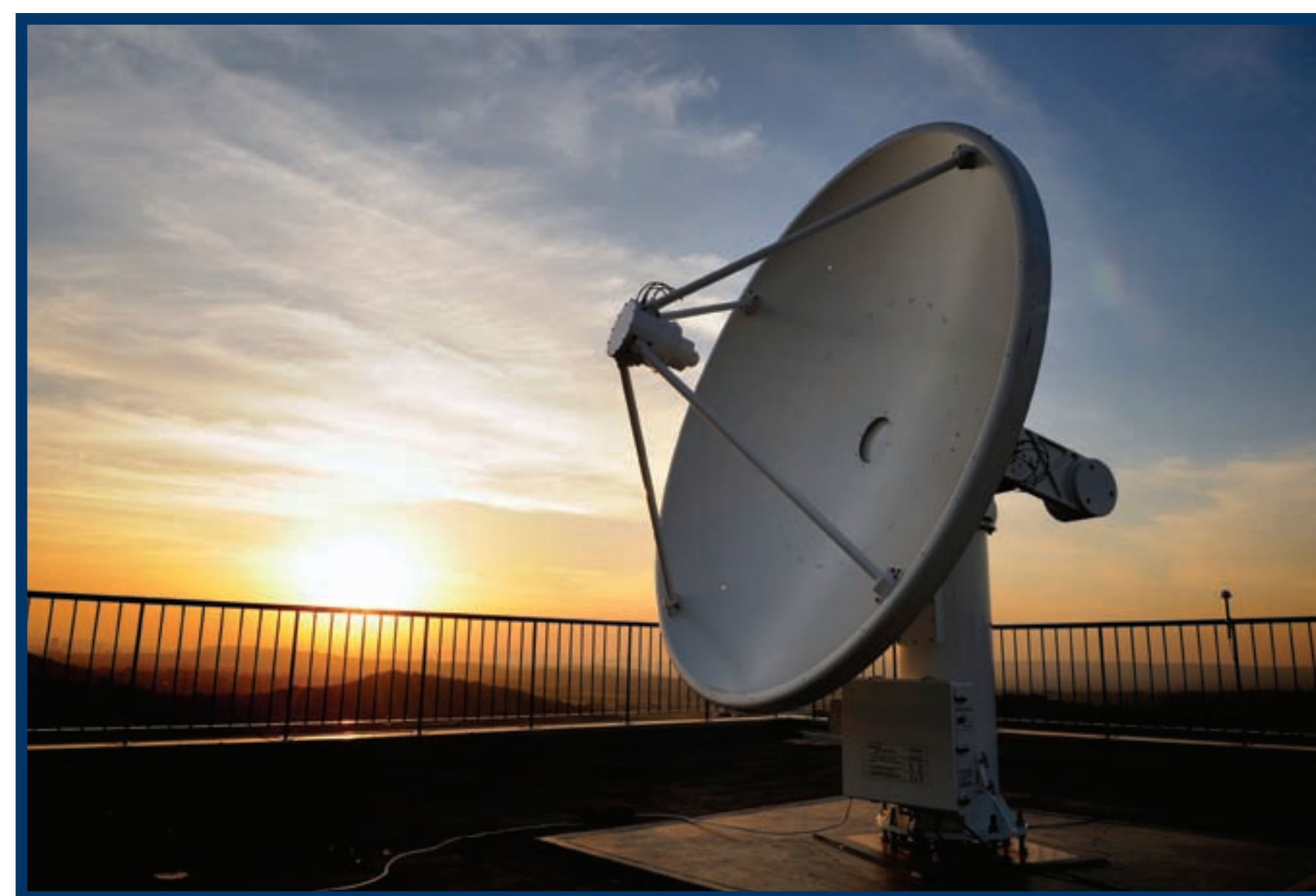


Figure 4. Managers' abilities to pinpoint fires and achieve early suppression have been significantly improved through the CSIR's Advanced Fire Information System (AFIS)

### LIVING WITH FIRE - THE BOTTOM LINE

Our ecosystems are fire-prone and fires are inevitable. We have to focus on preparation for inevitable fires as well as suppression if damage is to be avoided.



**CSIR research into fires, a powerful ecological force, aims to quantify their probabilities and consequences - to help improve fire management approaches.**

