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early warning and damage assessment for forest fire

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The main objectives of this proposal were: 1. To develop a suitable early warning technique to predict forest fire by means of MODIS and MERIS images. 2. To adapt a monitoring technique to the fires spread on the experimental area by using multi-temporal and multi-spatial satellite. 3. To adapt a monitoring technique to carbon emissions from forest fires by using MIPAS, GOMOS, GOME and SCIAMACHY images and 4. To set up a suitable damaged assessment methodology for large forest fire by integrating satellite Remote Sensing (RS) techniques and Geography Information System (GIS) techniques. All these objectives have been largely covered. The basis for the development of an early warning technique to predict forest fire was presented at Barcelona meeting by Dr Qin Xianlin. There, the experimental area was defined, the data to be used were introduced and the damage assessment methodology was described. In the Mid Term Symposium the first results about early warning fires in Guangxi were shown including forest greenness and fuel moisture content evolution of different forest classes. Also, an flowchart of an operational damage assessment was introduced together with the first results. A forest fire detection application was also developed by the Chinese team. This application was not included explicitly on the proposal, and it was an additional and very interesting task. This forest fire detection application was build on a Grid based infrastructure, starting from FY3 data which feed a Spatial Information Grid Runtime Environment, shortly named SIGRE, link to a SIGApp, built with Java, which put the information in a web graphic mode to end user. The final result, as it was shown at the Prague Symposium, is a very robust system able for early warning forest fires, fire detection in case of fire, and damage assessment, fully operational and giving excellent results. Simultaneously, a deep analysis of the fire emissions was carried out in order to evaluate the amount of CO/CO2 emitted and the characteristics of these emissions. From MOPITT data, and by means of a FFT, the seasonal evolution of emissions was obtained over populated and no populated areas. The next step was to estimate emissions by a direct way using two different approaches: seasonal evolution and single fire/cluster analysis: the emissions of a large fire were determined to be of several tens of kilotons. Finally, the developed procedure demonstrates to be able to distinguish between the emissions coming from natural sources from them coming from forest fires.

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森林火灾早期预警及损失评估

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项目主要目标包括：1. 开发一种适用于MODIS和MERIS数据的林火早期预警技术。该技术将集成植被生长、植被湿度和气候状态等指数。将根据实验区的历史火灾和其他需要的因子（如可燃物类型和地形等）等来建立相适应的火险指数参数。2. 建立基于多时间多空间分辨率的卫星影像（如MODIS, AVHRR, FY, ATTRS, HJ-1-A and HJ-1-B等）的火蔓延的监测技术。该技术将包括火的检测方法、着火面积计算方法和火的蔓延速度估测方法等。计算机网格技术将用于火的识别和蔓延速度的估测。3. 建立利用GOMOS, GOME和SCIAMACHY影像进行林火碳释放的监测技术。4. 建立综合利用遥感技术和地理信息系统技术的森林大火灾情评估技术。该技术将包括对过火面积、火的影响和植被恢复等的评估技术。这些目标都已广泛涉及到了。以覃先林博士在西班牙巴塞罗亚会议上汇报了早期预警的技术为基础进行了开发。在这次会议上，对设立的实验区，所用的数据和损失评估方法进行了介绍。在项目中期年会报告中，曾对不同森林类型的绿度和可燃物湿度、广西实验区的早期预警结果以及一种业务运行的损失评估框架进行了介绍。中方同时还开发了一种森林火灾监测应用程序。这项应用并不是项目建议书的研究内容，该项工作是额外的但是非常有趣的工作。该项森林火灾检测应用技术是基于网格架构，以空间网格为环境处理FY3数据，简称为SIGRE，与SIGAPP相连接，利用JAVA语言进行构建，并从网络提供终端用户监测信息。最终的结果，如在捷克布拉格年会上汇报，是一种非常智能化的系统。可提供早期预警，林火检测和损失评估。具有可操作和提供较好结果的能力。同时，为了估测火灾释放的CO/CO2量和碳释放的特征，而原来的研究进行了更加深入地分析研究。利用MOPITT数据，结合傅立叶处理等，分别对人口分布区和无人口分布区的季节排放量进行了估测。下一步将通过两种不同途径进行碳排放量直接估测：按季节估测和单场火/聚类分析。一场大火的排放量估测的结果达到数万吨。最后，发展后的示范程序将能区分排放的CO/CO2的来源是从自然资源还是从林火。

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