

The University of Manchester

MANCHESTER  
1821

NATURAL  
ENVIRONMENT  
RESEARCH COUNCIL

## *Knowledge for Wildfire*

### **NERC Knowledge Exchange Fellowship**




Improving management of UK wildfire  
through knowledge exchange

**Julia McMorro**  
Senior Lecturer in Remote Sensing, NERC KE Fellow  
School of Environment, Education and Development, University of Manchester  
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Wildfire 2013, The Vale Resort, Glamorgan, 22-23 Oct 2013



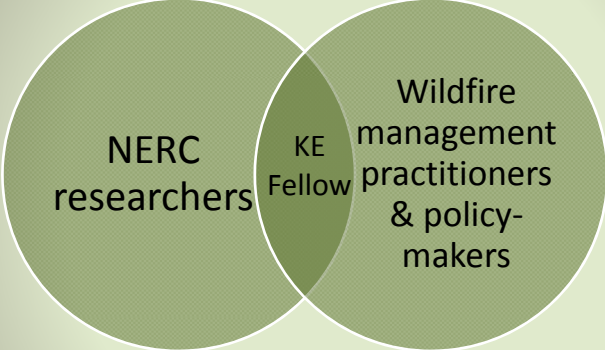
Improving management of UK wildfire  
through knowledge exchange

## **Structure of session**

1. Progress report on Knowledge for Wildfire project
2. Poster session

**KfWF**  
Improving management of UK wildfire  
through knowledge exchange

## KE Fellow's role



The diagram consists of two overlapping circles. The left circle is labeled 'NERC researchers'. The right circle is labeled 'Wildfire management practitioners & policy-makers'. The overlapping area in the center is labeled 'KE Fellow'.

- Planned as a 3 year project, 3 days a week
- Funded for 2 years at 2 days a week, Oct 2012 - Sep 2014
- Top up funding from NERC; from 1<sup>st</sup> Oct 2013, 1.5 days a week, but extended to a 3rd year, ending 2015.

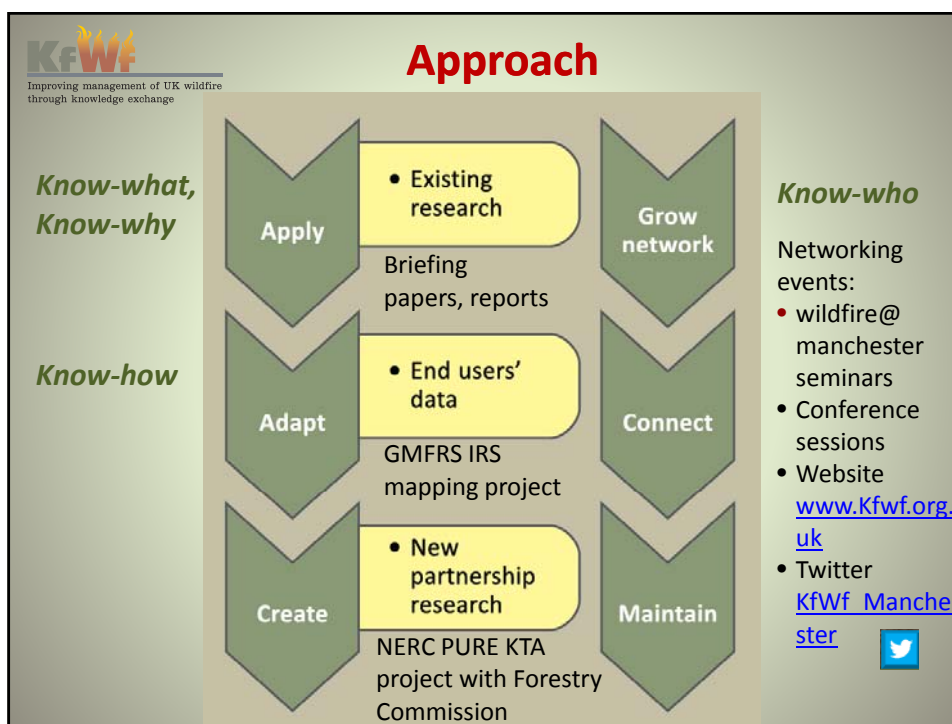
**KfWF**  
Improving management of UK wildfire  
through knowledge exchange

## Project aims

- To maximise the use of existing NERC-funded research and promote mutually beneficial new research and KE projects on wildfire;  
**improve the evidence base** for managing wildfire risk in the UK
- To assist the management of wildfire risk in the UK at all stages from prevention to response and recovery.

## Project objectives

1. **Connect** emerging cross-sector and cross-disciplinary interests in wildfire; awareness-raising and advocacy role
2. **Apply** NERC's existing fire-related research, and use research to **adapt** (add value to) user data
3. **Create**/facilitate new partnership research and KE which addresses knowledge gaps.



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## Apply | How NERC science can help

By improving our understanding of:


- How *past fire regimes* were related to climate and land management. How *climate change* may change wildfire frequency and magnitude, and feedback to climate
- How wildfires affect *carbon budgets*
- How wildfire emissions affect *air quality* and *health*
- How *fire ecology* explains complex relationships between fire, vegetation, soil, climate and people. How managed fire and wildfire interact with biodiversity, water colour and other ecosystem services
- How *remote sensing* can be used to detect: *pre-fire* fuel load & fuel moisture content; *active fire* location and energy; *post-fire* vegetation and soil burn severity, and monitor long-term ecological response
- How *GIS* can model wildfire risk, hazard and threat.....etc

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## Connect, Apply | Who's Who in UK fire researchers

	Fire behaviour	Hydrology	Keyword 3
Research group 1	●		●
Research group 2		●	
Research group 3		●	●


**John Dold** [john.dold@manchester.ac.uk](mailto:john.dold@manchester.ac.uk)



- fire control / prescribed burning
- wildfire research
- wildfire training
- fire monitoring
- patterned ignition
- fire and air-flow coupling
- blowup or eruptive fire spread
- fire behaviour and simulation
- large area fires / firestorms
- field-burn experiments

wildfire consultant  
Emeritus Professor,  
University of Manchester  
[firelab.co.uk/dold](mailto:firelab.co.uk/dold)

for the study, control and use of fire



**EMBER – Effects of Moorland Burning on the Ecohydrology of River basins**  
June 2009 – March 2013  
Lee Brown, Joseph Holden & Sheila Palmer

water@leeds  
UNIVERSITY OF LEEDS

NATURAL ENVIRONMENT RESEARCH COUNCIL

**Fire effects on runoff, erosion and water quality**  
Dr Hugh Smith  
School of Environmental Sciences, University of Liverpool, [hugh.smith@liverpool.ac.uk](mailto:hugh.smith@liverpool.ac.uk)

**Background:** researching wildfire and prescribed fire in Australia since 2003; published 18 papers and 4 reports for management agencies to date.

**Aim:** to apply fire research experience and methods in the UK.

**Key questions:**

1. How does burn patchiness affect runoff and sediment connectivity from paths to hillside scales?
2. Can we design prescribed burns to minimise possible impacts on soil and water resources?
3. Does wildfire present a future threat to water supply catchments in the UK under a changing climate?



Lee Brown et al (2013), 'Intact vegetation buffers 2-10 m in width were highly effective in reducing runoff and erosion after prescribed burning.'

UNIVERSITY OF LIVERPOOL



# Fire effects on runoff, erosion and water quality

Dr Hugh Smith

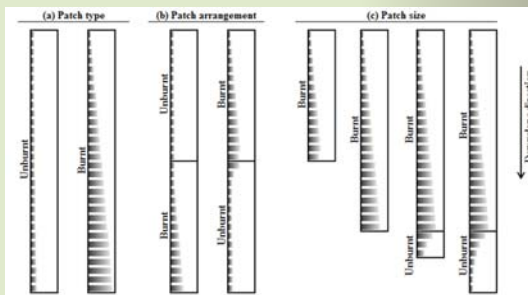
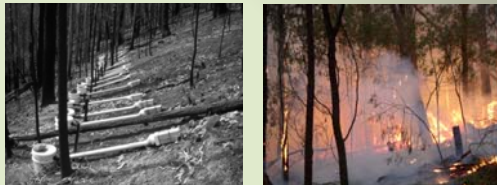
School of Environmental Sciences, University of Liverpool, [hugh.smith@liverpool.ac.uk](mailto:hugh.smith@liverpool.ac.uk)

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**Key questions:**

1. How does burn patchiness affect runoff and sediment connectivity from patch to hillslope scales?
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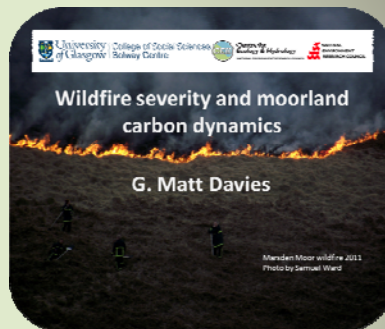
Cawson et al (2013) - unburnt vegetation buffers 5-10 m in width were highly effective in reducing runoff and erosion after prescribed burning




**Example paper:** Cawson JG, Sheridan GJ, Smith HG, Lane PNJ (2013) Effects of fire severity and burn patchiness on hillslope-scale surface runoff, erosion and hydrologic connectivity in a prescribed burn. *Forest Ecology and Management*, 310: 219-233.



## Connect, Apply | Wildfire@manchester



<http://kfwf.org.uk/assets/documents/Millin-Chalabi et al 13jun13 KFWF seminar report.pdf>



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[www.kfwf.org.uk](http://www.kfwf.org.uk)

## Connect | Website

Home | Contact us | Sitemap

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**OUR NETWORK** | **RESOURCES** | **NEWS & EVENTS** | **MEMBERS**

### Knowledge for Wildfire

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**What are wildfires?**

A wildfire is any unplanned and uncontrolled vegetation fire which may require suppression. Most wildfires in the UK are started by humans, and occur on moorlands, heaths, grassland, woodland and agricultural land. We can help to prevent damaging fires by managing people (ignition sources) and vegetation (fuel).

Not all fire is damaging – controlled fire is a traditional management tool in fire-tolerant ecosystems. Zero tolerance to all fire can create larger fires. Fire ecology recognises the complex interactions between fire, ecosystems and people.

**Why are wildfires important?**

- Over 118,000 'grassland' fires were recorded by Fire and Rescue Services in Great Britain in the financial years 2010/11 and 2011/12. They are strongly weather-related and so are challenging to plan for; on average there were 374 per day in the dry April of 2011 compared to 30 in January 2012. [Fire Statistics Great Britain, 2011-12](#).
- UK-wide in the dry April and May of 2011, 44 were estimated to be over 40 hectares in size.
- Response costs alone are estimated at £55 million a year, and up to £1 million for a big moorland fire.
- Wildfire is identified as a key risk in the [UK Climate Change Risk Assessment 2012](#). The likelihood of wildfires occurring may increase between 10% and 50% by the 2080s with projected warmer, drier spring and summer conditions.
- More large fires would lead to significant loss of biodiversity and ecosystem services such as carbon storage for ecosystems like peatland and heathland, which are particularly sensitive to fire.

[Information about how NERC science can help.](#)



**Who we work with**

**Why join us**

**What we do**

**Get in touch**

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**News**



**'Wildfire and Carbon Budgets'**  
Dr Matt Davies (University of Glasgow)

27th February at the University of Manchester.


First wildfire@manchester event, hosted jointly with Geography Research Seminars

[More information](#)

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## Connect | Who we work with

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**England and Wales Wildfire Forum**

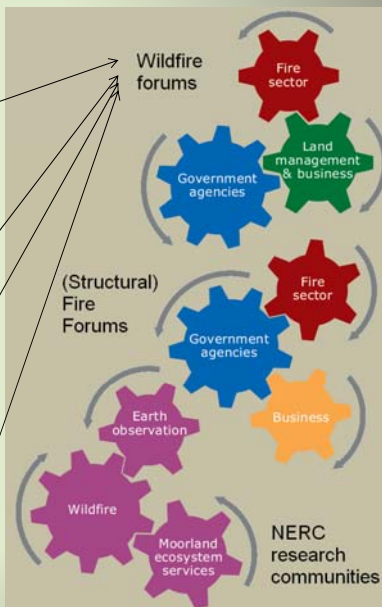
- [KfWf advisory panel](#)
- Responses to consultations, e.g: [UK Climate Change Risk Assessment](#) and [National Adaptation Programme](#);

**CFOA Wildfire Group**, Research & Information Workstream; IRS consultation

**Local Fire Groups** e.g. Lancashire FOG

**Moorland management groups**

- DEFRA Best Practice Burning Group: wildfire guidance note
- Moors for the Future: public awareness of wildfire risk interactive exhibit
- National Trust: [High Peak Moors Vision & Plan](#)



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## Connect | Launch of National Trust High Peak Moors Vision and Plan, 20 Sep '13

<http://www.high-peak-moors.co.uk/>




Heather seeding

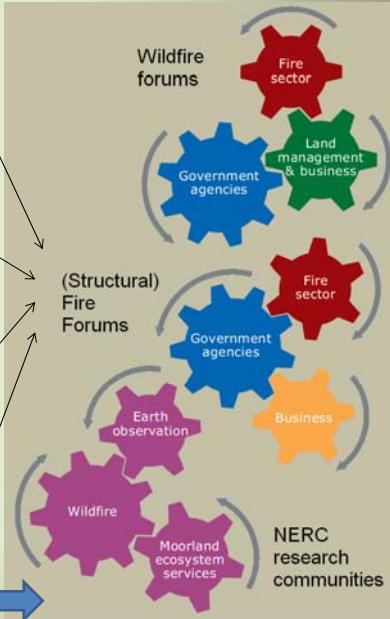


Contributed to 'expert evidence' on wildfire  
*'Managing the risk of wildfire is a key objective for us.'* (p23)

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## Connect | Fire sector

- **DCLG Fire Research Statistics User Group:** wildfire reporting in Incident Recording System
- **Fire Sector Federation**  
**Fire Research and Statistics Workstream:** raising awareness of wildfire issues 
- **Institution of Fire Engineers:** papers at Fire-Related Research conferences, Re12 and Re13
- **Knowledge Infrastructure for the Fire Sector:** Buckinghamshire FRS's Manchester workshop, 6 Sep '13





## Connect | Fire Sector Federation

<http://firesectorfederation.co.uk/workstreams/research-and-statistics.php>

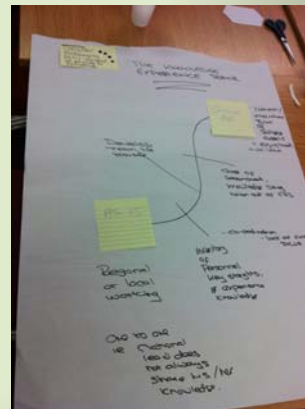
The screenshot shows the Fire Sector Federation website. At the top, there is a navigation menu with links for Home, About FSF, Resources, News, Membership, and Workstreams. Below the navigation is a banner with the text "Bringing together members with a particular interest or expertise to discuss and develop policy and actions." The main content area is titled "Research and Statistics" and includes a sub-menu with "Overview", "Meetings", and "Documents". A "Workstream Chair" section features a photo of Dennis Davis CBE, OFM, with his contact information: Tel: +44 (0)1244 323177, Mobile: +44 (0)7879 481000, and Email: [dsdavis@fsf.org.uk](mailto:dsdavis@fsf.org.uk). Below this, the text states: "The aim of Research and Statistics Workstream is to ensure Fire Sector Federation members, and those who work with or may be influenced by the fire sector, are aware of the scientific and statistical evidence that exists and that might be applied to help create a safer society. Specific activities focus on three areas:" followed by three bullet points:
 

- **Statistics:** support and encouragement in the collation and analysis of data related to fire and the wider requirements of integrated risk management planning. The FSF has a continuing relationship with the UK Fire and Rescue Statistics User Group and is reviewing a project investigating the economic cost of fire.
- **Applied research:** the use of empirical knowledge and the application of innovative solutions is viewed as essential to improve preventative, mitigation and response options. The intention is to capture information relating to technologies, studies and policies that may assist FSF members and others achieve these improvements.
- **Knowledge exchange:** identification of source materials with routes of access to that information, emphasising open access, is central to this plan. The current initiative is to develop a Fire Foundation to provide a think tank capability and to identify a suitable host web platform.




## Connect | Knowledge Infrastructure for the Fire Sector

Buckinghamshire FRS's Manchester workshop, 6 Sep '13









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## Connect | Research communities



**Conferences on remote sensing of fire; e.g. EARSeL Forest Fires Special Interest group**




**International Assoc of Wildland Fire; Human Dimensions conferences**



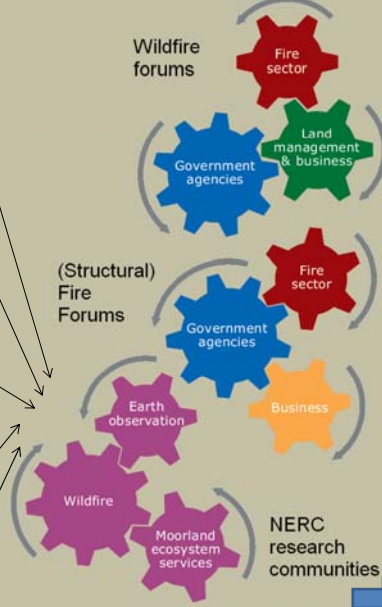
**NERC meetings**

- Think Tank on investment in natural hazards and risk, 21 Oct'13
- KE Network

**Living with Environmental Change (LWEC) partnership**



**Survey of UK fire research activity**



The diagram shows several interlocking gears representing different research communities: Wildfire forums (red gear), Fire sector (red gear), Land management & business (green gear), Government agencies (blue gear), (Structural) Fire Forums (blue gear), Earth observation (purple gear), Business (orange gear), Wildfire (purple gear), Moorland ecosystem services (purple gear), and NERC research communities (purple gear). Arrows from the text boxes on the left point to these gears.



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## EARSeL Workshop Forest Fires Special Interest Group, 15-17 Oct '13





Poster titled "Early warning system for wildfire detection" showing a satellite and various data visualizations.

European Association of Remote Sensing Laboratories



Poster titled "Knowledge for Wildfire" with a large image of a wildfire.



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## Apply, Connect | International Assoc of Wildland Fire (virtual) conference



**International Association of Wildland Fire**  
Facilitating communication and providing leadership for the wildland fire community.



Proceedings of 3rd Human Dimensions of Wildland Fire, April 17 - 19, 2012, Seattle, Washington, USA  
Published by the International Association of Wildland Fire, Missoula, Montana, USA

**3rd Human Dimensions of Wildland Fire Conference**  
*Responsibility: Research, Management, and Communities*


**Different risks, different solutions? A discussion on what traditionally fire prone and less fire-prone countries can learn from each other**

Cathelijne R. Stoop<sup>A</sup>, Brian Oswald<sup>B</sup>, E.K. (Lisa) Langer<sup>C</sup>, Mathijs Schuijn<sup>D</sup>, Julia McMorrow<sup>E</sup>, Alette Getz-Smeenk<sup>F</sup>, Ester Stalenhoef<sup>G</sup>

<sup>A</sup> Cornell University, Ithaca NY 14853, USA. Cathelijne.Stoop@cornell.edu  
<sup>B</sup> Stephen F. Austin State University, Texas, USA. boswald@sfau.edu  
<sup>C</sup> Rural Fire Research Group, Scien. Christchurch, New Zealand. lisa.langer@scionresearch.com  
<sup>D</sup> Safety Region Utrecht (V&U), Netherlands. mathijs\_schuijn@hotmail.com  
<sup>E</sup> University of Manchester, United Kingdom. julia.mcmorrow@manchester.ac.uk  
<sup>F</sup> Fire and Rescue Services, VNOG, Netherlands. A.Getz@vno.nl  
<sup>G</sup> National Safety Institute (NIVV), Netherlands. ester.stalenhoef@nivv.nl







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## Create | NERC-PURE KTA with Forestry Commission

**PURE**  
Probability, Uncertainty and Risk in the Environment

**KTA**  
Knowledge Transfer Associate

**Wildfire Threat Analysis (WTA)**  
(Moffat & Pearce, 2013)

**WILDFIRE THREAT**

**Risk of ignition**  

- Land use
- Population
- Accessibility
- ...

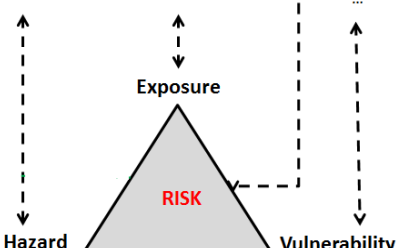
**Hazard fire spread**  

- Land cover
- Fuel types
- Fuel load
- Slope
- Fire climate
- FWI data

**Values at risk**  

- Life
- Property
- Infrastructure
- Forestry
- Agriculture
- Biodiversity
- ...

**Risk Triangle**  
(Crichton, 2001)





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## Benefits

### For end-users

- Access to NERC-funded science and expertise
- Opportunities to work with researchers and influence the research agenda
- Add value to your datasets

### For researchers

- Benefit from end-users' expertise and data
- Increase the impact of your research
- Find out what new research end-users really want

### For both

- Links into other networks
- Build partnerships for funding applications
- Improve the evidence base for management, policy making and funding applications



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**Thank you for listening**

Questions?

[Julia.mcmorrow@manchester.ac.uk](mailto:Julia.mcmorrow@manchester.ac.uk)

[www.kfwf.org.uk](http://www.kfwf.org.uk)



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## Poster session

1. **Controls on the formation, transport and fate of charcoal from moorland wildfires.** Gareth D CLAY
2. **Assessing prescribed burning performance over a 25 year period: a case-study.** Pierre DENELLE, Katherine A ALLEN, Francisco M SÁNCHEZ RUIZ and Rob H MARRS
3. **Measuring vegetation canopy moisture content with dual-wavelength terrestrial laser scanning** F.M. DANSON, R. GAULTON, S. HANCOCK, & L.A. WALKER
4. **The Geography of vegetation fires in Greater Manchester: adding value to Fire and Rescue Service incident data.** Richard DONLAN
5. **\*Development of a mobile app for fire prediction, detection and monitoring** Philip E FROST and Derick SWANEPOEL

\* Poster author not present



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## Poster session

6. **The effect of drought on fire severity in heather moorland prescribed burning.** Roger GRAU-ANDRES, G Matt DAVIES; Susan WALDRON and Michael BRUCE
7. **\*The International Wildfire Simulation Training Project: 3D serious game-based training and exercising of wildfire response professionals.** Philippe MERESSE, Eric TURPIN, Martijn BOOSMAN, Steven VAN CAMPEN, *et al.*
8. **Detecting moorland wildfire scars and their persistence in the landscape using Synthetic Aperture Radar (SAR); Peak District National Park.** Gail MILLIN-CHALABI, Julia MCMORROW and Clive AGNEW
9. **Flammability properties of British moorlands and heathlands vegetation: models for predicting fire ignition and spread.** Victor M SANTANA, Rob H MARRS

\* Poster author not present