



**6th Fire Weather
Workshop**

**Hahndorf
South Australia**

18-22 June 1995

DRAFT

Bureau of Meteorology

Other Fire Weather Conferences and Workshops

1 st	Melbourne (VIC)	1958
2 nd	Adelaide (SA)	1985
3 rd	Hobart (TAS)	1989
4 th	Mt Macedon (VIC)	1991
5 th	Bowral (NSW)	1993
6 th	Hahndorf (SA)	1995

Severe Weather Program Mission

The Severe Weather Warning Services Program aims to minimise the loss of life and property and community disruption caused by tropical cyclones, thunderstorms and wildfires. The warning services and direct liaison with users are undertaken by the Bureau's Regional Offices. Policy development, overall coordination of services, and liaison with national bodies and overseas National Meteorological Services are undertaken by the Severe Weather Program Office which is part of the Head Office Services Policy Branch.

THE SIXTH FIRE WEATHER WORKSHOP: OVERVIEW

18 - 22 June 1995

Hochstens at Hahndorf

South Australia

This workshop was the sixth in the series of workshops and conferences run by the Bureau of Meteorology to provide directions for the Bureau's fire weather services. The first Conference was in Melbourne in 1958, the second in Adelaide in 1985 and as workshops every two years since.

On this occasion the emphasis of the workshop was on the application of meso- meteorological models as research and forecasting tools for fire weather. To progress the use of meso models for fire weather, three invited speakers made a great contribution to the workshop.

Firstly Prof Lance Leslie and Milton Speer demonstrated that meso models could be run on medium sized computers in a reasonable time to provide an essential aid for wind forecasting in difficult fire situations. These fine scale uncoupled models will become vital tools for fuel reduction burning purposes.

Prof Mary Ann Jenkins provided results from running the Clark - Hall meso model with a coupled fire. The output of the model for the first time provided some insights into many puzzling fire behaviour especially the shape of fires. Mary Ann emphasised the controlling influence of the fire plume on fire spread through the coupling.

Terry Clark explored the methods for quantifying the coupling through The Froude number and low level wind shear.

The coupled Clarke-Hall model requires a 30 - 60 : 1 supercomputer time but is expected to reduce to a close around real time on workstations over the next few years. It is clearly potentially a very powerful fire research tool. The fire coupling is in a very early stage and we have been privileged to have access to preliminary and early results so early in the development of this technique.

Taken together these three presentations demonstrated that meso modelling will become an indispensable tool for fire weather operational forecasters and fire researchers.

From an operational view point there were presentations of the Bureau's new meso model soon to be available as a fire weather forecasting tool. The Bureau's meso-model will be operating at the courser end of meso-models at a resolution of around 25 kilometres. This promises to be most useful for fire weather warnings.

CSIRO also have a meso-modelling capability and have taken a particular interest in sea breeze problems. All fire managers will agree that the sea breeze is a particularly important phenomenon for both fire control and prescribed burning.

Other meso modelling interests centre around using models to assist in forecasting strong wind conditions that are of a small and often local scale and the ever important smoke dispersion.

The workshop had a run around the major activities in the various States and looked at automatic weather station problems and opportunities, some interesting fires were examined including the recent Victorian "Enfield" fire and the NSW and Queensland fires of 1994. The basis for imposition of fire bans and their effectiveness was also visited.

Satellite techniques (Vegetation index), lightning detection and the Haines index were also presented and briefly discussed.

The abstracts for the presentations are included in this report of the proceedings.

At the end of the workshop small groups were formed and each was asked to produce four important issues for the workshop to present as recommendations for further work, study or implementation as appropriate. These major conclusions are included in this document.

There was also a note kept of the many ideas and suggestions that participants espoused during the four days. These are also included and may be useful as an aid to the development of fire weather services.

A short field trip through yet another Adelaide Hills fire underlined the importance of fire management and fire weather to the Australian environment.

No overview of the workshop could be complete without recognition of the excellence of the Hochstems conference facility that played an important part in the success of the workshop and of course the wonderful organizing ability of the South Australian severe weather section who have done all the hard work and to Jenny Dickins who put the abstracts together and many other things. The extraordinary effort of John "mother hen" Pethick who ensured that the workshop ran very smoothly, on time and was a happy as well as useful activity cannot be over praised.

I hope the Bureau will continue to support this useful function and we can expect the next one to be in 1997 with a mini event attached to the 13th International Forest and Fire Conference in Lorne, Vic in October 1996. See you all there.

David Packham

Supervisor Rural Fire Weather Services

MAJOR RECOMMENDATIONS

(as presented by the four working groups)

R1 The Workshop participants are encouraged by the recent developments in mesoscale modelling and recommend that support be provided for further development of higher resolution models, with a resolution of 1-2 km being the ultimate aim.

In particular, the Workshop recommends that the Bureau pursue the provision of two(SE and SW Australia) 24 hour runs of the 0.25 degree model to the regions as soon as is feasible; thereby enabling regions to actively contribute in the assessment of model performance.

R2 The Workshop participants recommend that there be no reduction in the Bureau's upper air network until alternative data collection systems (such as TOVS, AMDARs, wind profilers, cloud drift winds or Aerosonde) become routinely available and are proven.

The Workshop participants particularly deplore any reduction of the 12Z observation network as the 12Z analysis forms the basis for numerical model runs which are most crucial to fire weather and severe weather forecasting.

R3 The Workshop participants applaud the forecaster outposting service developed by Victorian Regional Office and Dept of Conservation and Natural Resources and recommend that the feasibility of expanding the service to other states both operationally and in a training mode be investigated. In particular, Workshop participants feel this type of service, trialled under prescribed burn conditions would provide opportunities for worthwhile on site interaction between fire weather forecasters and fire control and fire behaviour specialists.

R4 The Workshop participants recommend the strengthening of communication links between the Bureau of Meteorology and fire agencies in order to improve co-operation between the two groups and to increase each 'group's knowledge of the others' business. Areas of focus to include fire behaviour and fire weather training; communication during operations; and the gaining of field experience by fire weather forecasters.

Given increasing interest in Fire Weather Workshops from agencies external to the Bureau, it is suggested that the role of non-Bureau participants be made more explicit. Towards this end, the Workshop participants recommend the establishment of a joint Bureau/ AF AC (Australian

Fire Agencies Committee?) committee to canvas opinion and develop policy and direction on fire weather services at a national level.

R5 The Workshop participants recommend that the regional offices of the Bureau and fire agencies take every opportunity to pursue collaborative research projects.

R6 The Workshop participants recommend that every effort be made to improve real time access to lightning data for the Bureau and fire agencies; that the Bureau and fire agencies collaborate to validate the accuracy of lightning data; and that the Bureau ensure that current and potential lightning data users in the fire community are aware of the Kattron LPATS system and the Bureau's relationship with Kattron.

R7 The Workshop participants recommend that a collaborative project between the Bureau of Meteorology and fire agencies (perhaps Country Fire Authority of Victoria initially) be undertaken to develop an operational nation-wide grass fuel curing monitoring technique using satellite derived NDVI data.

R8 Smoke management continues to be an important issue in states where extensive prescribed burning is conducted. The Workshop participants recommend that a smoke management forecast service be provided to those fire agencies who request the service and that this continue to be part of the basic service. Forecast content would be agreed on at regional level and fire agencies would undertake to provide routine feedback.

R9 The Workshop participants recommend the strengthening of communication links between the Bureau of Meteorology and fire agencies in order to improve co-operation between the two groups and to increase each group's knowledge of the others' business. Areas of focus to include fire behaviour and fire weather training; communication during operations; and the gaining of field experience by fire weather forecasters.

MINOR RECOMMENDATIONS, SUGGESTIONS AND IDEAS

1. That training in fire behaviour be made available to Bureau of Meteorology (BoM) forecasters, based on a national program similar to the Severe Thunderstorm Training program.
2. That graphical products be developed for delivery to fire agencies by Metfax or Infifax.
3. That fire weather forecasting services be maintained despite downward pressure on forecasting staff resources.
4. That databases of fire activity continue to be improved.
5. That BoM research papers and reports relating to fire weather be made available on the Internet.
6. That a time-series graphical representation of forecast weather variables and fire danger index become a standard BoM product.
7. That technical limitations on the use of satellite data by outposted forecasters be evaluated and appropriate remedial action be taken.
8. That broader consultation with the fire community be undertaken at an early stage in the planning of future fire weather workshops and that the feasibility of joint hosting be investigated.
9. That fire weather training for fire agencies by BoM be integrated with the national competency based training program.

10. That the final report on aerial reconnaissance of cold fronts be circulated to fire agencies.
11. That a complete list of fire weather products provided by BoM regional offices be prepared annually and distributed to all fire agencies and all BoM regional offices.
12. That users of Automatic Weather Station (AWS) data make greater use of the 1-minute data mode, particularly during fire emergencies.
13. That existing fire weather outposting equipment be loaned to BoM offices which are in the process of setting up outposting services.
14. That the funding and installation of hardware required to allow telephone access to individual AWS by a non-BoM agency be investigated.
15. That the World Wide Web hypertext book concept be further developed for the purposes of fire weather training.
16. That the application of NDVI (Normalised Differential Vegetation Index) data to fuel curing estimation be further researched.
17. That the need for national routine wildfire detection using an AVHRR (Advanced Very High Resolution Radiometer) satellite data be investigated and development of an automated detection process be carried out.
18. That products directly related to fire detection be developed based on lightning detection data.
19. That fire agencies actively co-operate with BoM in verifying the accuracy of lightning detection data.
20. That inter-agency working groups be set up at regional level to tackle applied research projects.
21. That further investigation be undertaken at regional level, of the relationship between the Haines Index and fire activity and fire danger.
22. That BoM guidance material be considered when planning the purchase and installation of AWS.
23. That the feasibility of Victoria conducting some outposting trials interstate be investigated.
24. That some ensemble forecasting trials be conducted.
25. That arrangements be made for handling competing demands by different regions for running the Limited Area Prognosis System (LAPS).
26. That improvement of the communication of fire weather forecasts to the fire line be given high priority.
27. That the BoM develop a method to flag missing data or other model deficiencies and distribute that information to the regions in real-time.
28. That support be given to the ongoing development of trajectory forecasts for use in smoke management services.
29. That the Aerosonde be trialed for fire weather forecasting purposes during the 1995/96 summer.

30. The next conference in this series should be jointly hosted and organised by a Bureau Region and the matching fire agency(s).

31. Link between the Bureau of Meteorology sections and the Australian Fire Authorities Council and Research and Development Committee, either formal or informal; annual/seasonal or ongoing. Bureau needs to reassess its links for involvement of fire agencies in research and development.

32. Drought products are of great interest, however there needs to be consistency. Could the Infobox products on drought use a strictly one month and 3 month window?

33. There is a new phenomenon of fire activity. The media are driving arsonists to increase their fire activity - a positive feedback loop. The fire agencies and the Bureau need to recognise this when preparing information for the media.

Author	Title
Noreen Krusel	Total Fire Ban Declarations and the Causes of Bushfires.
Ray Kollmorgen	Fire Weather Outposting in Victoria.
David Evans	The Bureau's Automatic Weather Station Program.
Ken Stephenson	Demonstration of Country Fire Authority of Victoria's Operational Management System (OMS) Computer System
Ian French	CFA's AWS Network and Meso-models.
Peter Gigliotti	The Bureau of Meteorology Modernisation Program - Impacts for Fire Weather Services
Chris Trevitt et al	Pedagogical Strategies for Fire Weather Education via the World-Wide Web: towards an Hypertext Book.
David Packham	Why Meso-scale Meteorological Models?
Lance Leslie et al	Mesoscale Modelling and Fire Weather.
Mary Ann Jenkins et al	Coupled Atmospheric-Fire Numerical Modelling: Effects of Fire-Line Length and Ambient Wind Strength.
Terry L. Clarke et al	Coupled-Atmospheric Fire Modelling: Effects of the Convective Froude Number and Near Surface Shear
Kamal Puri	BMRC's Limited Area Model - Activities and Plans.
Terry Hart	NMC's Plans for Operational Mesoscale Modelling.
Jack J. Katzfey	CSIRO-DAR Limited Area Model: 15 km Prognoses for Victoria.
Andrew Watson	A Preliminary Analysis of the CSIRO fine mesh Mesoscale Meteorological Model in the context of Fire Weather Forecasting in SA.
Tony Leggett	A Preliminary Investigation - Use of the CSIRO DAR's Mesoscale Meteorological Model for Fire Weather Forecasting Purposes
Ian Knight	Fire Behaviour at the Mesoscale.
W.L. Physick	Smoke Dispersion in the Adelaide Region using a Mesoscale Model.
G.A. Mills	Modelling Smoke Transport.
W.J. Grace et al	Some Observations and Simulations of the Gully winds of the Mount Lofty Ranges of South Australia.
Rod Dingle	Forecasting Strong to Gale Force Winds using Mesoscale Models.
G.A. Mills	The Enfield Fire - LAPS Model Results.
Andrew Treloar	Meteorological Study of a Bushfire Smoke Plume and Associated Convective Cloud in South East Australia.
Guy Tuddenham	Monitoring the 1994 Drought Using Satellite Derived NDVI over SE Australia
Jon Gill	Monitoring Wildfires in the NT Using AVHRR

	Satellite Imagery.
John James	Lightning Data - Use in New South Wales.
Tony Leggett	Ability of the LPA TS Lightning Detection Network to Locate Wildfires Ignited by Lightning in Victoria during the 94-95 Fire Season
John Bally	The Haines Index as a Predictor of Fire Activity in Tasmania.
Tony Leggett	Severe Fire Weather Conditions in the Thomson Catchment and Central Areas of Victoria
Bruce Buckley	The January 1994 Bushfires in New South Wales.
Sue Dargie	The November 1994 Pine Plantation Fires in Southeast Queensland.
Peter Billing	Planning and the Response - Issues for Fire Weather Services.
Rick McRae	Wind - Terrain Interactions - A Model for Emergency Response Uses.
Jeff Strickland	LPATS - Lightning Network Status and Plans

NOTES ON PROCEEDINGS

(supplementary to the abstracts)

MONDAY 0830-1230 Actions since Bowral & Regional Summaries

Summary of Recommendations from Bowral : David Packham

- First Fire Weather Conference In 1958
- Bureau is being "pruned" - more "fruit" required with fewer human resources
- Change in philosophy of fire fighting - technology will be the panacea - NOT SO
- Fire fighting facilities in Australia are good - should continue to be supported
- There is more prescribed burning with time - will need more support. Fire in forests increased forest health. More stresses on fire weather forecasters to provide support
- David proposed that recommendations from Bowral be circulated amongst participants and indications be given as to whether action on items had taken place - or whether item was important. To be returned by end of workshop.

New South Wales summary : Sue Lawrence

- Four day graphical fire weather outlook provided to fire authorities
- Permanent outpost facility set up at Rose Hill (Bushfire Services)
- Three to four fire weather training courses per year for fire agencies

Victorian summary: Tony Leggett

- Fire weather forecasters have attended fire agency training courses. Have been able to see how fire weather forecasts are used by fire combatants
- Joint outposting facility with CNR

Tasmanian summary: John Bally

- Noted lack of inland AWS in Tasmania. Concerned with slow installation program and impending cuts in upper wind flights (12Z)
- Fewer meteorologists mean RFC is taking SW forecasters for routine duties
- Administration is questioning value of outposting service due to priorities in staff placement
- Have done a detailed analysis of Haines Index, works well in Tasmania

- Using METFAX for SDI data and other
- Possibility of INTERNET for end of season reports
- Have run several fire weather courses for fire authorities

South Australian summary: Jenny Dickins

- Described outpostting facility as a communication/computing system
- Additional services since Bowral - Wind direction forecasts - Wind Change/frontal charts
- Forecast accuracy has levelled off over past 5 seasons - will not improve much more. Method and style of delivery will be improve. Mike Willmott (OEB) made point that since McIDAS system change there are more limitations than before on remote access of data

Queensland summary: Sue Dargie

- Season 1994/95 was worst for several seasons
- There are problems with fuel quantity and type assessment
- There are problems with communication between Fire agencies and BoM
- To improve above a Combined Fire Agency Committee has been formed
- Recently implemented fire weather forecast spreadsheet similar to South Australia

Western Australian summary: Barry Hanstrum

- New fire weather desk implemented - last fire season Fire forecast districts overhauled and new districts implemented last season
- Detailed fire weather forecasts done for CALM - considerable detail in 4 day outlooks
- Very positive feedback from users on new initiatives
- Plans for graphical forecasts for fire agencies

Northern Territory summary: Jon Gill

- Fire problem less significant for life than in southern states - still significant for property
- Have provided training for BFC
- Like Qld have problems with fuel state estimates
- Use remote sensing (A VHRR) for smoke management
- Forecast verification (monthly) to RFC has improved over forecasting of winds peed

Discussion: Concerns (post Bowral from fire agencies) : Rick McRae

- Direct access to AWS data by fire agencies
- Coordination of A WS networks (inter agency)
- Marketing and promotion of services

- Fire weather training for fire agencies and for BoM meteorologists to "dovetail" with Competency Based Training of fire agencies
- Possibility of next FW workshop being co-hosted - with dual flavour in the agenda
- Feedback from fire agencies is required to monitor true forecast performance
- Verbal briefing BoM to CNR is "best" service

Bowral recommendations not acted on or completed

- R3 National list of forecast services
- R7 No inter-agency working groups
- R9 None done, needs to be revisited
- R10 None done, needs to be revisited
- R11 None done, needs to be revisited
- R13 LPATS not to fire authorities
- R14 Some regions YES, some NO
- R15 NDVI to be discussed later
- R16 To be discussed at this venue
- R18 Has not been done

RESOLUTIONS OF THE FIRE GROUP

Most fire agencies have excellent across the board relationships with the Bureau. The following points are intended solely as a guide to improving on this situation and further developing this venue.

Some steps might be:

- 1) We're both stakeholders in this business and we must respond to each other's needs, recognise recent changes in technology, continue to improve our performance and advance relationship between fire agencies and Bureau:
 - User surveys have been successful.
 - Networking within Bureau re existing services.
 - Policy re fire weather service standards across Australia: coordination of Bureau Regions' responses to State agencies' needs (show us your full range of services); developing new services or technology.
- 2) Looking at use of the CFA (Vic) system for access to AWS data in other fire agencies. BoM should investigate and advise. **Direct access** to AWS data for all fire agencies.
- 3) Coordination of development of AWS network in each State. Fire agencies under financial pressure, but growing needs for AWS data, plus other AWS user needs - result: BoM must take responsibility for and lead role in coordination. Long-term plans need to be clearly stated. Positive benefits already clearly demonstrated in Victoria from AWS Coordination Committee.
- 4) Assisting the Bureau in marketing and promotion to the public. Fire services support and are willing to promote the Bureau's services and benefits to the community.
- 5) Fire weather training for the fire services - BoM has the expertise in weather; fire services willing to give support in standardisation, development and implementation of training.
- 6) Fire Weather Conference:
 - Pre-conference survey of all participants; in each State: meeting to discuss survey results and develop agenda items and progress and outcomes of previous conference; and also identify contact-people;
 - Agenda should include separate fire / weather items and, joint items - and supporting research reports.
 - Pre-conference Papers where possible to allow more discussion time during conference. Post-conference summary and resolutions to be circulated.
 - Avoid re-visiting issues from previous conferences unless resolution

likely. Identifying theme and matching venue [with field trip relevant to fire weather issues] will increase value of conference. Pay-your-own-way; hosts to provide venue.

MONDAY 1415-1630 Monitoring Fire Weather

David Evans - BoM's Automatic Weather Station Program

David gave a brief history of the Bureau AWS installation program commencing in the 1970's with the northern Australian offshore stations to the current time with over 200 installed AWS. He described the Bureau Program system whereby funds for AWS are allocated on Program by Program basis. Table X was displayed (the table detailing the AWS implementation schedule for years ahead) and reference was made to externally funded AWS and method to bring forward installations with external funds. RD can lobby to have stations moved up the list or new stations added with help from external funds.

AWS installations limited by:

- (a) Lack of money to provide AWS
- (b) Manpower resources to install and maintain
- (c) Communication costs for data collection (1 minute data available). He commented that there will be a reduction from \$5.6M to \$4.6M in the co-operative observer budget and that a scheme is being considered to accelerate the AWS installations to overcome losses from the co-op network

External AWS can be of Type (1) On Bureau table X or Type (2) Not on X, but funded by external organisation An OEB document entitled "Automatic Weather Stations for Agriculture" was distributed. This document details the issues to be considered by any group wishing to purchase or operate an AWS. The matter of archiving AWS data was discussed with reference to 1 sec, 1 min, 10 min and 1 hour data.

Bernie Keogh - BoM's portable AWS project

Discussion centred on the technical history of AWS in the Bureau and the need for a portable Bureau standard AWS. A portable ALMOS based unit has been developed which maintains Bureau standard instrumentation ie RM Young wind sensor and 10 metre mast height. Bernie stressed the need for standardisation in equipment and expressed reservation with sensors at non-standard heights.

Ray Kollmorgen - Fire Weather outposting in Victoria

The Victorian Outposting service was discussed. Slides depicting location of AWS setup for the Wilson's Promontory/Yarram service were shown, as were slides from an outpost training day at Olinda. Requirements for the Outpost service as well as plans for the future were raised.

Discussion: A WS issues

David Evans noted that with capital cost/ maintenance/ spares/ communication the cost for an AWS over 10 year is \$100,000. RD's will usually accept about \$25,000 from an agency for an A WS installation.

Bernie when questioned about AWS types suggested that as the ALMOS is now the standard Bureau AWS, the ALMOS portable re-packaged to some Bureau portable specifications would seem the most logical option.

Graeme Furler enquired about the future of AWS text to voice and AWIBS. David responded that the black box card to allow dial in to retrieve the data would only amount to about \$200.

Ken Stephenson - CFA IS Operational Management System .

Ken displayed the CFA RAWs and OMS system. He showed how AWS data and cold front position data accessed from the Bureau could be displayed in conjunction with other GIS type overlays. All software written in house in C++ over a period of several years Vegetation indices depicted raised a question about ground truthing from Graeme Furler. Ken noted that a study was in place to truth the system.

Ian French - CFA AWS network and meso-models

Discussed his PhD project, still in it's early stages,. to produce a CFA rate of spread model.

MONDAY 1630-1730 Communication in the Computer Age

Chris Trevitt - Fire Weather & Fire Management Education via the WWW

The use of the WWW for creating and presenting an interactive textbook on fire weather and fire management was discussed. This approach has been used to educate foresters at the ANU.

The main aim of the training is to provide relevant practical experience on the computer. The advantages of this method are that:

- it can depict real fire events;
- it is self-paced learning;
- it can take place at remote localities;
- it can be used by a large number of people, which is very efficient in an environment of diminishing training staff;
- it gets away from the generally one-way transmission of Knowledge through lectures and allows people to construct their own Knowledge;
- it is better than a printed textbook because it is interactive, with animated graphics, and
- the internal links allow the trainees to explore their own path; and
- it is very suitable for in-service training.

And of course, the paper is available on the WWW at the site:

<http://online.anu.edu.au/forestry/fire/IUFRO/fireweather95.html>

Peter Gigliotti - The BoM Modernisation Program Impacts for Fire Weather Services

The central feature of the modernisation program, AIFS, was described.

The main points not discussed in the Abstract were:

- the current computing infrastructure needs to be replaced not only to improve its efficiency, but also because it is becoming very expensive and stressful to maintain;
- the overall aim is to improve the ability to deliver services through increased accuracy, timeliness and a greater flexibility to meet changing customer requirements;
- each AIFS workstation will run in a Unix environment and feature 2 screens, one keyboard and mouse;
- AIFS design criteria include: international standards, modular structure, Windows environment, robustness and tolerance of faults;
- an essential part of data displays will be a background map provided through Geographical Information Systems software;
- background Computer-Aided Learning is expected to be an integral part of the system;
- the expected impacts for fire weather are an increased diversity of better displays and better communications.

Better communications include dial-in access to Regional Office servers, Weather by Fax, Metfax, Fax and the Internet. All sorts of real observations and model data will be available through these mediums.

The order of States for the implementation of AIFS is:

Victoria, NSW, Queensland, NT, WA, SA and Tasmania.

TUESDAY 0830-1230 MMM's

No notes were compiled on this session. John Pethick did video the three keynote speakers; Lance Leslie, Mary Ann Jenkins and Terry Clark. While the video quality is not tremendous, it is useable - contact John for more details.

TUESDAY 1330-1515 MMM's continued

Kamal Puri - BMRC's Limited Area Model (LAPS) (Abstract provided)

Kamal gave a brief overview of the development of the Bureau's Limited Area Prognosis' System (LAPS). Features of the new model are that the resolution can be easily changed and the domain moved. There are 19 sigma levels and the physics are essentially the same as the GASP. Model designed to routinely run at 0.75 degree resolution out to 48 hours. However, can nest a finer mesh 0.25 degree model in the 0.75 degree output. Such a model (to be called FLAPS?) could be run over a domain such as SE Australia and/or over SW Western Australia. Scope for moving the domain to where the severe weather is.

Kamal emphasised that a lot of effort has gone into the data assimilation scheme (essentially the analysis). Facility to input bogus observations to resolve systems such as TC's.

Kamal suggested that the 12Z run of the model could be delayed to allow as much data input as possible and still produce a timely product for the early morning forecast. When asked how long LAPS took to run, Kamal said about 90 minutes; suggesting that 0.75 degree LAPS could be run at 1-2am, then launch the 0.25 degree FLAPS to produce output that could be used for that day's forecast.

Kamal showed the effect on the model forecast of omitting the TOVS data (TC Bobby). Several people stated that knowledge of what data has or has not been included in the model run was vital to forecasters. The suggestion was made that a method of disseminating this information to regions in real time be developed.

When asked about SST's, Kamal said the weekly SST composite charts were used in the model.

Terry Hart - NMC's Plans for Operational Mesoscale Modelling

Terry's talk followed on nicely from Kamal. NMC are currently looking at the best way to run LAPS operationally. There are a number of options and now is a good time for people in the regions to think about the issues themselves.

For the 0.25 degree FLAPS, should it be run over 1 or 2 domains? How long should the model be run for? It is unlikely that the model would be run out further than 24 hours.

When should the model be run? A model run at OOOZ is too late for severe weather purposes. A model run at 12Z might well be based on minimal data. Perhaps the model could be run at 18Z, using 12Z data, TOVS data (which would definitely be in by then) and possibly the 18Z upper winds. Good food for thought.

When asked would the model be run in the regions, Terry suggested that this was very unlikely and in the short to medium term at least, not necessary. With BoM's network, it is more practical to run the model in HO, but perhaps eventually, the control might be from the regions (as is currently being done with the TAPS).

Current plan is to provide the regions with the capability to run the model non-real time for case study work Kamal said that BMRC will be hiring someone for 6 months to build a menu system, whereby people in the region can easily input such requests.

Jack Katzfey - CSIRO DARLAM - 15 km Prognoses for Victoria

Model description is detailed in the abstract. Jack showed the model output for the day of the Enfield/Berringa fire (25 Feb 1995) and the day after. Of interest was the use of streamlines to display the wind field rather than the standard method of using wind vectors. For presentation purposes, the streamlines were very successful.

Andrew Watson - CSIRO DARLAM - Preliminary Analysis in the context of Fire Weather Forecasting in South Australia

Everything that Andrew said is amply described in the abstract. Andrew showed the model output for one case, 29-30 April 1995. As well as the typical spatial displays of various fields, Andrew also showed the temporal variation of temperature, dew point and wind produced by the model for a specific site (Adelaide). A front moved through Adelaide on the morning of 30 April and the model predicted the time of this wind change quite well. Of note, was the very gradual change depicted by the model (over 6-8 hours) compared with observations. The proximity of Adelaide to the domain boundary may have contributed to this.

In general discussion at the end of this session, the question was raised as to whether water vapour derived winds would be used in the models. Graham Mills indicated that BoM will be using water vapour winds and that he has recently seen some very encouraging results from the US.

Bruce Buckley raised the issue of ensemble model runs; was the BoM considering these? Graham Mills replied that it had been much talked about in BMRC and there were plans to try a few experiments. One of the big constraints (apart from computer time) was human resources. The offer was made, that this type of project would be ideal for a regional person to undertake as a short term visitor to BMRC.

WEDNESDAY 0845-1015 Monitoring from Afar

Guy Tuddenham - NDVI satellite data (Abstract supplied)

Following Guy's presentation, Ken Stephenson commented that, in their (that is CFA's) experience, the NDVI derived curing values were biased towards the green end of the spectrum.

Guy noted that considerable ground truthing was required. The useful information to be gained from the data were the changes in the vegetation index. In dry periods the progressive drying of the vegetation could be observed. Following passage of rain bands the greening response could be clearly noticed.

Andrew Watson asked when and if the imagery would be available in the regions. Guy thought some time in the future due to re-mapping problems. Being polar orbiting satellite data, the perspective with respect to a given location was continually changing.

Regions with large remote grassland (eg NT & Qld) expressed desirability in receiving data.

John Gill- Monitoring wildfires with A VHRR data (Abstract supplied)

Peter Billing asked whether Bureau could provide Fire Authorities with this data on a national basis. Tarini Casinader and David Packham responded that at present, it would be too labour intensive to carry out such a service.

It was observed that detection was sometimes inhibited by the inability to "see" through smoke. This mostly occurred with less intense grass fires.

Mike Willmott said that the system was best suited to large forest fires. Ad hoc services could be provided in situations like the recent Sydney fires. Here widespread smoke made it difficult to locate "hot spots" by aircraft and A VHRR data provided useful information to locate such "hot spots".

John James - Lightning data in New South Wales (Abstract supplied)

Several people commented on the large maximum in lightning frequency in the Sydney region. Bruce Buckley suspected that this was a manifestation of the network design and this would be further investigated with the new network.

Others also noted that the low frequency in the storm prone New England Tablelands may also be due to a fault in the network design.

Tony Leggett - LPATS in Victoria (Abstract supplied)

Jeff Stickland was a late withdrawal from the Workshop, but he did provide a comprehensive set of notes (available from Jenny Dickins if you missed out).

Rick McRae considered that lightning data has the potential to reduce the need for aircraft detection of fires following thunderstorms. This would result in large savings. It was observed that lightning data could play a life-saving role in the early detection of quick spreading grass fires.

Peter Billing noted that 30% of fires in Victoria's CNR areas are started by lightning and should the Bureau have a responsibility to provide this information since it has, the potential to save lives. Tony Leggett replied that the situation was legally complicated since the LPATS system was owned by a commercial operator.

It then became obvious that this topic was going to become a major point of discussion. Therefore the matter was identified as a potential major issue for the final discussion session.

List of Workshop Participants

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