User Survey to Assess Requirements, Standards and Utilisation of Smoke Forecast Information

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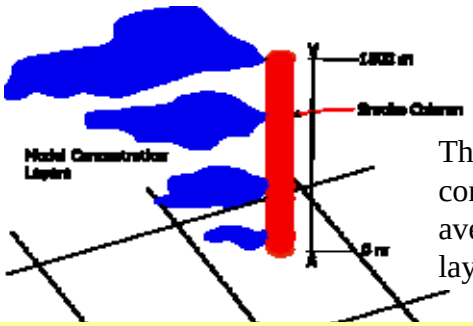
Smoke dispersion forecasts attempt to predict the effects of low-level wind speed, turbulence, temperature and humidity on a column of smoke using information contained in the Bureau of Meteorology's numerical weather prediction (NWP) models.



The plotted smoke concentration is an average of 4 grid layers

Smoke Dispersion Forecast calculations currently assume a 1500m vertical line source (smoke column).

Smoke Forecasts :

- Have been available for ~5 years
- Are produced every 12 hours
- Have focused on prescribed burns.

User survey undertaken to establish:

- How forecasts are being used?
- Are forecasts meeting requirements and standards?
- Are changes or additional information needed?

Survey method

- Site visit interviews
  - -Allowed for better interactive discussion
- 42 questions
- 16 respondents representing Victoria, Tasmania and Western Australia
- 5 survey categories
  - –Usefulness
  - –Requirements
  - –Standards
  - –Barriers to use
  - –Other needs

Results: Usefulness

- Potential smoke impacts
- Disruption to outdoor social or work activities
- Economic (vineyards)
- Nuisance (public complaints)
- Health
- Visibility (visual aesthetics)
- Transportation

Usefulness

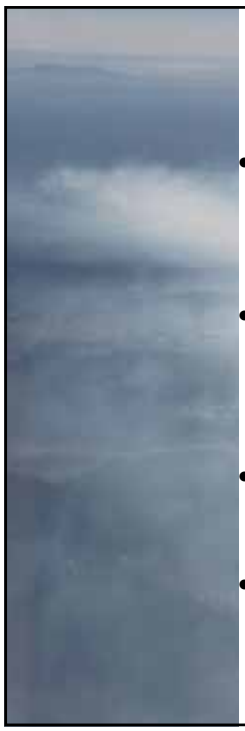
- Primary decision is to burn or not to burn
- 62% indicated smoke forecast is important for decision-making
- 81% indicated smoke forecast influences decision
- The value of the forecasts are:
  - –Enhanced or reinforced decision-making
  - –Timeliness and accuracy
- 62% indicated using the forecasts daily during burn season

Requirements

- Needed information:
  - Plume rise/height
  - Transport/trajectory
  - Dispersion
  - Concentration values
  - Background residual smoke
  - Meteorological elements (wind fields, inversion height…)
- Forecasts are desired to be highly accurate given importance of final burn decision
- National Environmental Protection Measure provides PM guidelines

Standards (accuracy)

- All respondents indicated that the forecasts are sufficiently accurate for operational usage
- Respondents define accuracy as agreement between the observed smoke plume and the model forecast
- Sea breeze, troughs and low wind speeds were cases cited as being most problematic for the smoke forecasts.
  - these are also problems for the underlying NWP model (potential research topics)

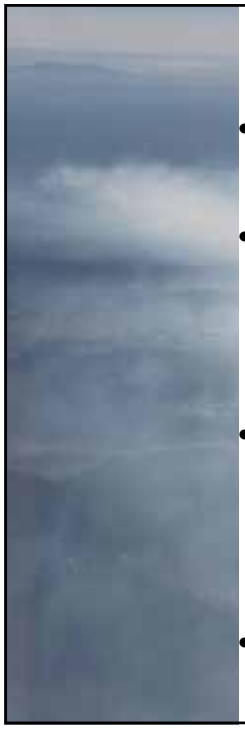


Standards (uncertainty)

- All respondents desire forecast uncertainty information via forecaster provided text or phone discussion
- 81% of respondents would use a probability based smoke forecast
  - Graphical display most desired
- Current forecast period (24-hours) sufficient
  - Up to 4 days could be useful for some planning
- Current hourly forecasts sufficient

Barriers to use (forecasts)

- 62% find the current information content of the forecasts adequate
  - A number of enhanced/ new products are desired
- 75% indicate the current display is adequate
  - A number of display enhancements were also suggested
- Access to the forecasts is adequate
- Distribution of the forecast information is adequate
- Overall there is very little smoke forecast assistance or training directly available within the organisations



Barriers to use (value)

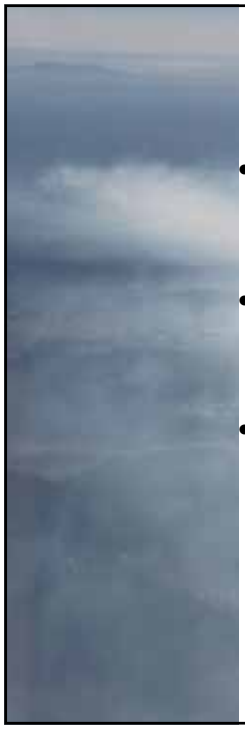
- Most respondents indicated understanding past forecast performance is important
- Majority indicated quantitative verification is important
  - Difficult to acquire observations, reliance on satellites
- 81% indicated that demonstrated value of smoke forecasts is very important
  - Supports scientific based decisions and public credibility
- Other operational and political factors can readily outweigh smoke forecast

Barriers to use

- Forecasts are sufficiently accurate to use regularly
- Most of the respondents indicated no significant forecast inconsistencies
- Nearly half of respondents indicated desire for additional forecast information

Other needs

- Forecasts are considered of high value, so no additional information is needed to change usage
- New related scientific studies will improve and support decisions and provide education
- Expert assistance is desired via discussions with forecasters
- Information on the vertical distribution of smoke is also desired



Other needs (training)

- Meteorological training related to smoke is desired
- BMRC smoke training module needs to be updated and distributed more broadly
- There is very little formal smoke management training available
  - Perhaps a good time to develop a specific course

Action Items

1. Training
2. Forecast Accuracy (uncertainty?)
3. Quantitative Verification
4. Improve Displays