



The Bureau
of Meteorology

Challenges of Operational Weather Forecast Verification

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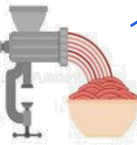
AI generated art about forecast verification

Verification in the Bureau

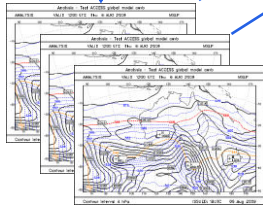
Observations



Meteorologist expertise



Objective
un-biased
blend

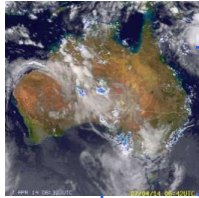


Multiple weather
model outputs

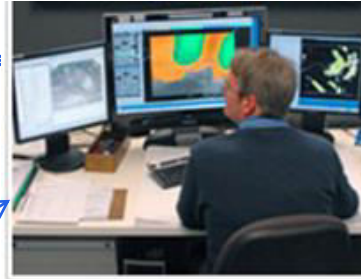


Verification in the Bureau

Observations



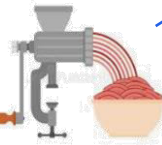
Meteorologist expertise



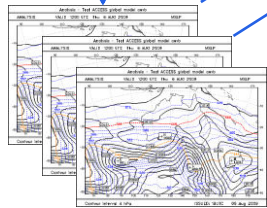
Warning products



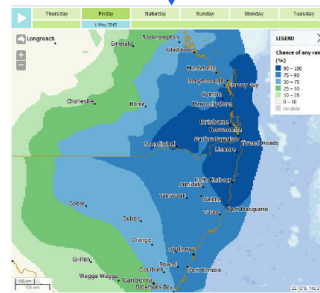
Objective un-biased blend



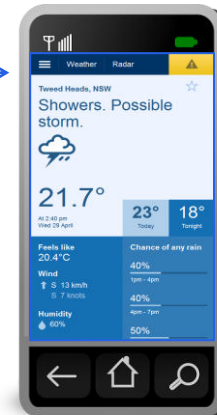
Automated text forecasts at locations



Multiple weather model outputs



"Official" forecast grid



Customer applications



Verification in the Bureau

Situational awareness

Post event reporting

Observations

Meteorologist expertise

Operations to Research

Automation policy

Warning products

Objective un-biased blend

Automated text forecasts at locations

Multiple weather model outputs

Bias adjustment

"Official" forecast grid

Annual reports, Senate estimates

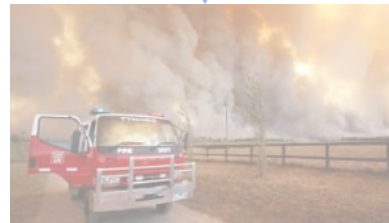
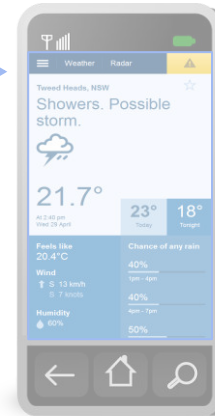
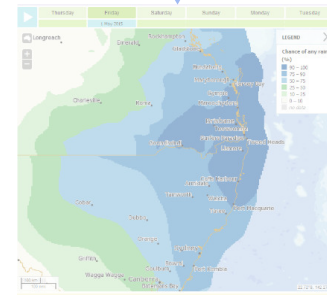
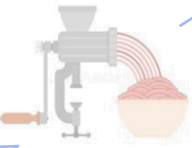
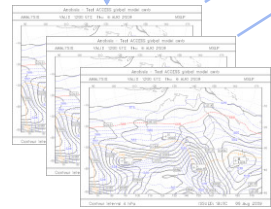
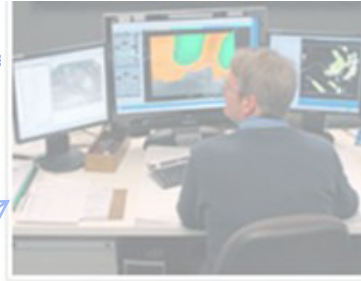
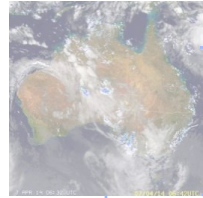
Model development and acceptance

International benchmarking

Customer applications

Customer trust building

Key Performance Indicators



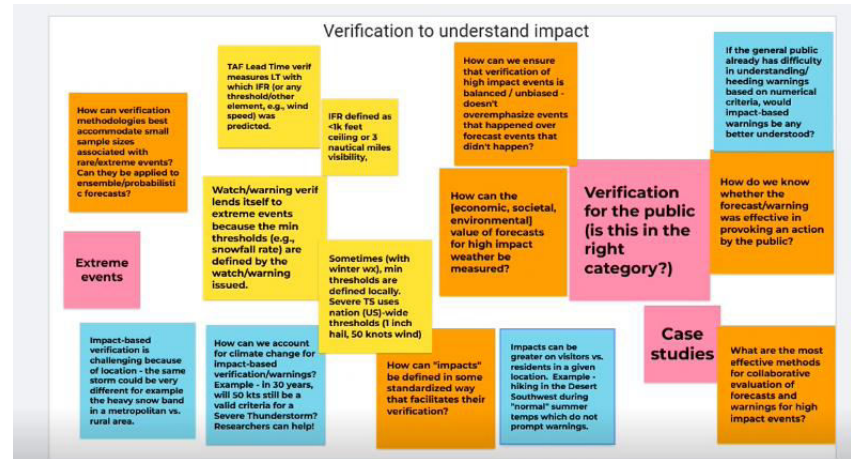
Challenges of Operational Verification

Motivation

- Verification researchers answer many questions
- But are they answering the right ones?
- Wide gulf between state of the science and some operational practice – Why?
- Scientists want to help- let's help them help us

Article

- Bulletin of American Meteorological Society
- Co-authors from AU, NZ, US, UK, Canada, S. Africa
- Discussing the physical and social science challenges of operational verification



Setting an international research agenda

20 operational challenges in 5 themes

Using the right verification approaches

Observations

Performance evaluation and assessment

Communication

Institutional factors



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47 operations-relevant science questions including

How can long operationally realistic hindcast datasets be generated most efficiently (e.g., reduced ensembles)?

How to identify non-representative stations independently of forecasts (e.g., observed wind gust factors signalling exposure issues)?

Can causal inference assess the effectiveness of risk- and impact-based forecasts when users take mitigating actions?

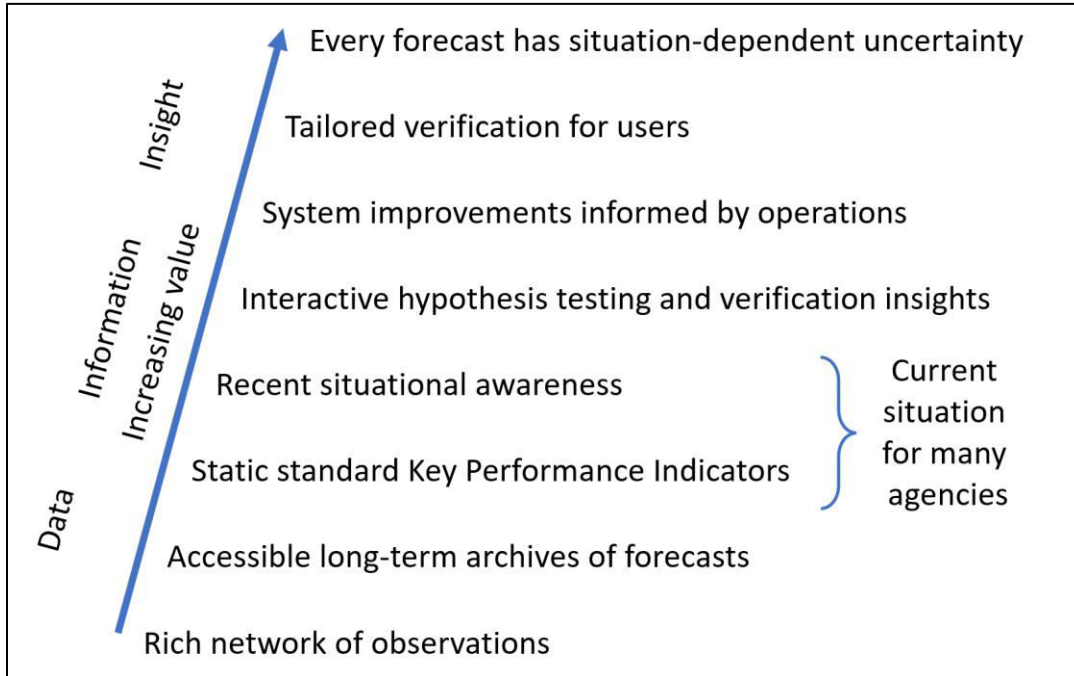
Can machine learning provide insightful plain-language summaries of a verification dataset or baskets of metrics?

If forecasts are communicated with quantified uncertainty, is there still a demand for additional verification information, potentially presented alongside the forecasts?

How can equitable verification services be provided to marginalized communities?



Verification Information Value Ladder



Scan for my email

Tom.Pagano@bom.gov.au



These slides

Calls to action:

Design products and services with verification in mind

More, better data

Shared software and systems

Foster international verification community



Paper
(in review)

