Natural Hazards Research Australia

WA mobile radar field campaign and workshop

Peter May, Mika Peace, Alain Protat, Mark Curtis, Murray Mitchell, Jackson Parker, Adrien Guyot, James Ashley, Afie Jazreeen, Nathan Ramage, Agnes Kristina, Pascal Mater

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Natural Hazards Research Australia
Monash University

Science aims of the project:

1. **Demonstrate the ability to safely locate and operate the radar in (relatively) close proximity to fires.**
2. **Demonstrate the diagnosis and detection of wind shifts using the “clear air scatter”.**
3. **Demonstrate the detection of ash and embers and discrimination from other airborne particles such as raindrops, using the dual polarisation data.**
4. **Develop strategies for potential operational detection and monitoring of the development of precipitation and smoke/ash plumes.**

Cooperative aims of the project:

1. **Conduct a multi-agency field research project in southwest WA.**
2. **Hold a multi-agency workshop to discuss the results of the field campaign.**
3. **Provide a learning and development opportunity for field and technical operatives to work with leading scientists.**
4. **Produce a report capturing and summarising the opportunities presented by mobile radar for understanding fire plume processes and ultimately mitigating impacts associated with fires.**

DFES
Department of Fire & Emergency Services

GOVERNMENT OF WESTERN AUSTRALIA
Department of Biodiversity, Conservation and Attractions

The Bureau of Meteorology

MONASH University

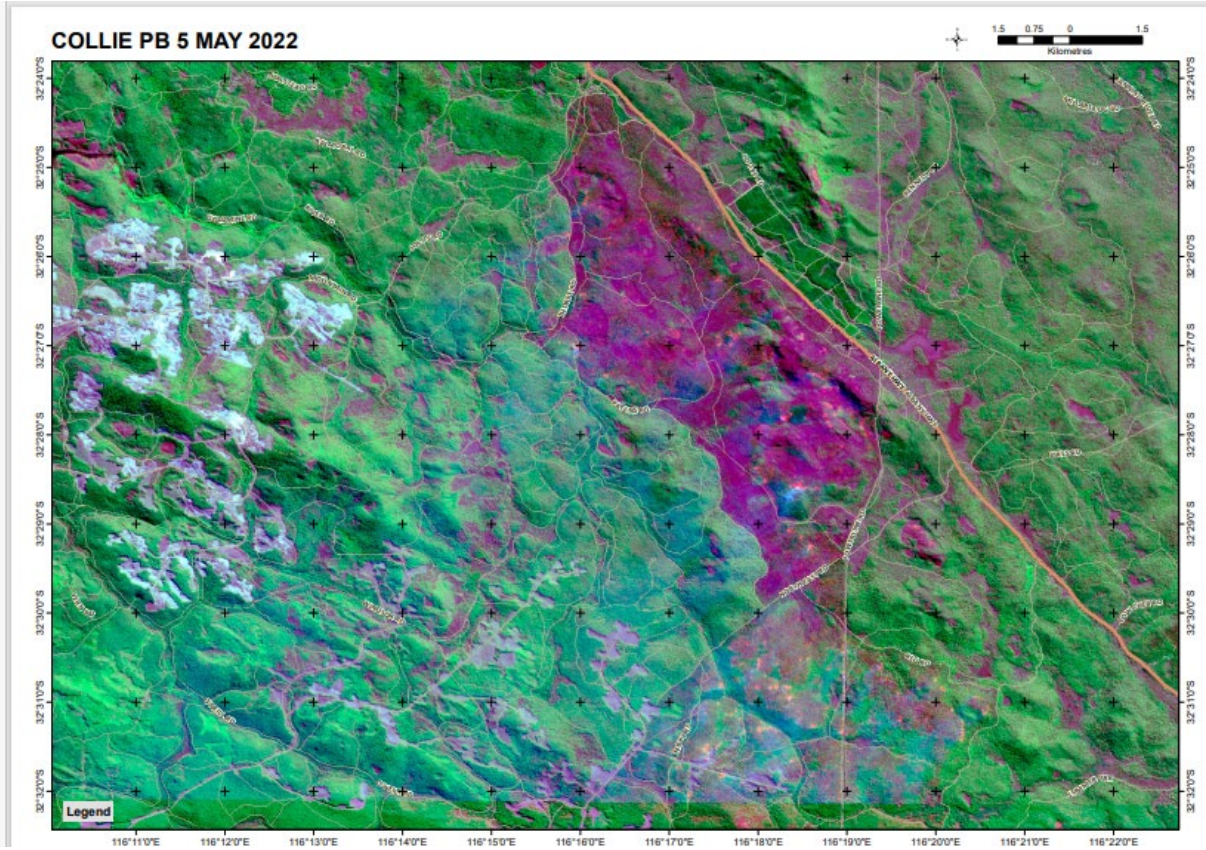
Monash mobile radar:

- **Trailer mounted X-band dual polarimetric radar**
- **Trailer has diesel generator, self contained.**
- **Weighs 3 t and 3 m high**
- **Deploy in ~ 45 minutes (with access)**

- **Similar sensitivity to operational radars**
- **Used 2 minute sector and vertical (RHI) scans**

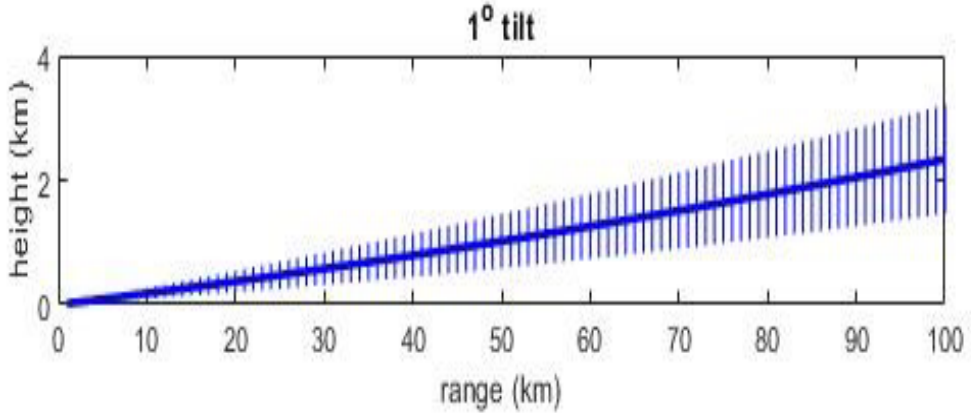
Southwest WA. DBCA planned burns

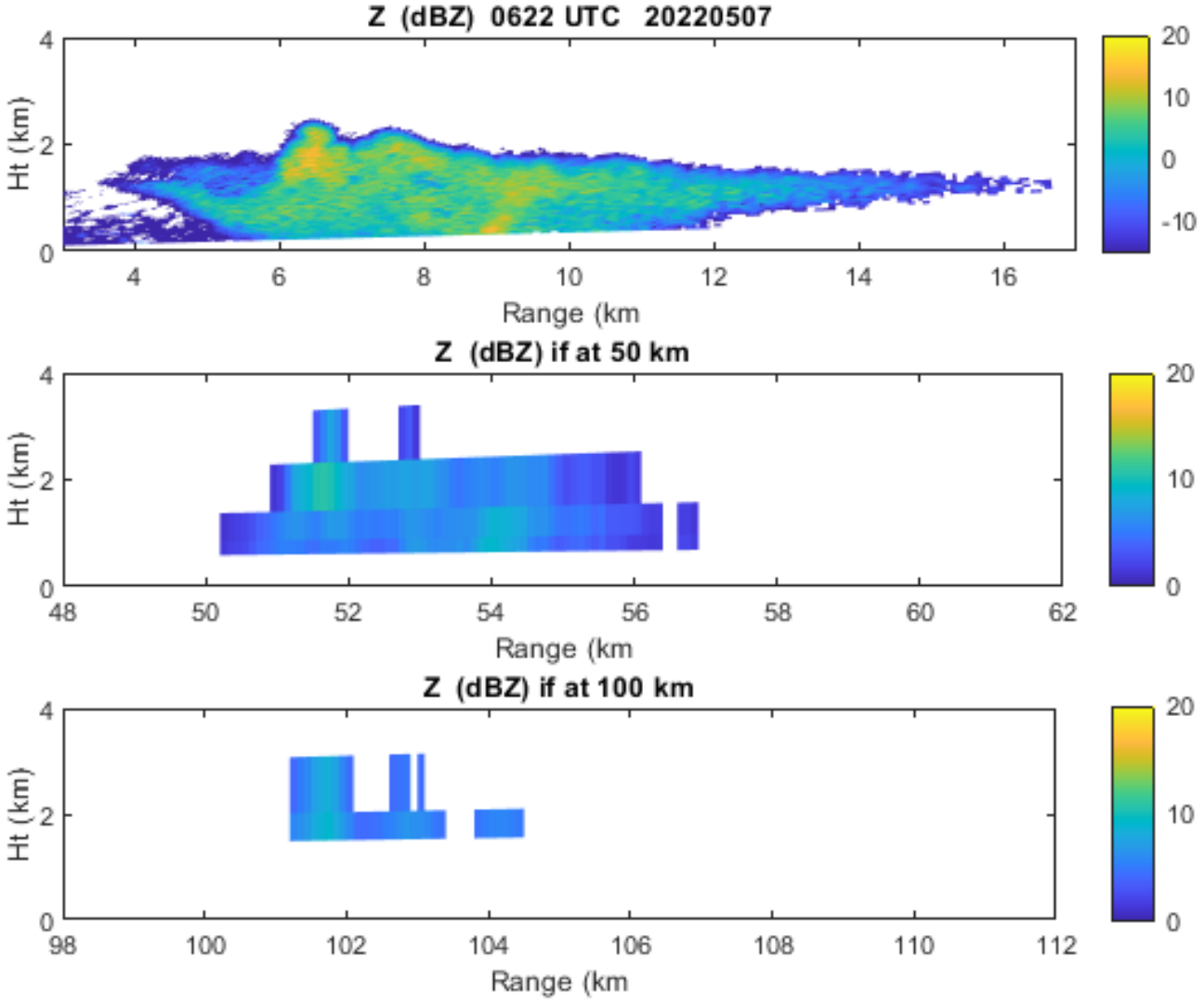
- **4 good deployments to environmental burns (3 in May, 1 in November 2022)**
- **1 rain case that also had a local fire**
- **Planned burns to reduce fuel loads**
- **Low wind, relatively dry fuel**
- **Use airborne incendiaries**
- **Radar located ~ 1-5 km from the nearest edge**



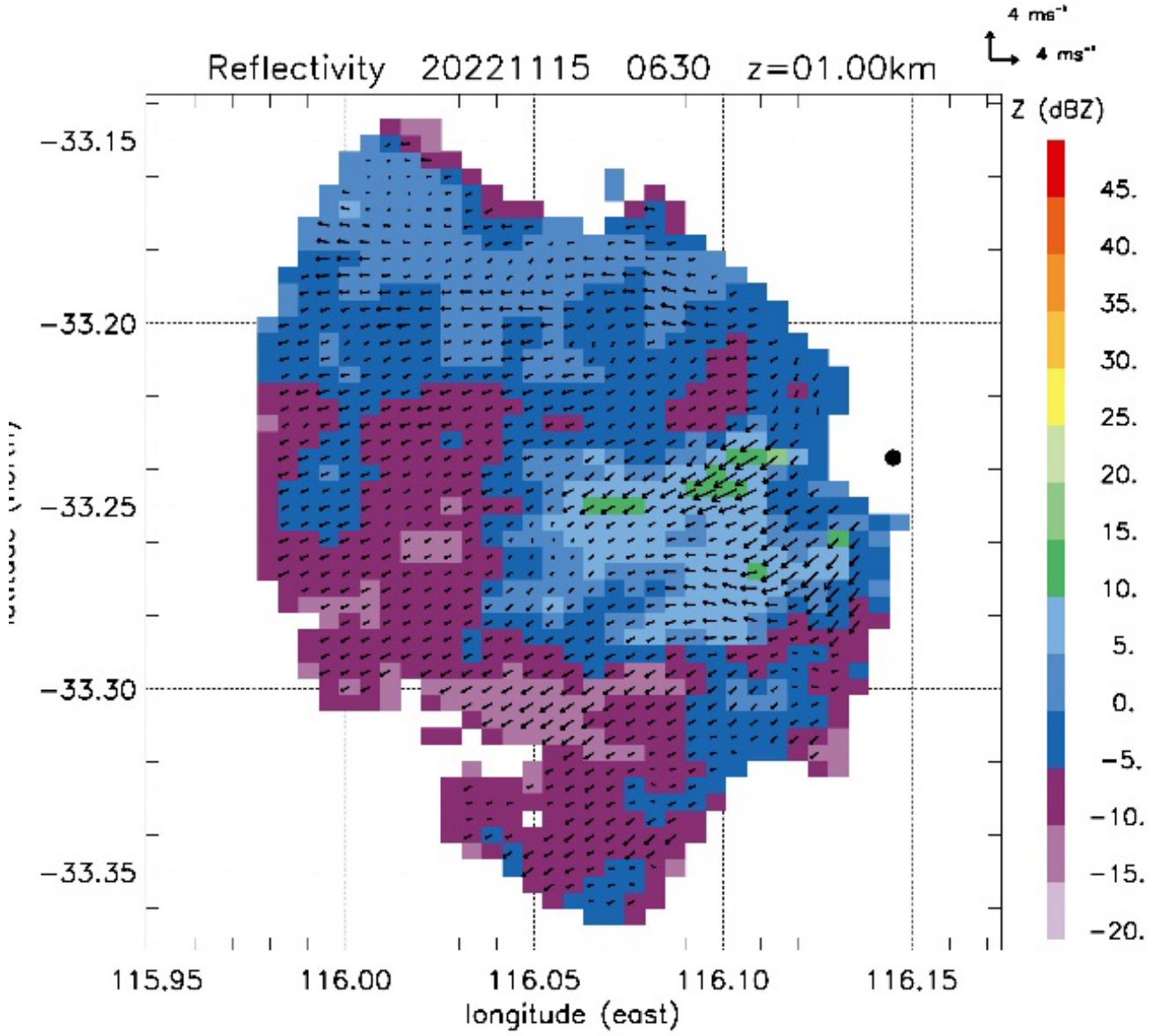
Mobile vs operational radar

- **Operational radars often too far away**
- **Lower resolution**
- **Beam is too high**
- **Scans not optimised**

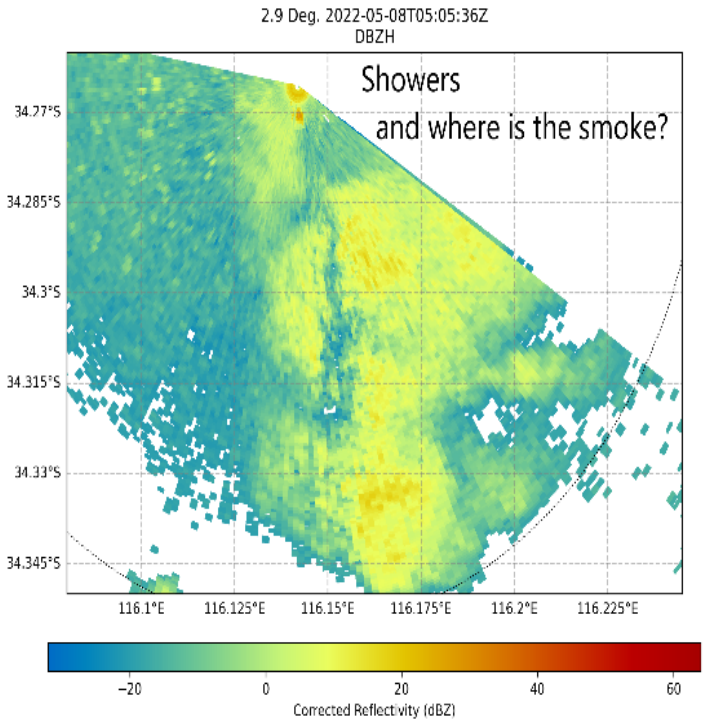




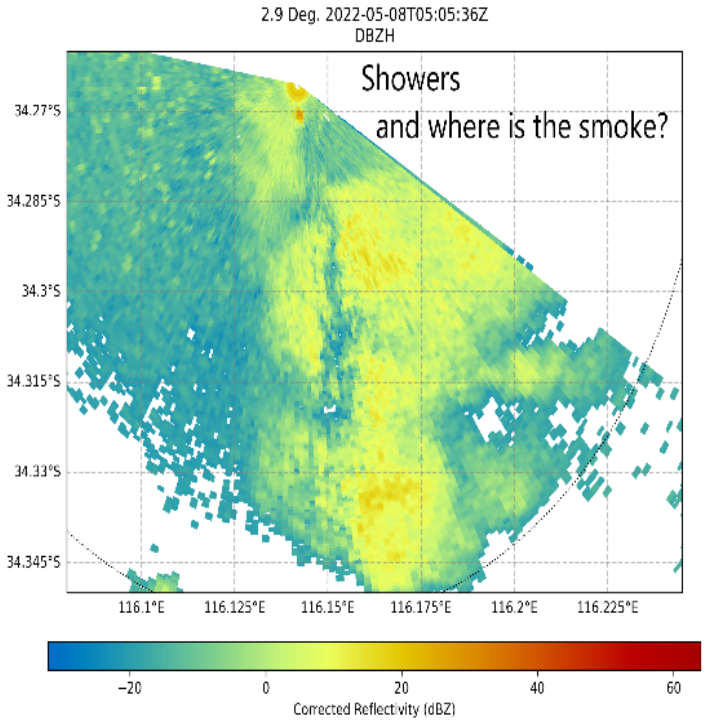
Two-dimensional wind retrieval showing ability to monitor three dimensional circulations in the vicinity of a fire

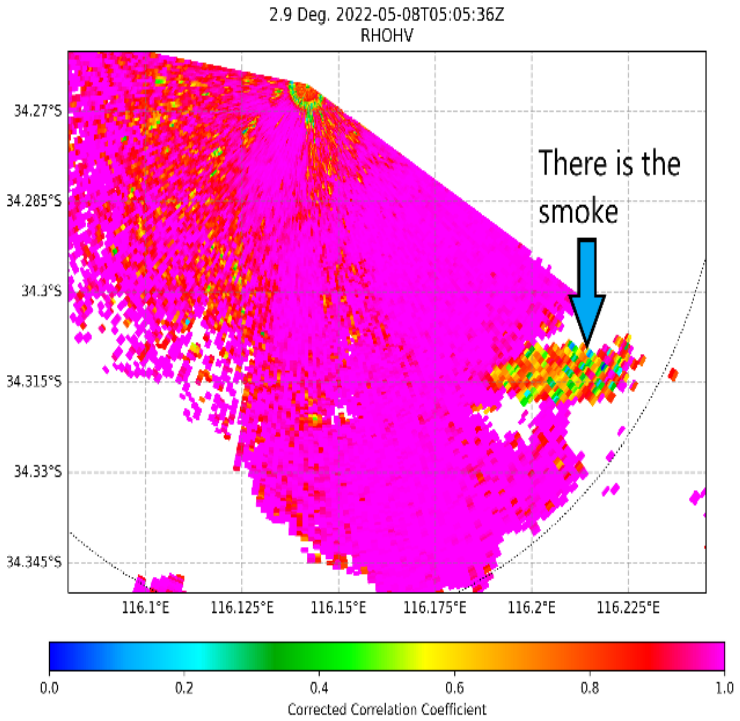


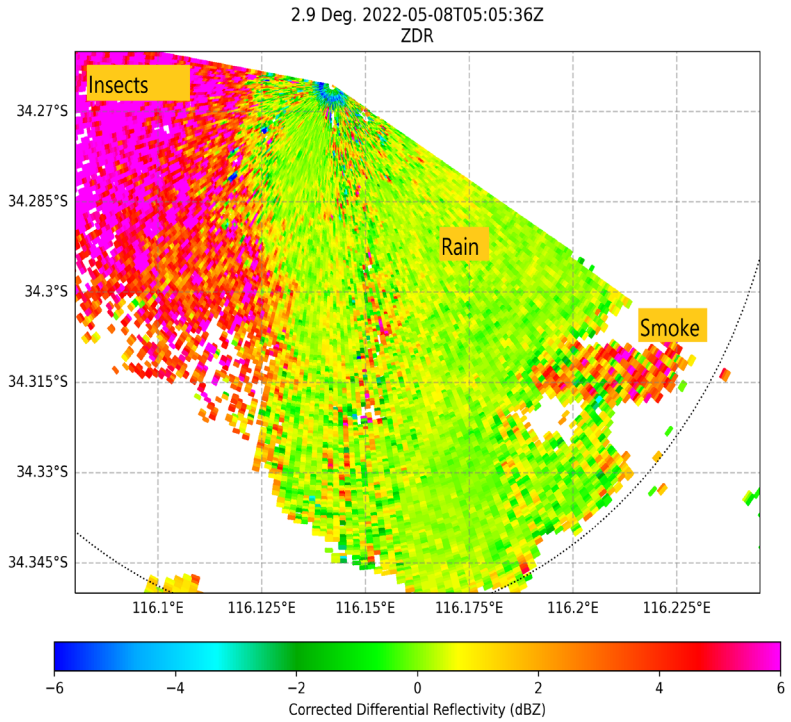
Separate smoke and rain



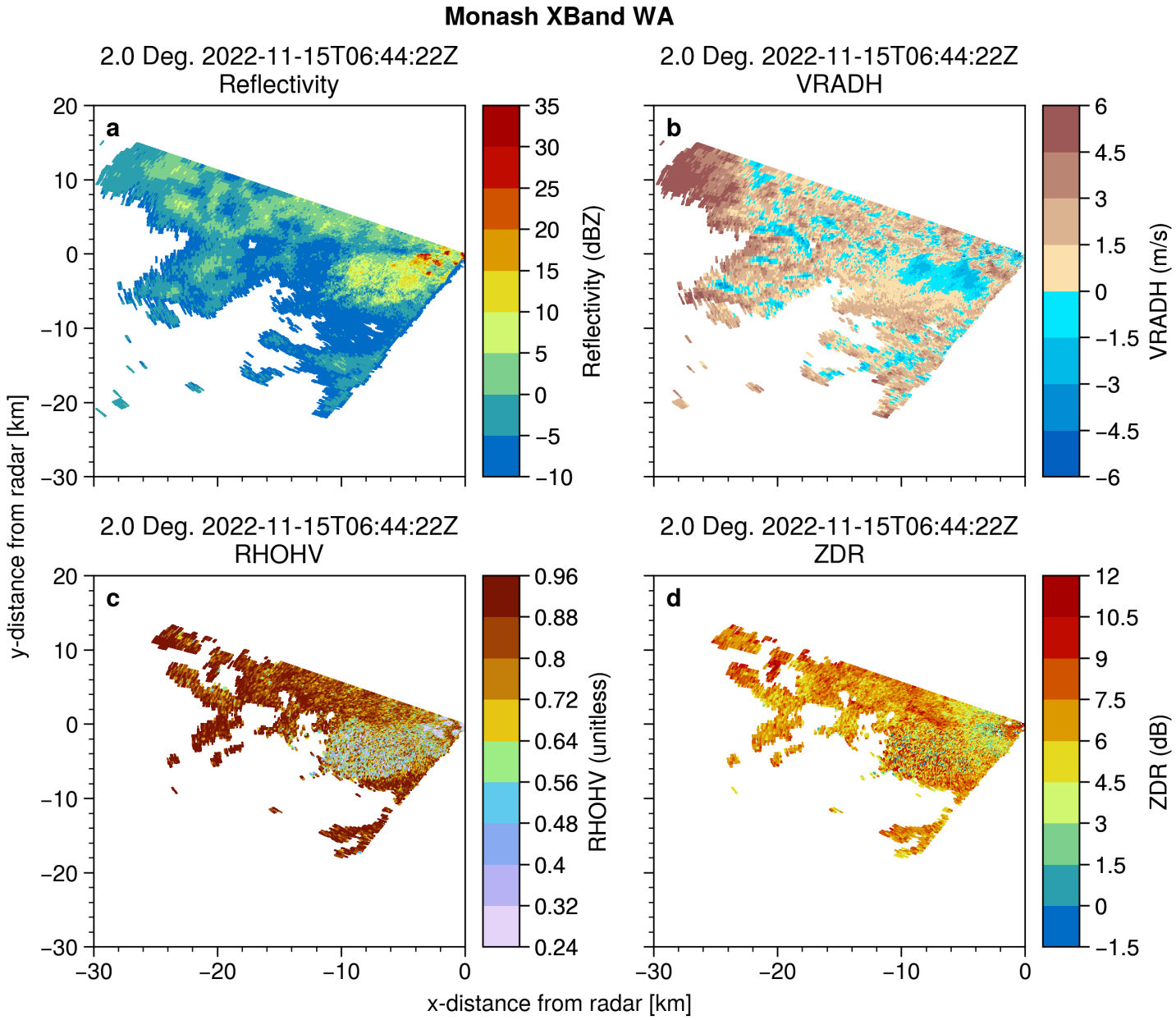
Separate smoke and rain

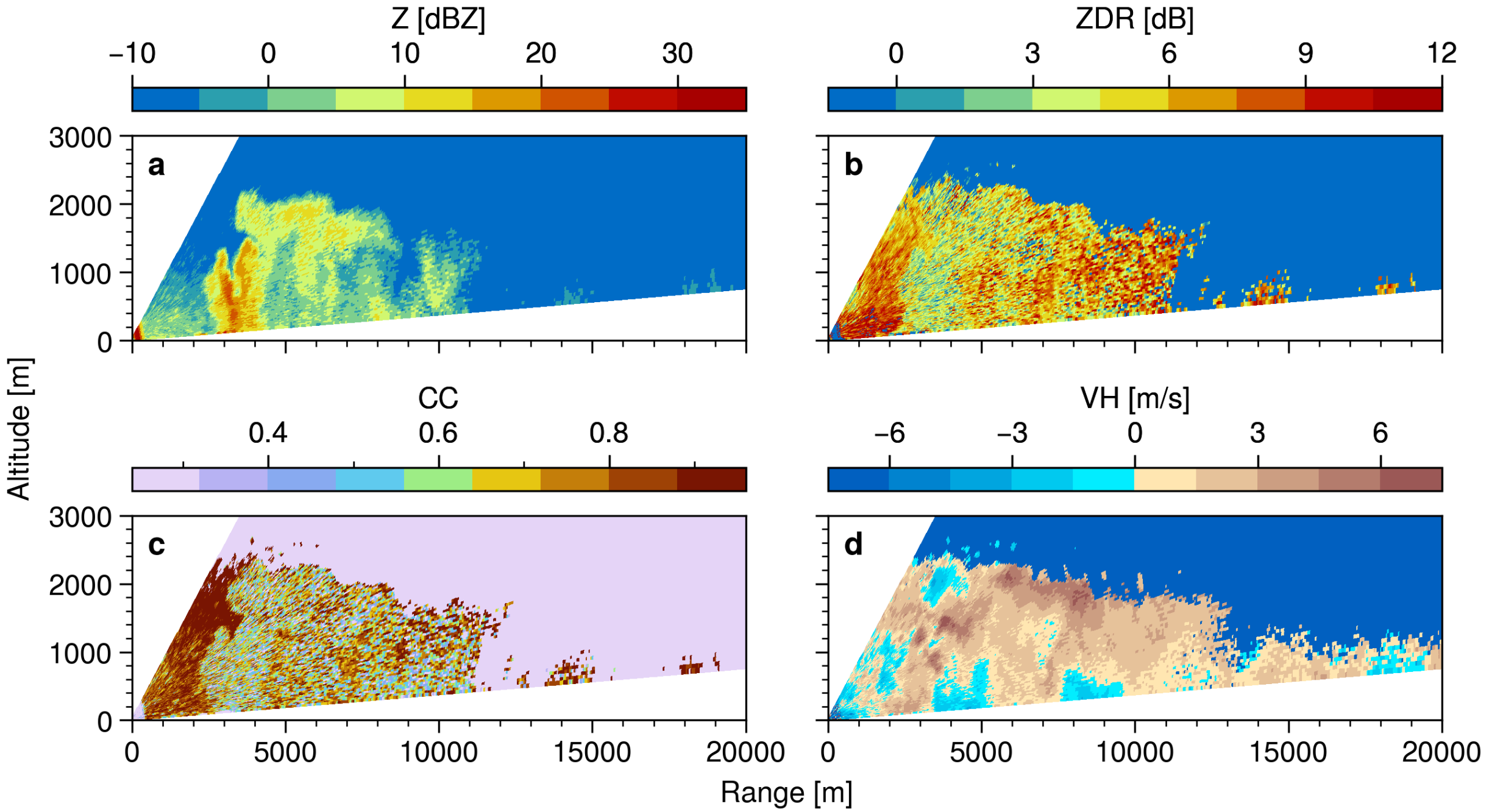






Sea breeze coming in during the burn. November 15 2022

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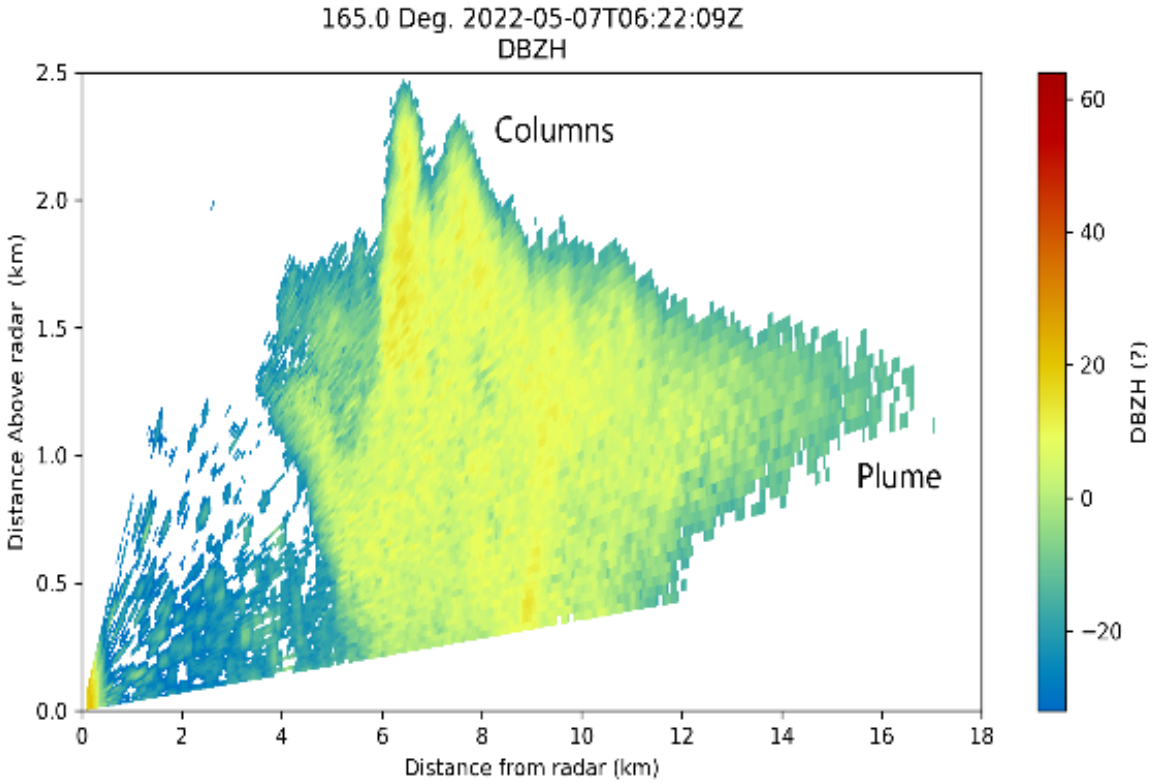
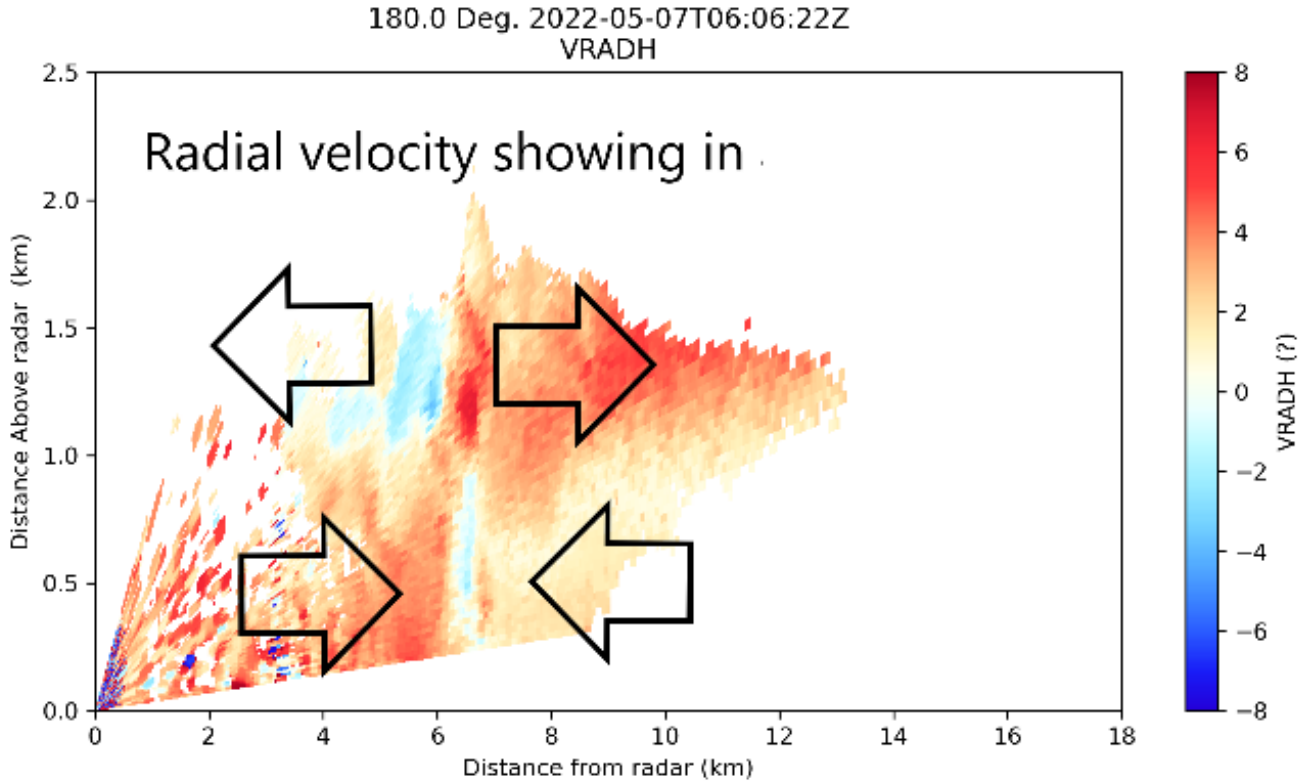
Example of a strong column





Diagnose circulations around fires such as in inflow and outflow

Potential to detect vortices

Bushfire Center of Excellence Nambeelup, WA

Thanks to BCoE for hosting workshop

Workshop invitation. May 2023

WA Portable Radar Fire Plume Field Experiments - 2023 Workshop

Supported by NHRA and the Bureau of Meteorology, you are invited to the project workshop to share the results of the 2022-2023 field experiments using mobile radar to monitor bushfire plumes.

Agenda (details to follow):

Wednesday 3rd May	**Session 1:** Introduction to radar and fire plumes, international context and overview of the project. **Session 2:** Science. Operational and research experiments and case studies. **Session 3:** Operations and logistics including considerations for deployment at wildfires. **Evening:** Workshop Dinner
Thursday 4th May	**Session 1:** Field tour with radar and operational instruments. (TBC depending on logistics). **Session 2:** Operationalisation considerations. **Session 3:** Where to from here?

When: 3rd - 4th May, 9:00am - 4:00pm

Where: Bushfire Centre of Excellence, 20 Dollyup Street, Nambeelup, WA 6207

Logistics:
- Lunch and refreshments will be provided on both days.
- Accommodation options will be shared shortly.

Please RSVP to **James.Ashley@bom.gov.au** by **12th April 2023.**

Questions? Feel free to contact us:

James Ashley: James.Ashley@bom.gov.au
Mika Peace: Mika.Peace@bom.gov.au

The Bureau of Meteorology · Natural Hazards Research Australia · Department of Biodiversity, Conservation and Attractions · MONASH University · Government of Western Australia · DFES Department of Fire & Emergency Services

NHRA funded logistics for the workshop attendees (flights/travel, lunches and group accommodation booking).

Workshop attendees

DFES
DBCA
Bureau
research, radar
technical, ops
Monash Uni
Google / UQLD
CSIRO
NSW RFS
VIC CFA
AFAC

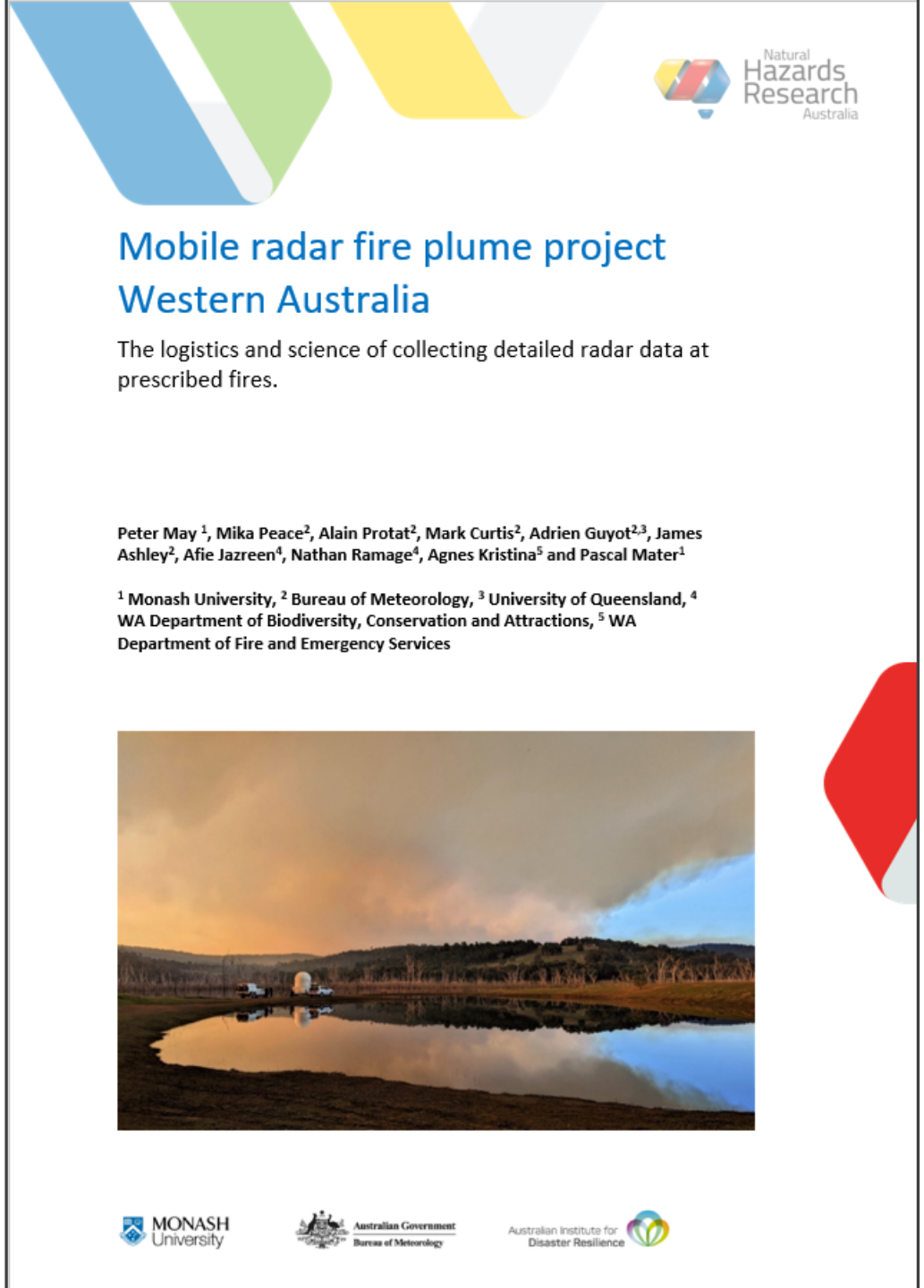
29 attendees

Report

Request a copy from NHRA, Mika or Peter

Follow up activities:

- **Journal papers**
- **Data for further analysis**
- **Collaboration with USA**
- **Further research plans**
- **Operational pragmatism**



Natural Hazards Research Australia

Mobile radar fire plume project Western Australia

The logistics and science of collecting detailed radar data at prescribed fires.

Peter May [1], Mika Peace[2], Alain Protat[2], Mark Curtis[2], Adrien Guyot[2,3], James Ashley[2], Afie Jazreen[4], Nathan Ramage[4], Agnes Kristina[5] and Pascal Mater[1]

[1] Monash University, [2] Bureau of Meteorology, [3] University of Queensland, [4] WA Department of Biodiversity, Conservation and Attractions, [5] WA Department of Fire and Emergency Services

Question…

- **Collaborative science project and two day workshop was hugely successful.**
- **What other projects (maybe SA based?) could follow a similar approach?**