



Final Presentation

Project outline (reminder)

- APR Internship August '19 – March '20
- Presentation ready visualisations
- NCI data management
- Analysis of model output

Project outputs (so far)

- Several plots presented by Mika
- Poster at ACCOMC
- Oral presentation for RFS clients

Other stuff

- Pyrocumulonimbus (PCB) analysis
- Validation of potential PCB prediction code
- Framework for model output visualisations
- Measurement comparisons where available
- 2.6 conferences, many seminars
- Trajectory modelling preliminary work

Objectives	Activities	Outputs	Due Date
Objective 1:	Modify and run scripts to post-process multiple ACCESS fields and files into consolidated .nc files	Scripts on NCI, tested and documented and shared with the project team	25 August 2019. Date to coincide with AFAC conference the following week.
Objective 1a:	Develop scripts to plot above files as vertical levels and as cross sections with multiple fields and animations	Scripts with multiple functionality to produce plots as decided with supporting documentation. Plots with appropriate colour and labels for publication, shared with the project team.	25 August 2019. Date to coincide with AFAC conference the following week.
Objective 2: APR.Intern Mid-Term Presentation	Short presentation by Intern Skype to Industry Partner and Academic Mentor summarising the status of the work. Please invite APR.Intern facilitator if required. See below. Reorder Objectives as needed so mid-term is delivered at the appropriate interval.		Week 8 of internship
Objective 3:	Develop and refine 1 and 1a above and extend to both case studies to support analysis.		Week 17 of internship
Objective 3a:	Prepare visualisations of data from project partners (eg linescans, F160's) as required		Week 17 of internship
Objective 4: APR.Intern Final Report and final presentation	Provide a draft of the APR.Intern Final Report, Intern Executive Summary (templates at the end of this document) to the Industry Partner and Academic Mentor for review and approval prior to submission to the APR Facilitator a week before the final presentation. Final 30 min presentation by Intern via Skype to APR Facilitator, Industry Partner and Academic Mentor summarising the overall outcomes of the work.		Week 16 of internship

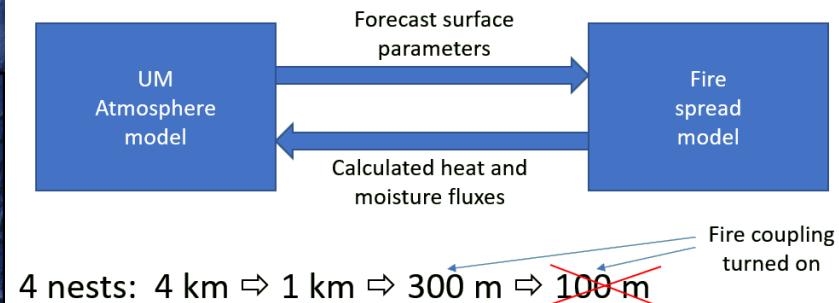




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bushfire & natural
HAZARDS CRC

ACCESS-Fire modelling



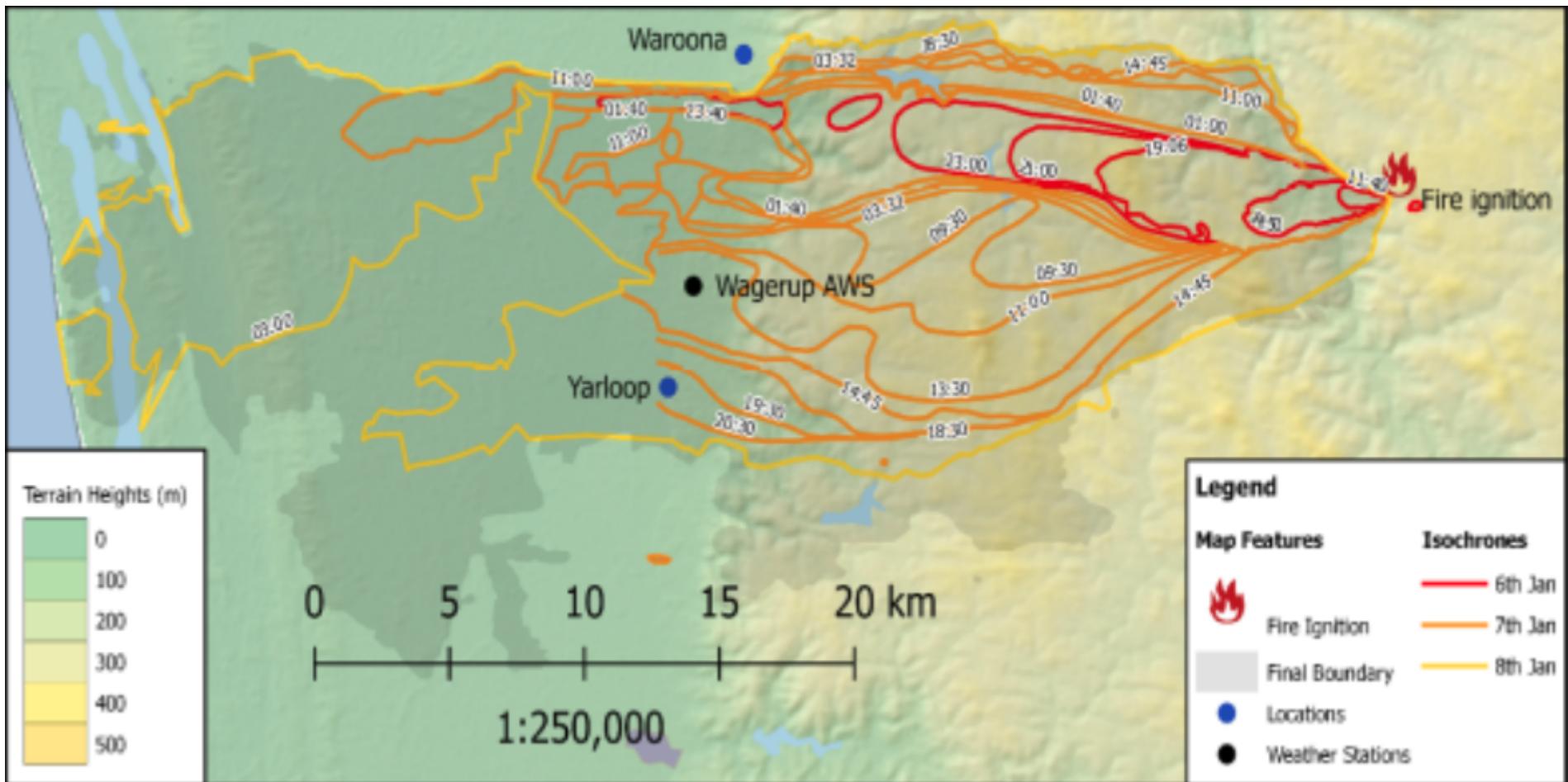
- Several model runs available currently
- Three of the Waroona fire, one of the Sir Ivan fire
- Fire intensity and spread based on prescribed fuel loads and modelled meteorology
- Modelled meteorology affected by heat flux from the fire
- Model CAN reproduce PyroCB (fire driven storm creation)
- Process is sensitive to modelled boundary layer stability
- Realistic fire spread is also achievable



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Rate of spread



On day 1

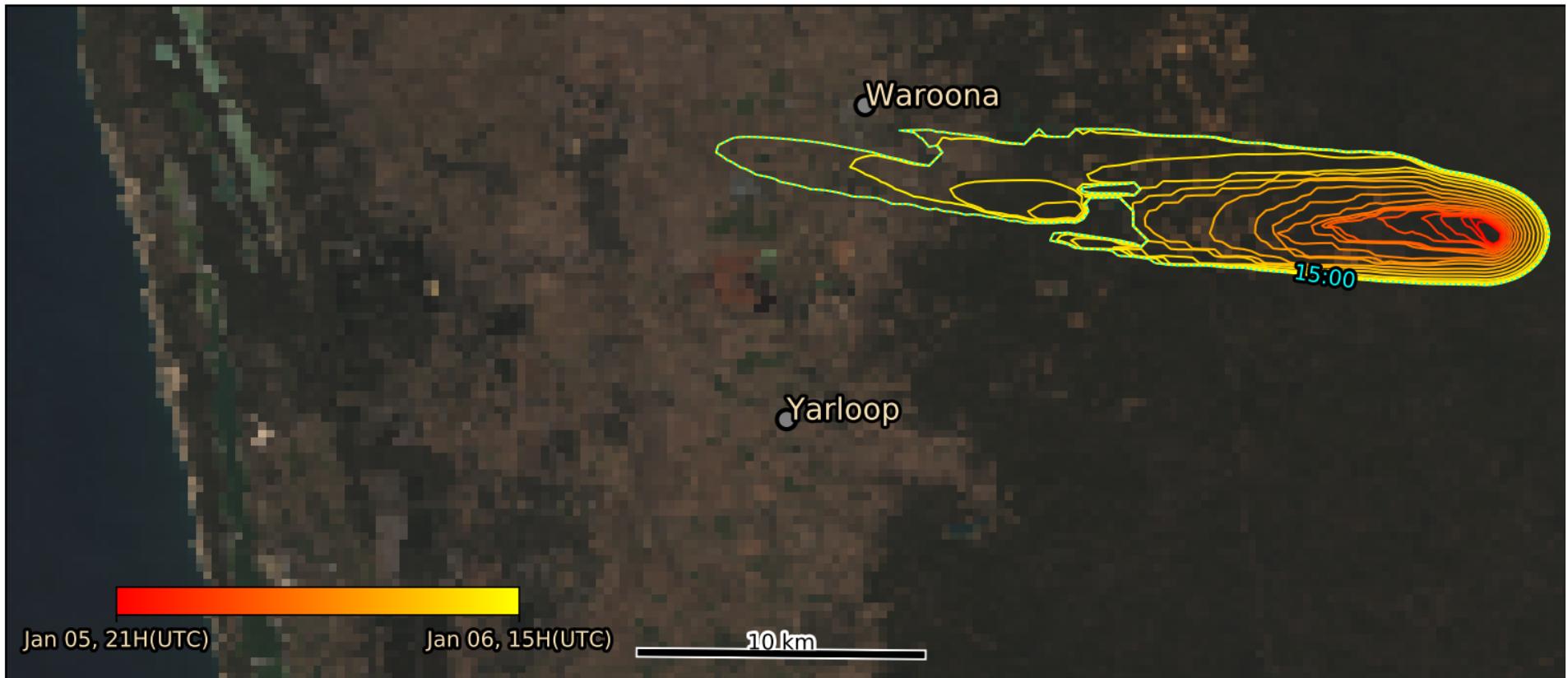
- escarpment reached, due to spotting (likely) driven by PyroCB
- quick westward run at the base of the scarp in the late evening

What do we see in the model?





Rate of spread



- 15 hours of burning (Jan 6: 0900-2300)
- Spotting is prescribed (not built into fire model)
- Shape is relatively well represented

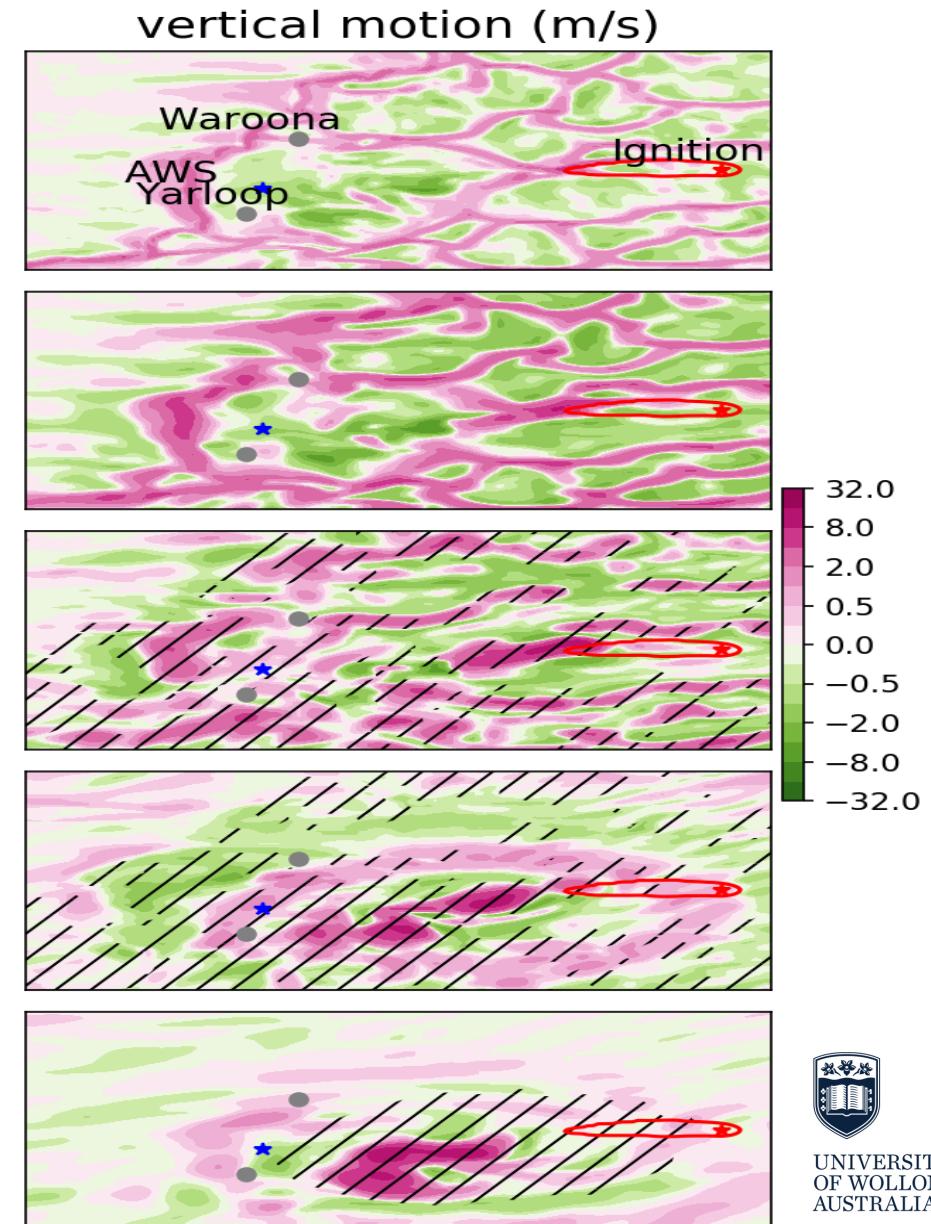
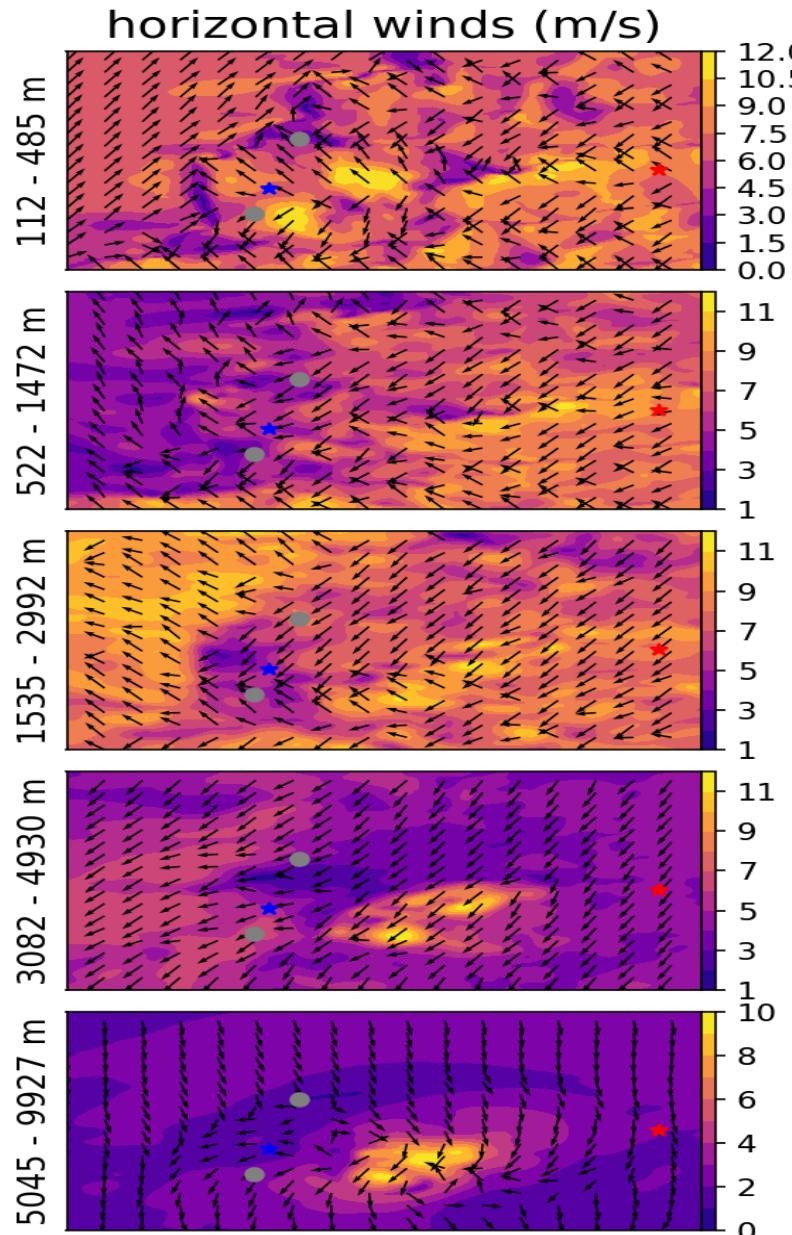
- Fire spread affects and is sensitive to surface winds, which require careful tuning
- Too much instability causes runaway fire dynamics (spread is too fast)
- Too much resistance to instability can dampen physical effects (e.g., PyroCB)





Weather summary

waroona_run2 weather 2016 Jan 06 06:40 (UTC)





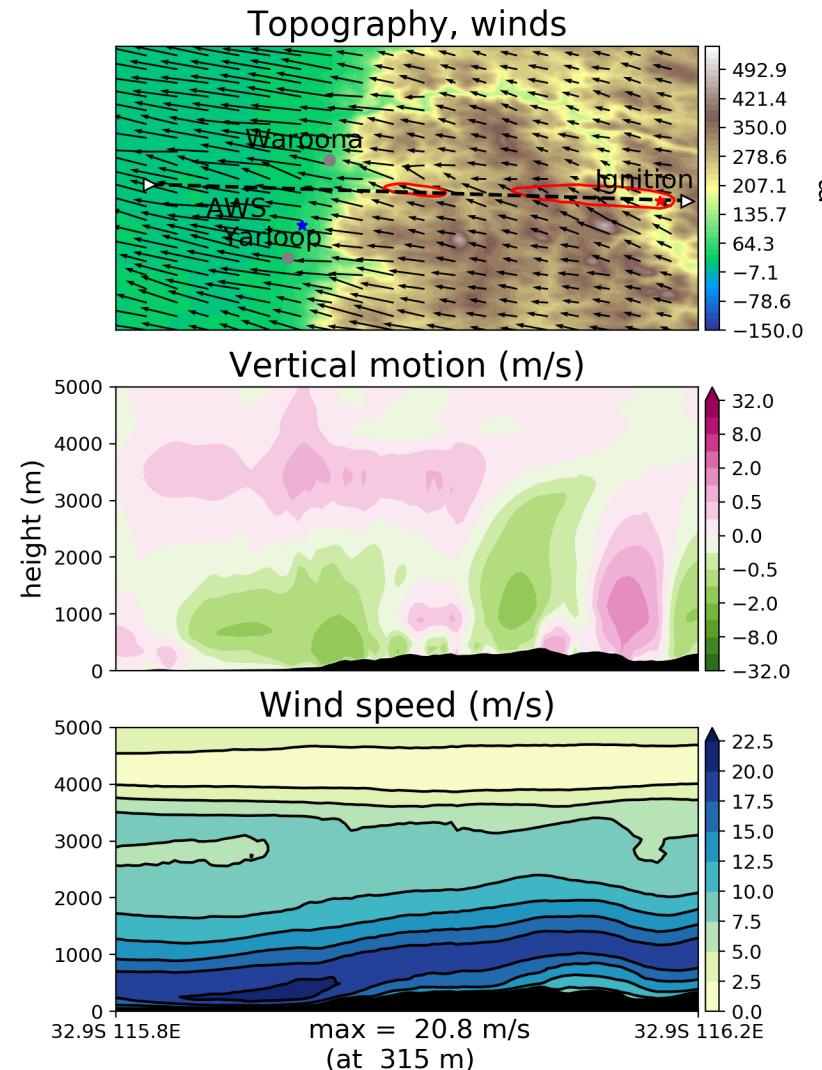
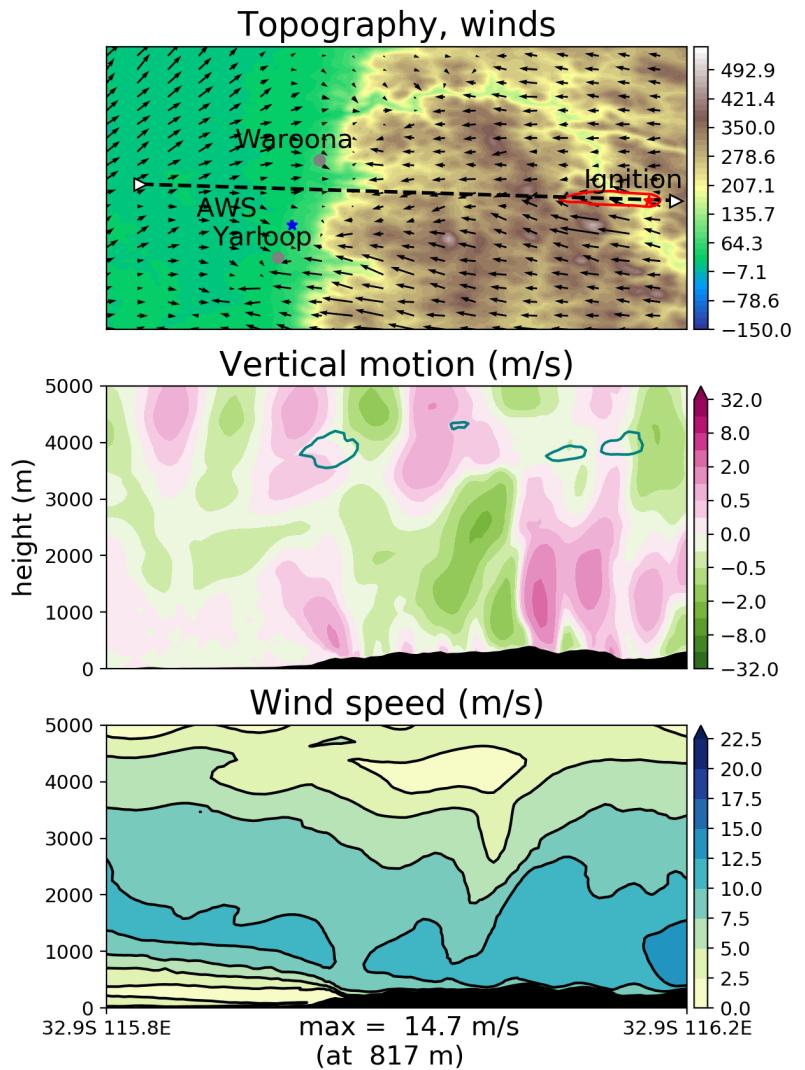
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Wind speeds

2016 Jan 06 10:40 (UTC)

2016 Jan 06 14:10 (UTC)



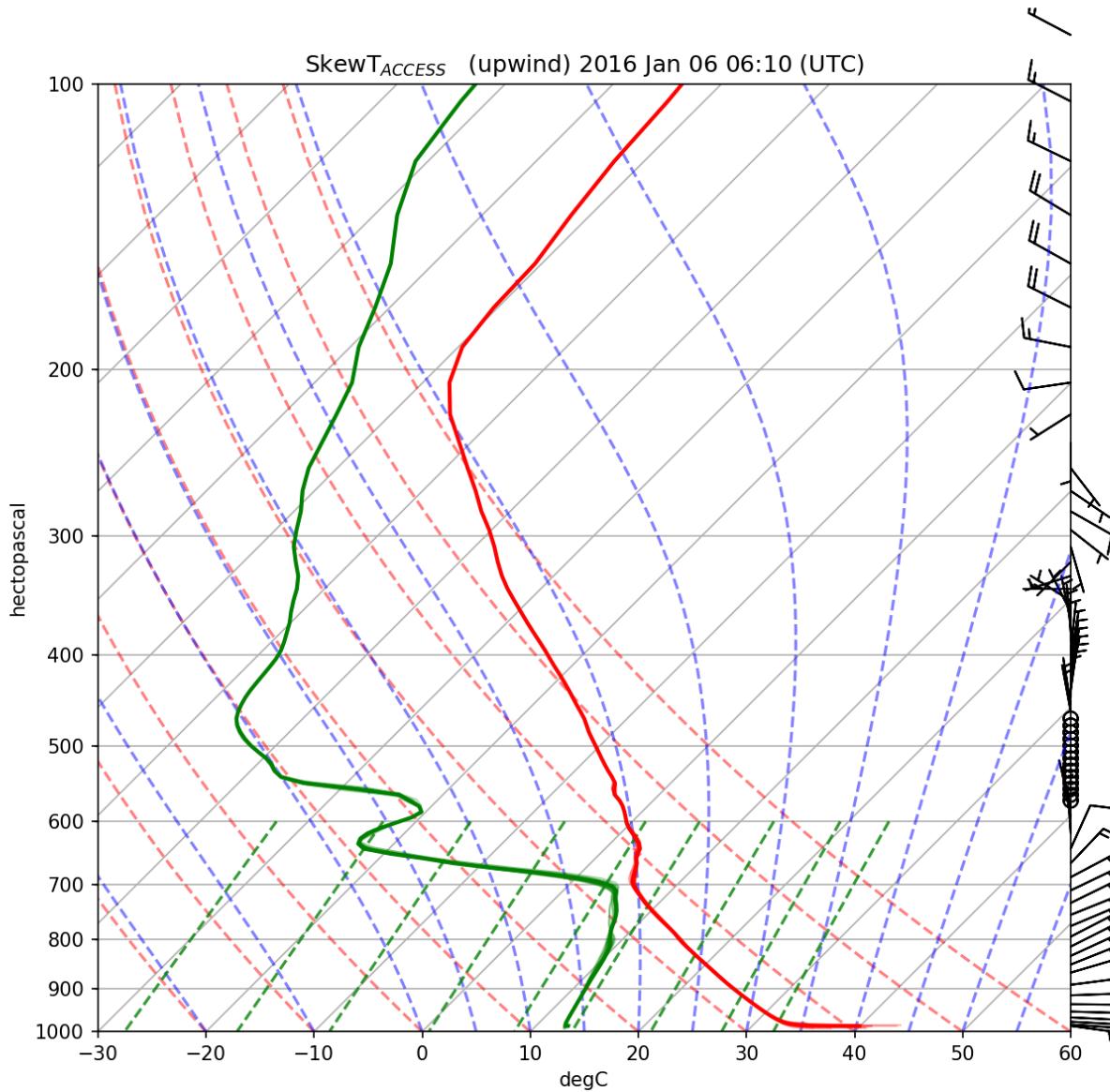
- Vertical wind speeds are affected by the fire
- High horizontal wind speeds seen at base of scarp



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Skew T log P



$$PFT = C (Z_{fc})^2 U b_{fc}$$

PFT: PCB Fire power Threshold

C : constant

Z_{fc} : free convection altitude

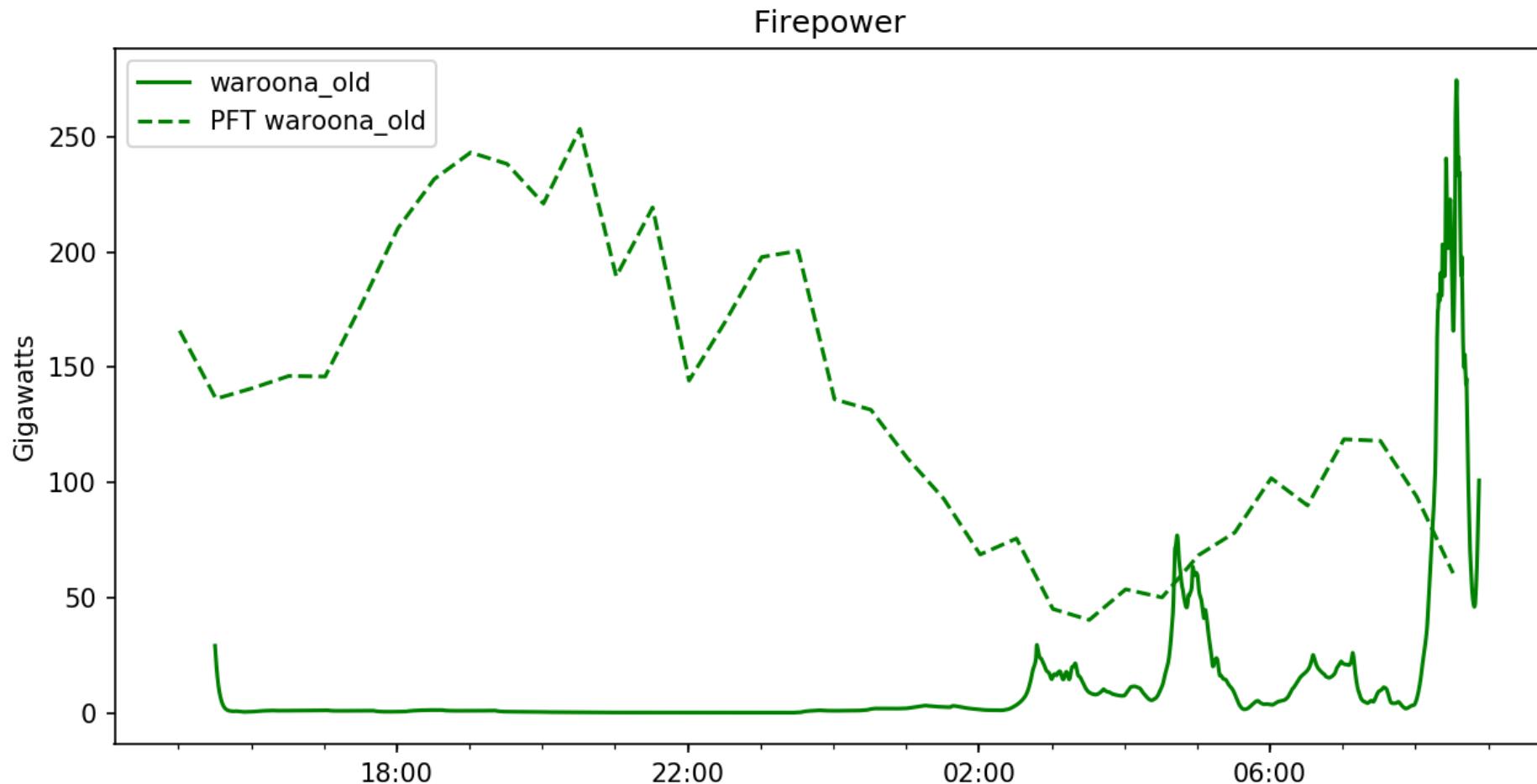
U : wind speed

b_{fc} : Plume escape threshold





Firepower vs PFT



- Original run (lower BL stability) overshoots PFT threshold at 12:30 and 1630 LT

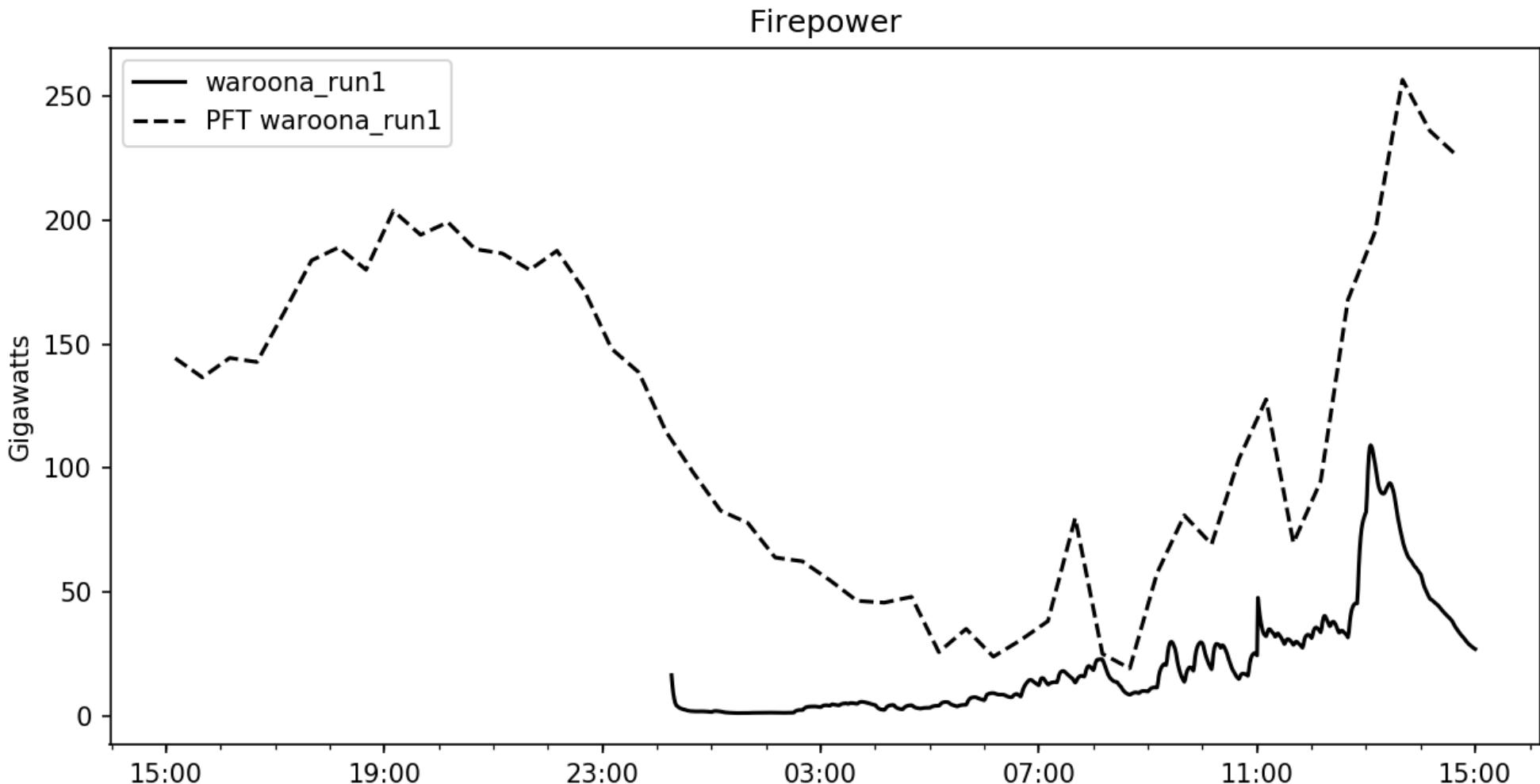




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Firepower vs PFT



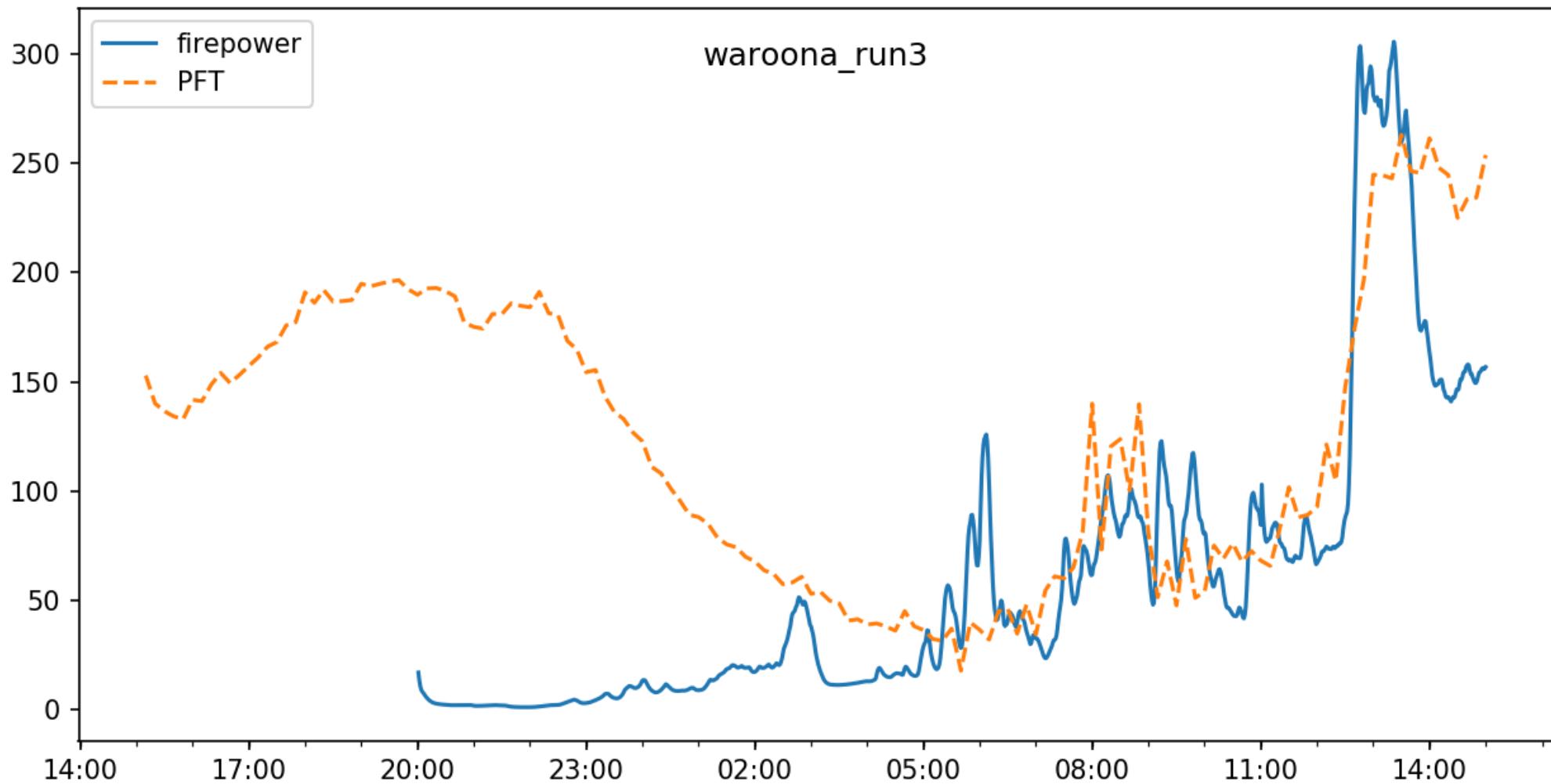
- Newer run (higher BL stability) does not overshoot PFT
- PyroCB can be seen in the original run from about 1200



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Firepower vs PFT



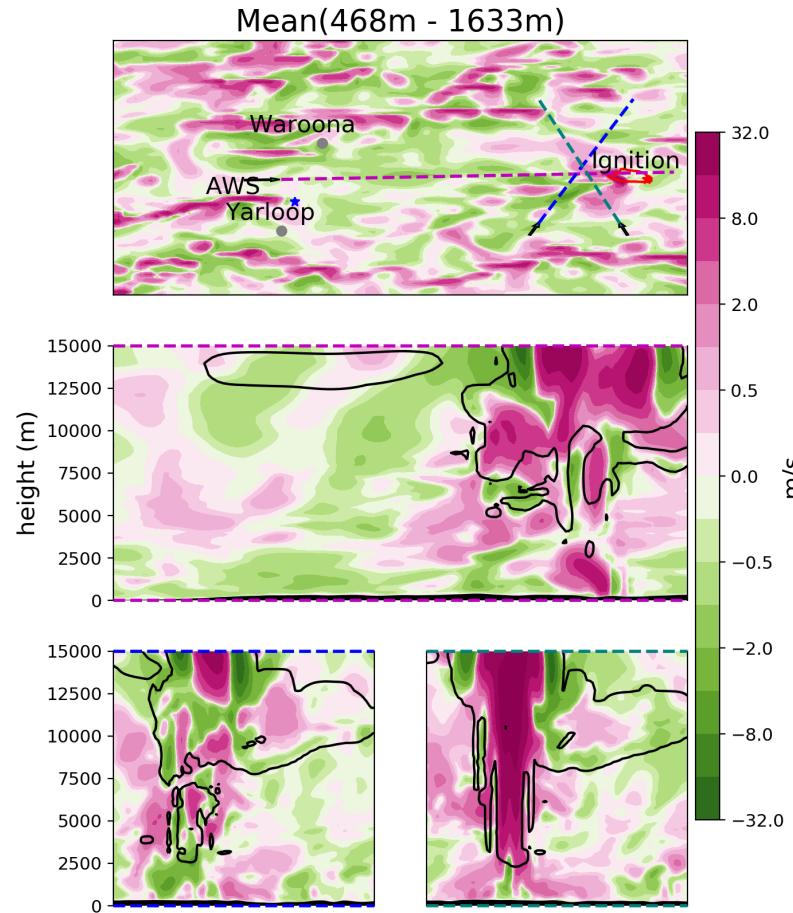
- Latest run (higher BL stability, fewer limitations on fire spread)
- PyroCB again could be expected from overshoots



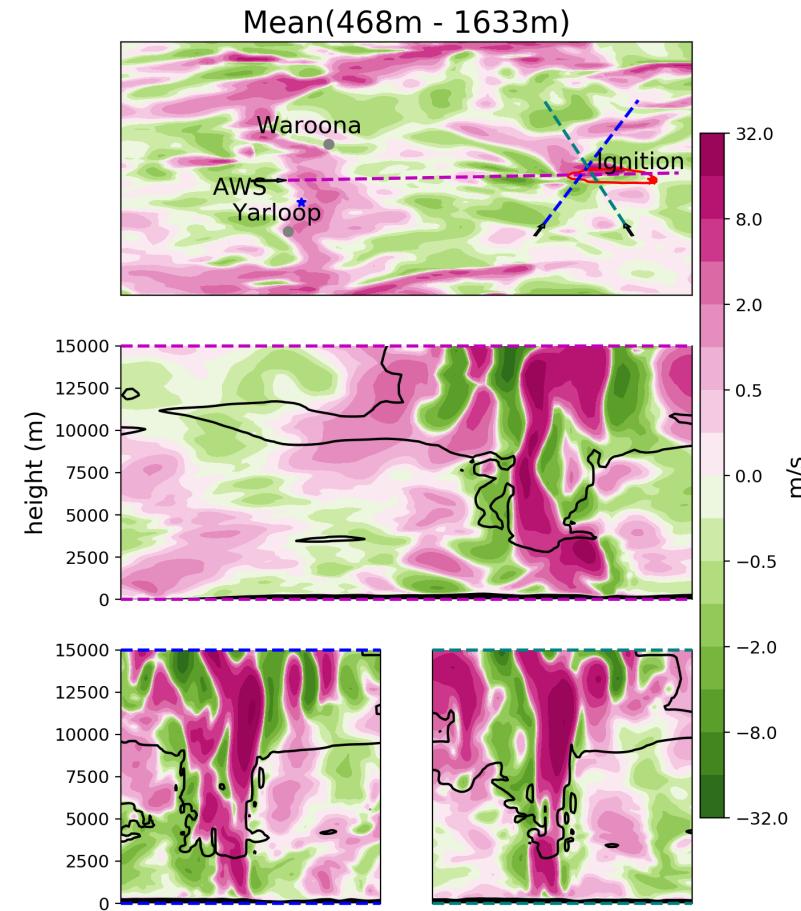


PyroCB

Vertical motion 2016 Jan 06 04:01 (UTC)



Vertical motion 2016 Jan 06 07:01 (UTC)



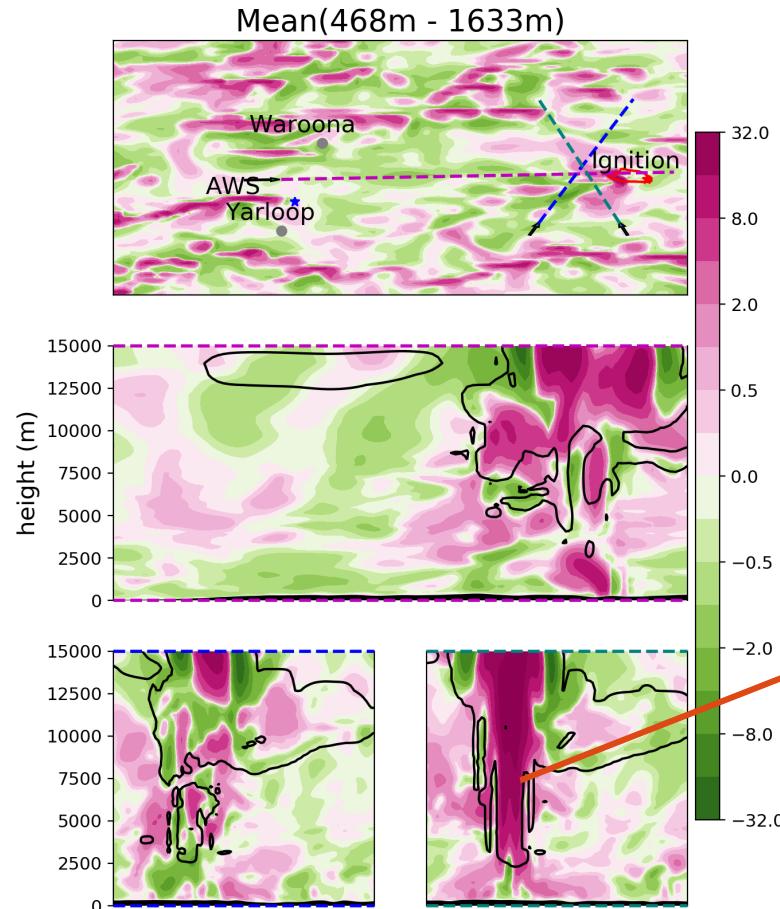
- Strong vertical updraft throughout the troposphere over the fire front
- Cloud formation and downdrafts can be seen nearby



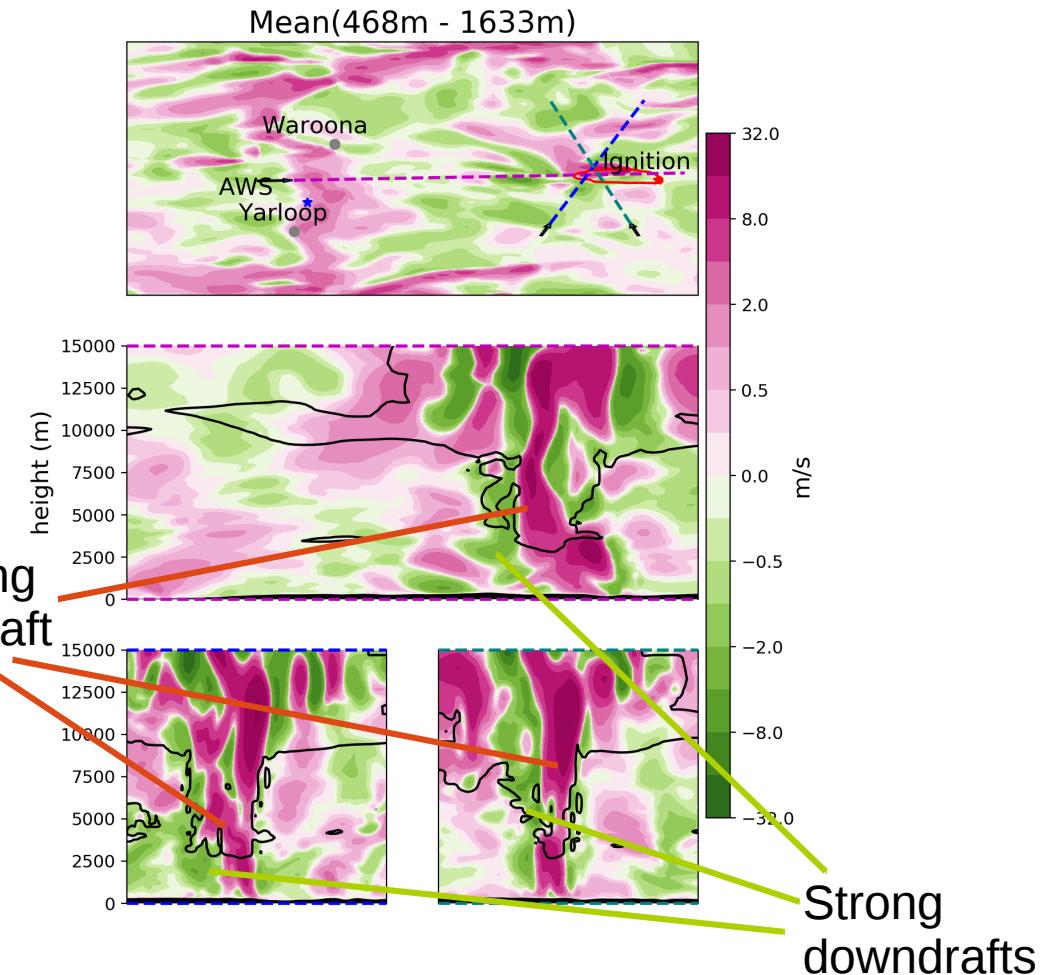


PyroCB

Vertical motion 2016 Jan 06 04:01 (UTC)



Vertical motion 2016 Jan 06 07:01 (UTC)



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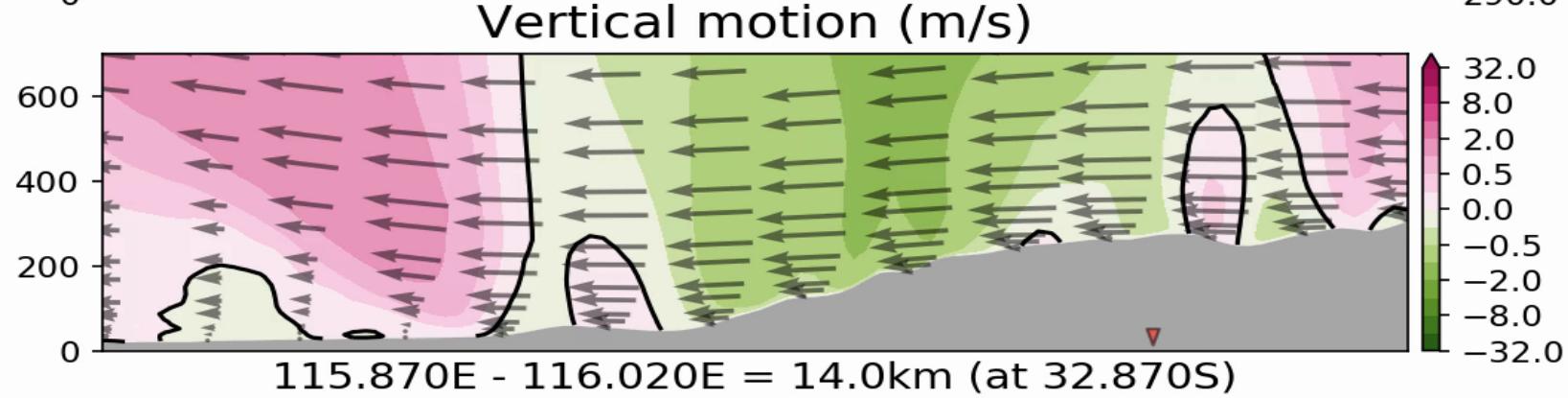
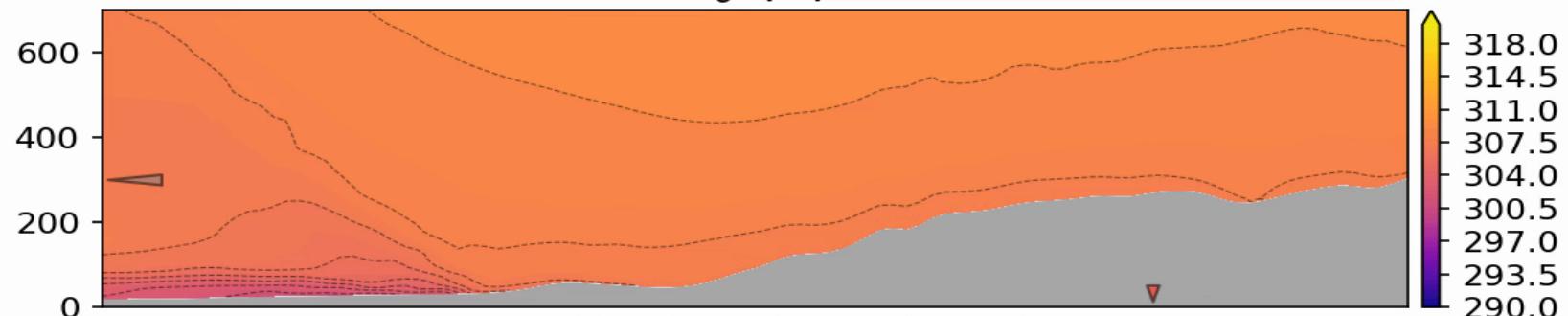
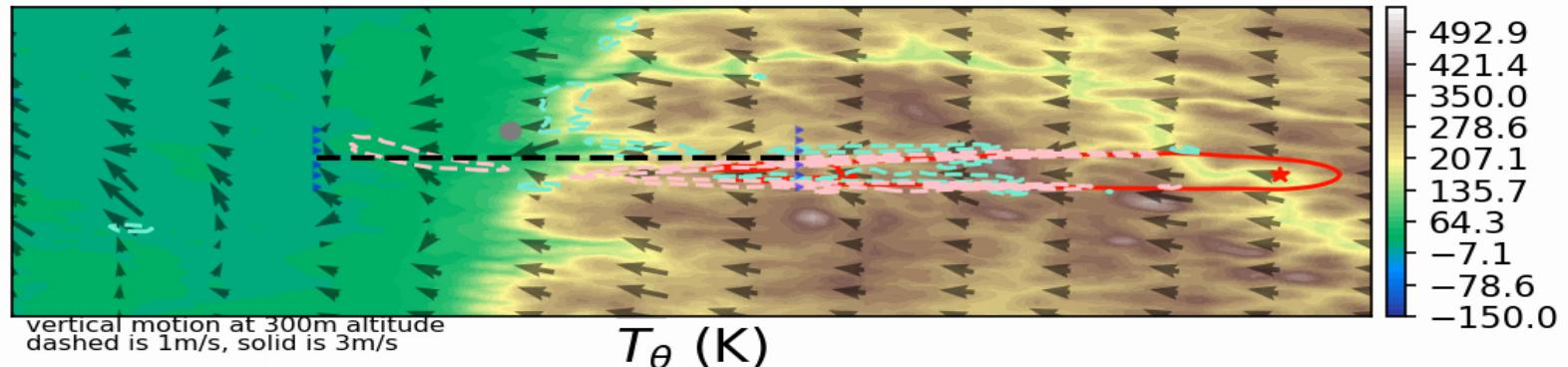




Ember storm

Emberstorm Jan 06 11:50 (UTC)

Overview





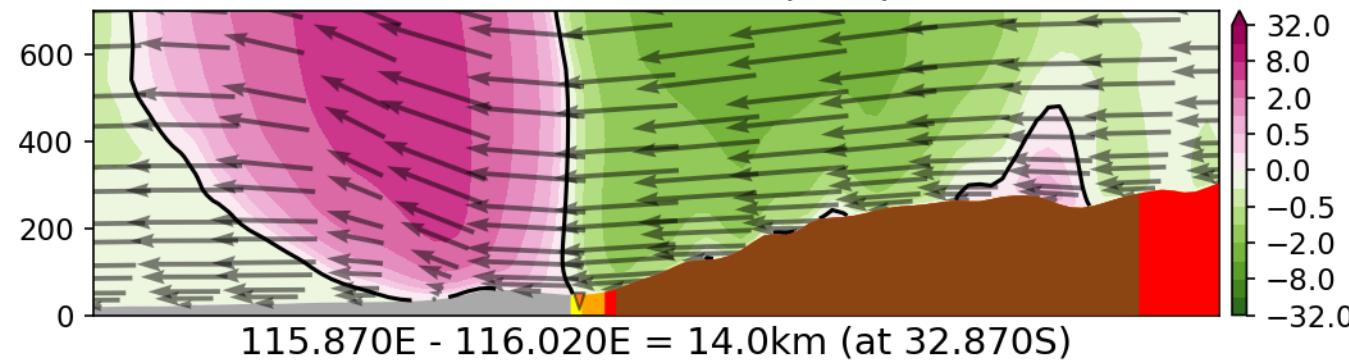
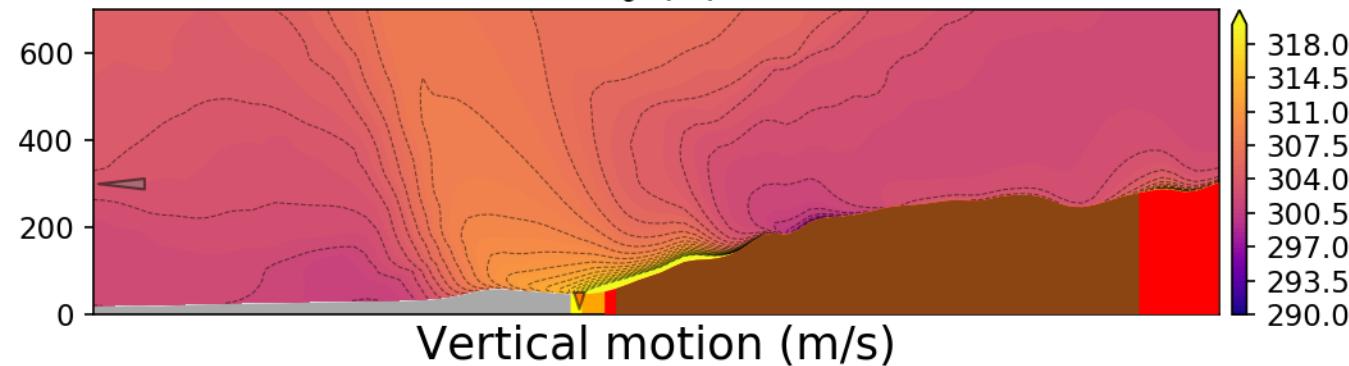
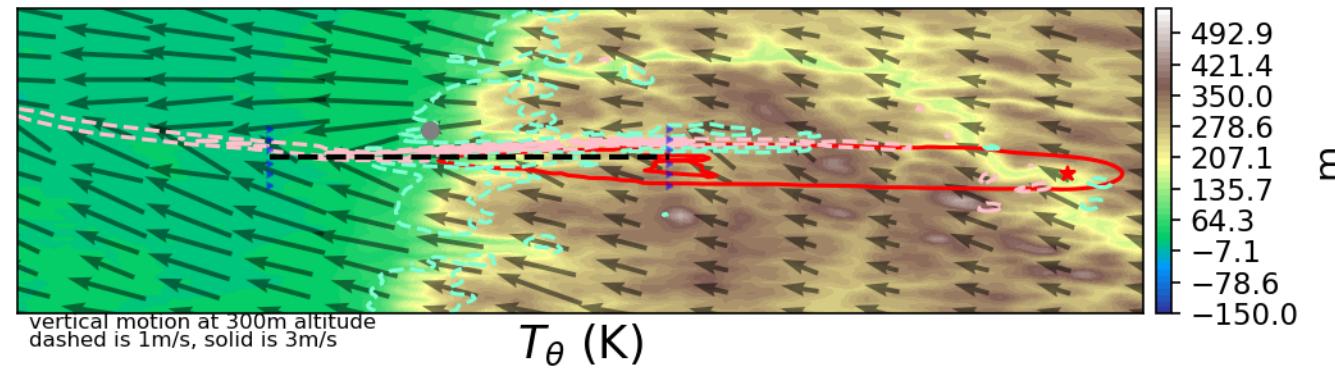
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Clear Jump

Emberstorm Jan 06 13:40 (UTC)

Overview



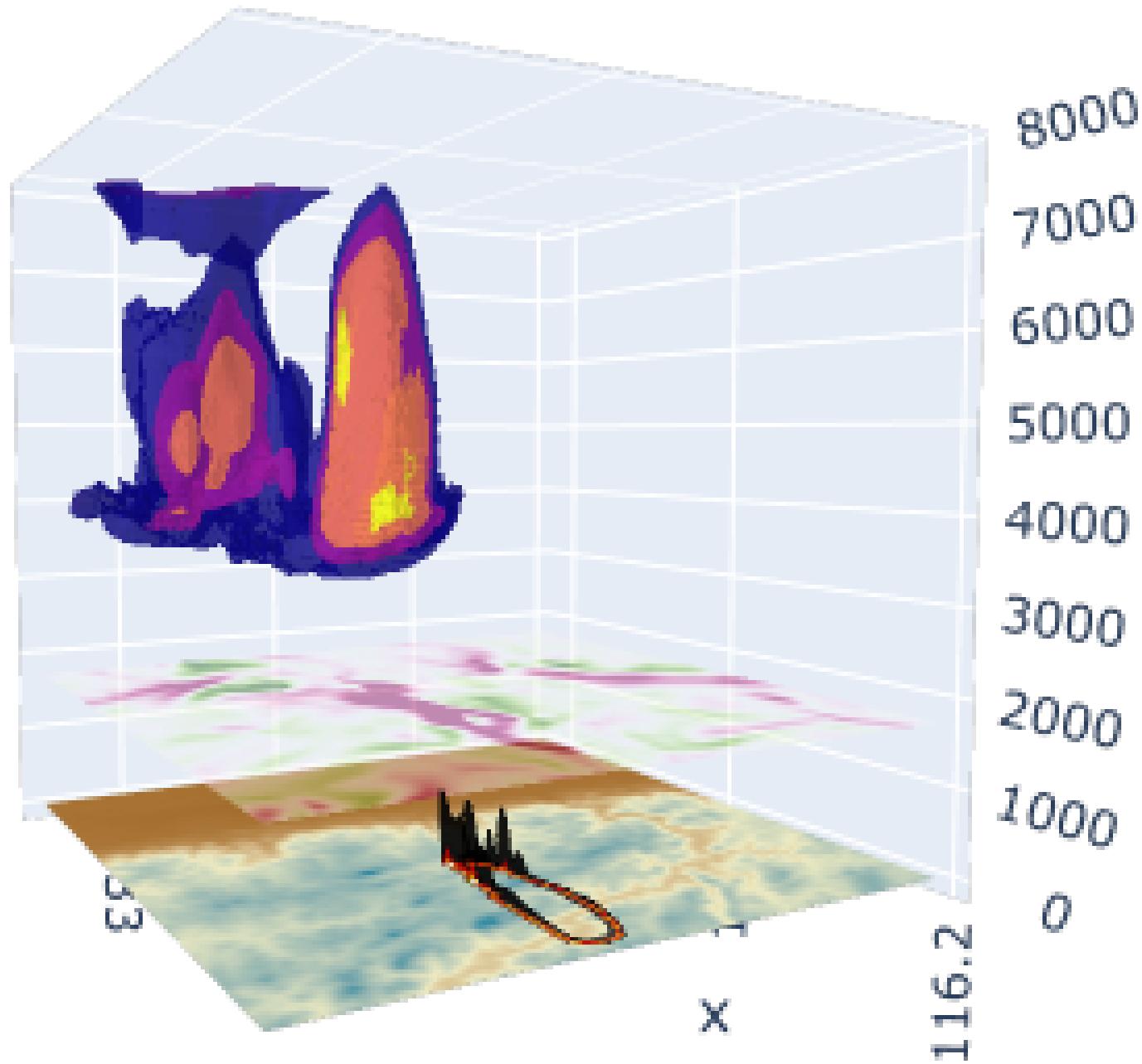
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Cool



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Other opportunities

- Talk: RFS client meeting
- Poster: ACCOMC CGASM
- Attendance:
 - BOM R&D conference
 - ACAWSI summer institute
 - AFAC fire conference
- Seminars and webinars:
 - ACCESS
 - NWP validation
 - NCI data product access
 - ...
- Knowledge leeching:
 - NCI productivity experts are everywhere
 - Fire/Met/Modelling experts too



Thanks



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Mika Peace,
Jeff Kepert,
Harvey Ye,
Jenny Fisher,
Kevin Tory



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