SIMULATING THE EFFECT OF VARYING FUEL LOAD IN FOREST FIRES

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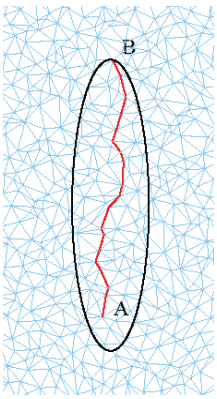
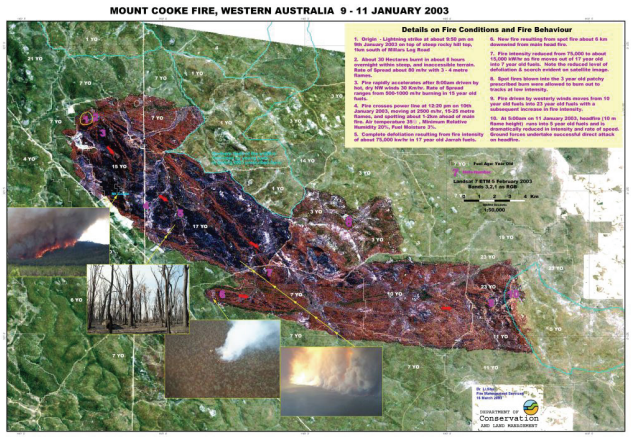


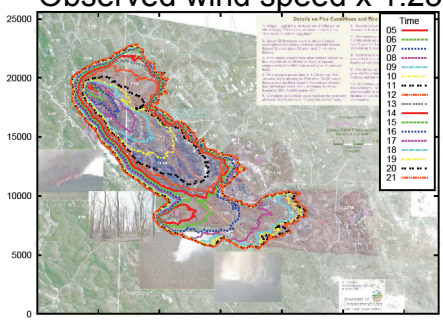
Underlying simulation mechanism

- The landscape is discretised by randomly distributed points and assigning elevation, fuel type and fuel load to each point.
- Random distribution of points removes bias introduced by the grid.
- Fire spread occurs by ignition of the neighbours of a burning patch with a delay that depends on the fire behaviour meter (wind speed, fuel moisture, fuel type) and direction of the neighbour with respect to wind and slope.
- Because the shortest distance from A to B along the network is greater than the direct distance, to attain the correct macroscopic rate of spread, inter-neighbour rate of spread is greater than the head fire rate of spread up to 30 degrees away from the maximum spread direction.

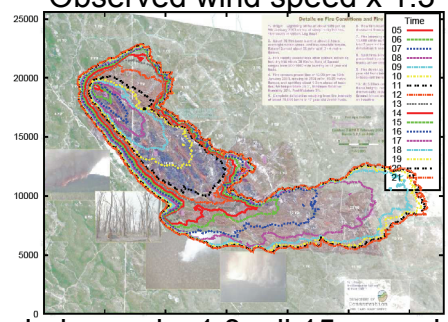
Real world application – The Mt Cooke fire, WA, January 2003



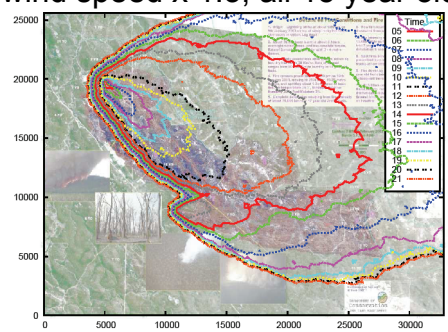
Observed wind speed x 1.25



Observed wind speed x 1.3



Obs. wind speed x 1.3, all 15 year old fuels



Input data

- Northern Jarrah fuel type with fuel loads calculated from time since previous fire (Red book)
- Surface Moisture Content vs time (calculations by L. McCaw, DEC)
- Wind speed vs time from weather station away from fire ground multiplied by a single scale factor
- Wind direction inferred from fire shape.
- Ignition at 4 am 10 Jan, plus spot fire at 12 noon
- Topography

Conclusions

- A small increase in wind speed causes a large increase in area burnt
- Reduced fuel load due to prescribed burns contained the fire on the northern flank
- The BushfireCRC simulator reproduces fire spread with slight modification of input data
- Red book possibly under-predicted ROS for this fire?