Plan View

186 m

0 m

360 m

FBP X

FBP Y

FBP Z

FCS X

FCS Y

FCS Z

Fire line

Road

360 m

160 m

Used fine grid of 1 m x 1 m

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | FCS Z | | FCS Y | | FCS X | |
|  | Exp | sim | Exp | sim | Exp | sim |
| Firebrand density (pcs/m2) | 536 | 643 | 463 | 495 | 335 | 34 |
| Total firebrand flux (pcs/m2.s) | 1.361 | 1.632 | 0.902 | 0.965 | 0.824 | 0.083 |

Total number of firebrands landed on FCS Z and flux: 2 m x 2m

|  |  |  |
| --- | --- | --- |
|  | Experiment | simulation |
| Firebrand density (pcs/m2) | 536 | 551 |
| Time span (s) | 394 | 394 |
| Total firebrand flux (pcs/m2.s) | 1.361 | 1.398 |

Firebrand collection analysis: Firebrand flux size distribution

* Total 42 types of firebrands (cylindrical, spherical, cubic shapes) according to 6 different size groups were used as inputs. Taken from ‘Investigation of firebrand production Filkov et al 2017’.
* Input firebrand composition
  + Cylindrical: 45%, Cubic: 36%, Spherical: 19%

|  |  |  |  |
| --- | --- | --- | --- |
| FCS Z | | | |
| Size group(x10-5m2) | Firebrand distribution flux (pcs/m2.s) | | Error (%) |
|  | Experiment | Simulation |
| 0.75 – 5 | 1.0473 | 1.07557 | 3% |
| 5 - 10 | 0.1873 | 0.191392 | 2% |
| 10 – 20 | 0.0856 | 0.086329 | 1% |
| 20 – 30 | 0.0236 | 0.033418 | 42% |
| 30 – 50 | 0.0118 | 0.013165 | 12% |
| >50 | 0.0059 | 0 | -100% |

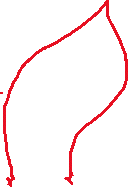
|  |  |  |  |
| --- | --- | --- | --- |
| FCS Z | | | |
| Size group(x10-5m2) | Firebrand distribution number (pcs/m2) | | Error (%) |
|  | Experiment | Simulation |
| 0.75 – 5 | 413 | 424 | 3% |
| 5 - 10 | 74 | 75 | 2% |
| 10 – 20 | 34 | 34 | 1% |
| 20 – 30 | 9 | 13 | 42% |
| 30 – 50 | 5.18 | 4.65 | 12% |
| >50 | 2 | 0 | -100% |
| Total | 536 | 552 |  |

|  |
| --- |
|  |

|  |  |  |
| --- | --- | --- |
| Case | Input number vs intensity (pcs/MJ.m) | Firebrand flux (pcs/m2.s) |
| Experiment | NA | 1.361 |
| Simulation1 | 392 | 1.401 |
| Simulation 2 | 455 | 1.733 |
| Simulation 3 (1m grid) | 392 | 1.632 |

Average heat release rate =2401 MW (27 s to 140 s)





Fire intensity and input number of firebrands



Fireline length =130 m



Fire line depth = 2 m



Fireline intensity =18.46 MW/m



Firebrands input volume = 2m x 130 m x 9 m = 2340 m3

Input number of firebrands = 7223 pcs/s

Input number vs HRR =

=

Wind profile

Canopy height = 18 m

Understory= 1m

