

Operational conditions of aerial forest firefighting: efficiency and effectiveness

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ABSTRACT – The present work is a segment of a larger project named PROMETEU and aims to contribute to study the effectiveness and efficiency of aerial firefighting in the *Cerrado* Biome (Brazil). The study area was the Federal District (Brazil) and data collect was performed by the probe SAPHIRA 3v.3, coupled in a airtanker (water bomber) aircraft (Airtractor AT-802F, with 3000 liters of water capacity). Data were collected every 2 seconds, comprising information on geographical coordinates, speeds, altitudes and various kinematic data. The accuracy of the passes over the fire lines was assessed by orthogonal photographs taken by a RGB camera and the water release point was determined by the altitude and barometric oscillations. Another set of data came from Landsat 8 satellite images (end of the dry season), in which the fire scars of forest fire were identified. The distances between the scar borders and the water launching point were used to classify the operation in efficiency classes: high if below 100m, moderate if between 100 and 300m and low if above 300m. Air combat effectiveness was high in 46.4% of cases, moderate in 42.9% and low in 10.7%. The results show the importance of aerial combat and also reveals that the findings must be analyzed in the companion of several factors, including coordination with the team on the ground (local firefighters), vegetation factors (biomass and humidity), meteorological (wind direction and speed) and topographic/topological (relief and obstacles), since these factors interfere with the effectiveness of the operation. The aircraft tracking also showed that 22% of the time was spending in taxiing (moving in aerodrome with low speed), a fact associated with the operation based at Brasília International Airport, where there is interference from other segments of aviation (military, civil, general, commercial, executive, etc.). This value compromises the efficiency and effectiveness of the operation, as it increases the operational cost and the response time of the operation. These data are useful to justify the adoption of operational bases at alternative aerodromes, already in use. Acknowledgments: FAPDF (proc 0193.001387 / 2016) and CNPq (proc 442722 / 2018-4).

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