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Interactive comment on "Changing patterns of fire occurrence in proximity to forest edges, roads and rivers between NW Amazonian countries" *by* Dolors Armenteras et al.

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In their article "Changing patterns of fire occurrence in proximity to forest edges, roads and rivers between NW Amazonian countries," Dolors Armenteras and colleagues (2017) contribute to addressing one of the most pressing problems in Amazonian research: understanding the potential role of fire as a threat to Amazonian forest. Fires are becoming ever more frequent and more damaging because of the rapid increase in ignition sources as new roads are opened and human occupation increases, together with increased forest flammability as more forests are disturbed by logging, edge effects and extreme weather events. Climate changes already in course are increasing the frequency of severe droughts from both El Niño (Marengo and Espinosa, 2016) and

the Atlantic dipole (Cox et al., 2008; Evan et al., 2009; Marengo et al., 2008, 2011). Armenteras and colleagues examine the distances of fire locations from forest edges (both for fires inside the forest and for those in cleared areas) and from access routes by road and river. Most important is the question of fire entry into forest. How frequently do fires enter, how far do they spread, and under what conditions?

The study shows a close proximity of fires to forest edges on both sides: on the forest side of the edges and in the adjacent clearings. Fires on the forest side are especially close to the edge. The study's Figure 5 indicates that on the forest side of edges, 60% of fires are within 100 m of an edge and 80% are within 200 m. These distances are well within the error of the method, meaning that many of the fires classed as forest fires near edges could really be fires in the nearby clearings. Likewise, some of the fires classed as being in the clearings could really be in the adjacent forest. That fires enter Amazonian forests is obvious to anyone who has seen these events on the ground, and satellite studies are the key to quantifying the present and potential future reach of these fires. Armenteras and colleagues have provided a first step in this effort, but quantification needs to be improved with a series of next steps. Some of the tools for this are already available.

The study uses MODIS (Moderate Resolution Imaging Spectroradiometer) from NASA (National Aeronautics and Space Administration) to detect active fire. The data was from MODIS active fire data collection 5 downloaded from the Fire Information for Resource Management System (FIRMS). In 2016 NASA replaced this dataset with Collection 6, available since September 2015 with data for imagery beginning in November 2000 (for Terra) and from July 2002 (for Aqua) (NASA, 2017a). The active-fire data from FIRMS has 1 km resolution (NASA, 2017b). The manuscript does not specify which MODIS product was used (including whether it is "near real time" or one of the datasets posted 3 months later with many geopositioning errors corrected). The 1-km resolution of the active-fire data available at the time of the study is a severe limitation. Beginning on 8 January 2016 NASA began releasing improved near real time (NRT) data with 375 m resolution (VII-RS) (NASA, 2017c).

All of these datasets report the presence of absence of at least one active fire within each pixel. The location of the fire is given as the center of the pixel. With a 1 km $\times$ 1 km pixel, the actual location of the fire (or fires) could be anywhere within 500 m of this center point, plus any additional uncertainty from geopositioning errors. These locational uncertainties, together with the reduced detectability of understory fires as compared to those burning in open areas, have been the main impediments to quantifying the overall reach of fire in standing Amazonian forest (Vasconcelos et al., 2013). These factors imply considerable uncertainty in the quantification of fire distances from edges and access routes, but this uncertainty does not affect the overall conclusion that most fires are very close to these features.

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