

Violence by Fire in East Timor, September 8, 1999

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The Research Location

East Timor is located in Southeast Asia, on the southernmost edge of the Indonesian archipelago, northwest of Australia. The country includes the eastern half of Timor island as well as the Oecussi/Oecusse (Ambeno) enclave in the northwest portion of Indonesian West Timor, and the islands of Atauro and Jaco (Figure 1). The mixed Malay and Pacific Islander culture of the Timorese people reflects the geography of the country on the border of those two cultural areas. The total area of the country is 15,007 km² and is primarily mountainous terrain. The climate is tropical: hot and semi-arid with a rainy and dry season. The capital city is Dili. The satellite image used for this research did not cover the entire country of East Timor (Figure 2), nor was it possible to obtain full coverage. The image was chosen because of the date it was acquired, September 8, 1999, which marked an important period in the violent post-referendum transition from Indonesian rule to East Timorese independence. What further contributes to the uniqueness of the image is that there was on that day very little cloud-cover over the study area, and it happens to contain the capital city of Dili, which experienced massive destruction during the first two weeks of September 1999.

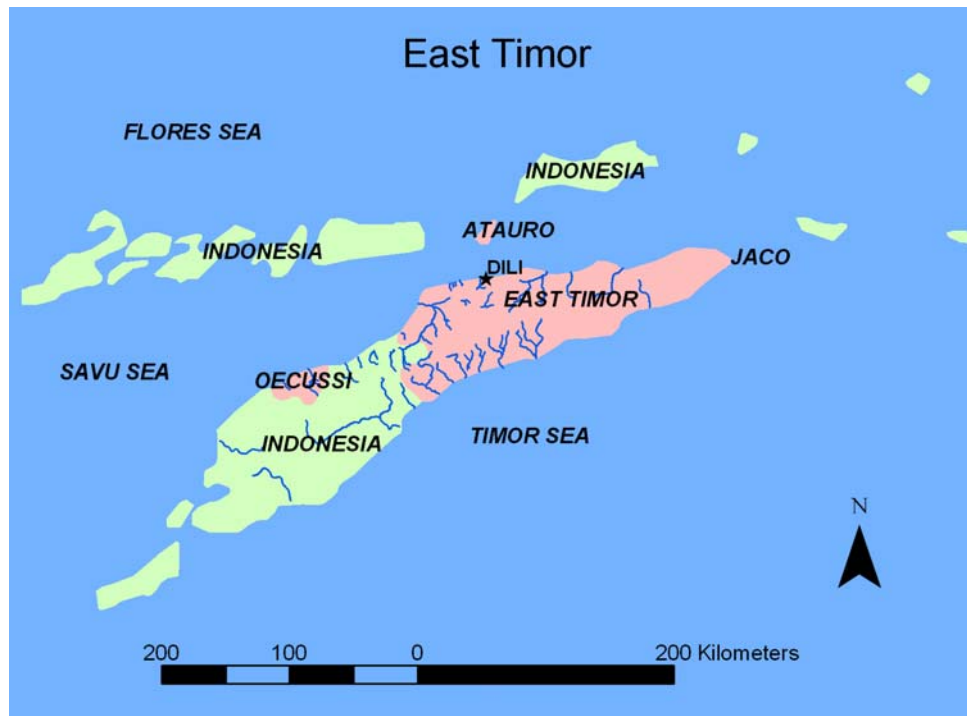


Figure 1.

The Satellite Image*

Coordinate System & Projection:

WRS	Path 110	Row 66
UTM Zone	51N	WGS 1984

Satellite Images:

Landsat ETM+ Acquisition Date: September 8, 1999

The spatial resolution for ETM+ images is 30 m and, when applying the panchromatic band, the spatial resolution can be reduced to 15 m for viewing purposes only.

*For more information about GIS (Geographical Information Systems), Remote Sensing, and Satellite Images, see “An Introduction to Remote Sensing & GIS,” http://www.yale.edu/gsp/gis_files/remote_sensing_intro.pdf.

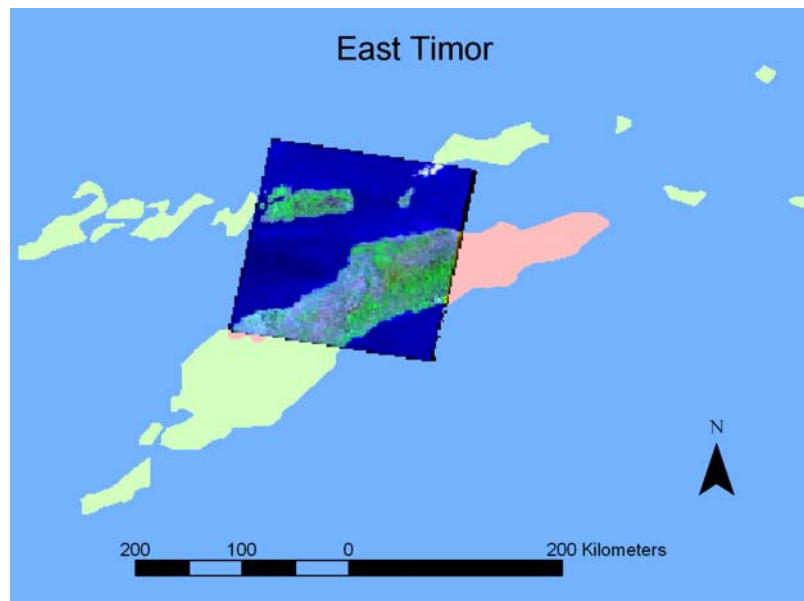


Figure 2.

The Research Questions & Applications

It is rare that an image both temporally and spatially coincides with a place and moment in time under research. In the East Timor case, a Landsat ETM+ image was acquired during the apogee of violence accompanying the independence referendum aftermath. The primary purpose of this research was to assess the extent of destruction by locating in the image fires on the ground; identify these locations using a GIS shape file; and finally, corroborate these findings with eyewitness accounts of locations known to have experienced destruction when the image was acquired, as well as other locations not officially reported. A band 7 threshold-window application was used to isolate this specific reflectance signature. When examining the findings, it is important to note that,

because of the satellite image's 30 m spatial resolution, the specific reflectance signature of a fire or group of fires would have to dominate at least one 30 x 30 m pixel for it to be digitally processed by the computer as containing the specific reflectance signature particular to the fires. That is, smaller fires, or smaller fires of a more scattered grouping, would be less discernible or not at all. (For a brief discussion on GIS, remote sensing technology and satellites, the electromagnetic scale, and a glossary, see the section at the end of this paper.)

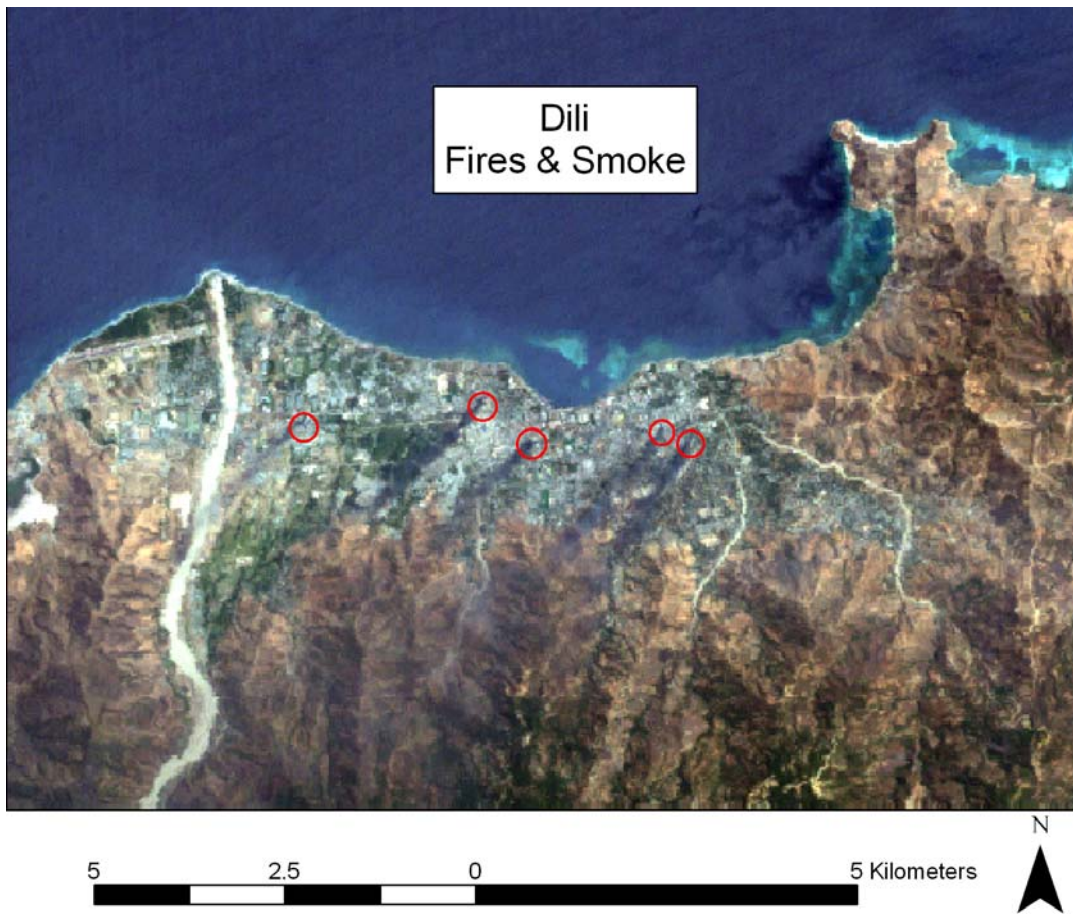


Figure 3.

- A Landsat 1999 ETM+ RGB 321 true color representation of Dili, capital of East Timor, on September 8, 1999, four days after the pro-independence referendum results were announced.
- The red rings identify the focus points of the fires and the black smoke produced by the fires can be seen streaking southwest across the image.

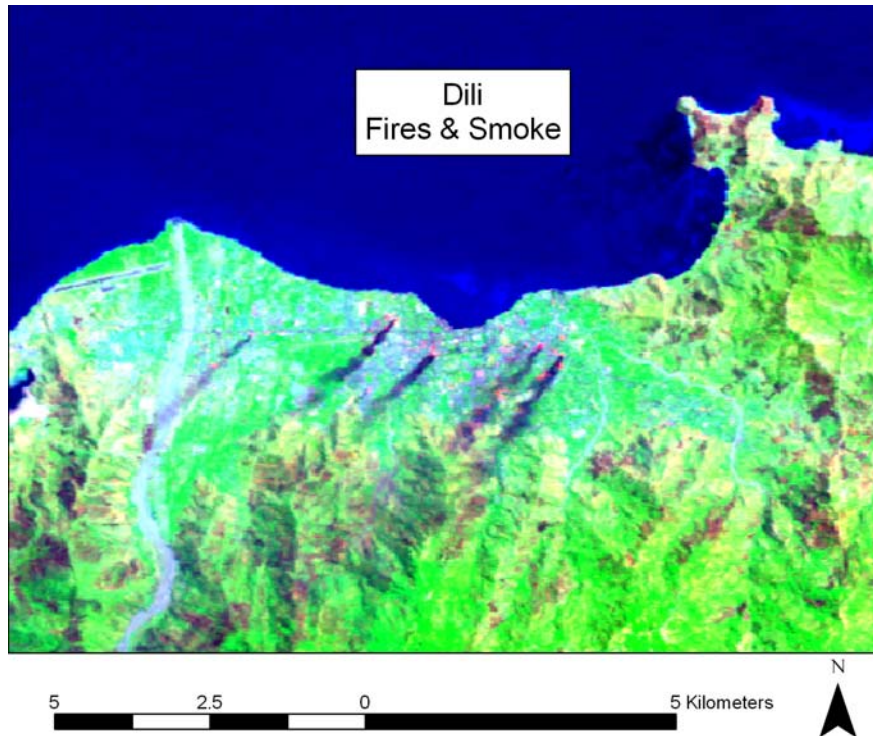


Figure 4.

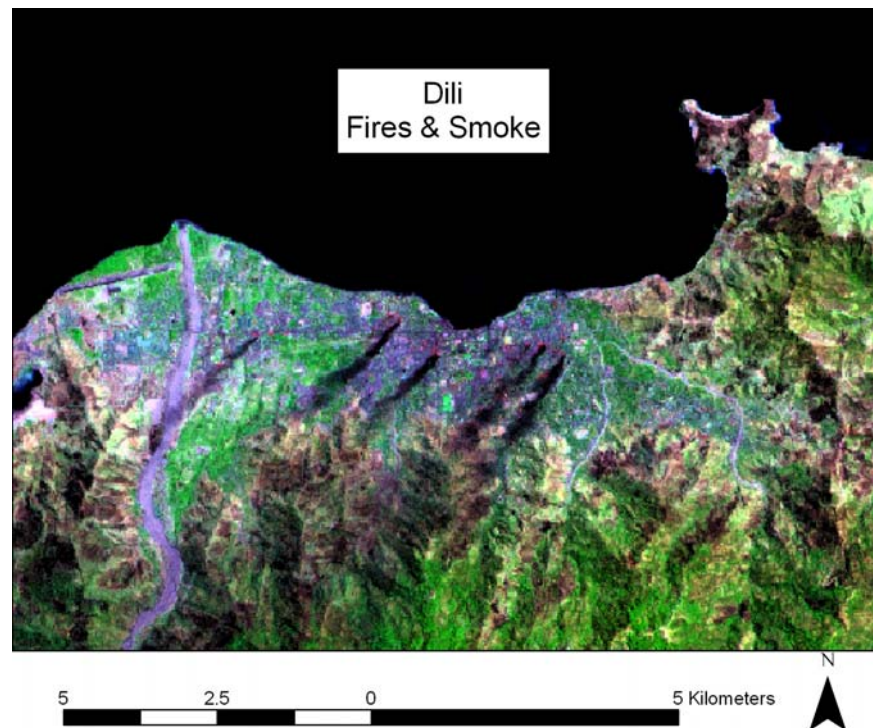


Figure 5.

- A Landsat 1999 ETM+ RGB 741 false color representation of Dili, capital of East Timor, on September 8, 1999, four days after the pro-independence referendum result was announced.
- The light violet colored pixels represent the focus points of the fires and the black smoke produced by the fires can be seen streaking southwest across the image.
- Figure 5 has the 15 m panchromatic band applied.

The most intense fires were in the capital city, Dili (Figures 3-5), and were easily recognizable. Based on the band 7 reflective values of these fires, a threshold-window based on the arbitrary digital number (DN) pixel values and intended to isolate the fire's specific reflective intensity (based on real reflectance intensity levels) was created. This band 7 threshold-window was processed into a single band image (Figure 6). Clouds primarily represented the only other anomalies, which the band 7 threshold-window positively identified in the image. However, on the RGB 321 real color visual application, these clouds were easily identified and not included in the results. Furthermore, by constructing an RGB 741 false color application, a second control was established. In this RGB 741 application, the intersection of the band 7 applied threshold (red) with band 1 (blue) resulted in a positive identification for fires (light violet) and these results were compared on a pixel-by-pixel level with the single band 7 threshold-window application results (Figures 6 and 7). Band 4 accentuated primarily vegetated areas. It was expected that there would be some brush fires, etc. in other locations on the image, unrelated to the genocide activities. This was especially important to serve as a control for the findings. A number of likely unrelated fires were identified on the Indonesian island of Alor (Figure 8).

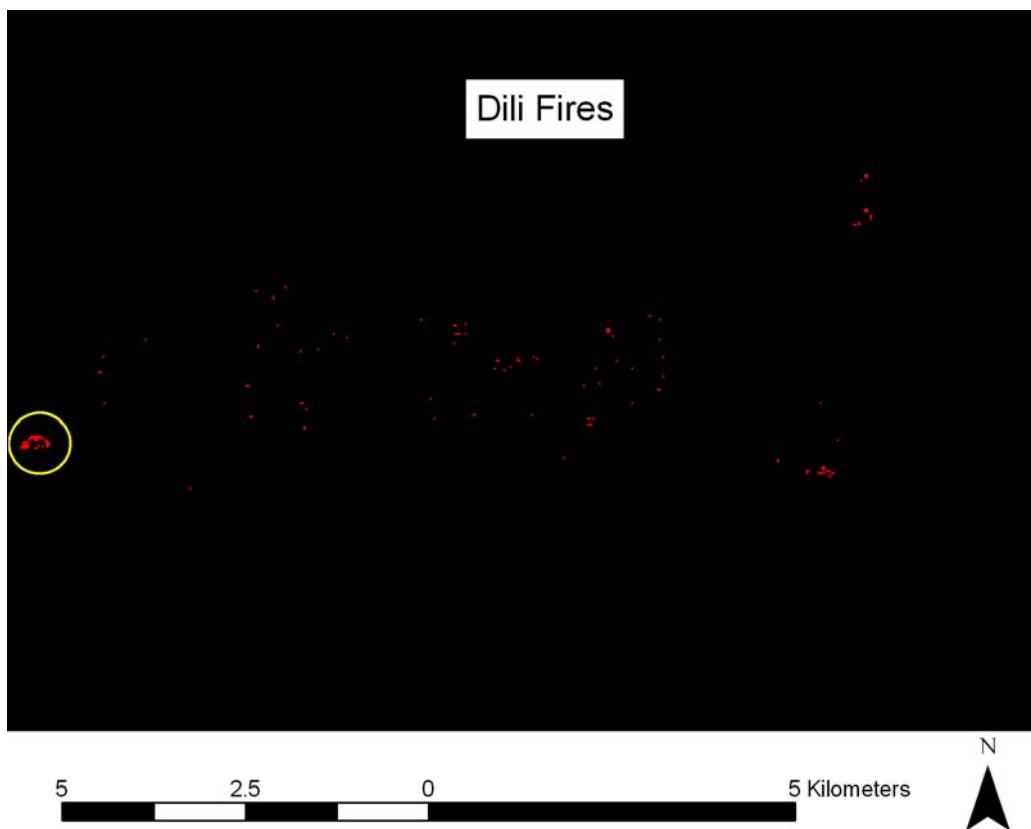


Figure 6.

- A Landsat 1999 ETM+ band 7 threshold-window false color representation of Dili, capital of East Timor, on September 8, 1999, four days after the pro-independence referendum result was announced.
- The red pixels identify locations of positively identified fire focus points based on the band 7 threshold-window.
- The yellow ring identifies a false-positive anomaly that is not a fire.

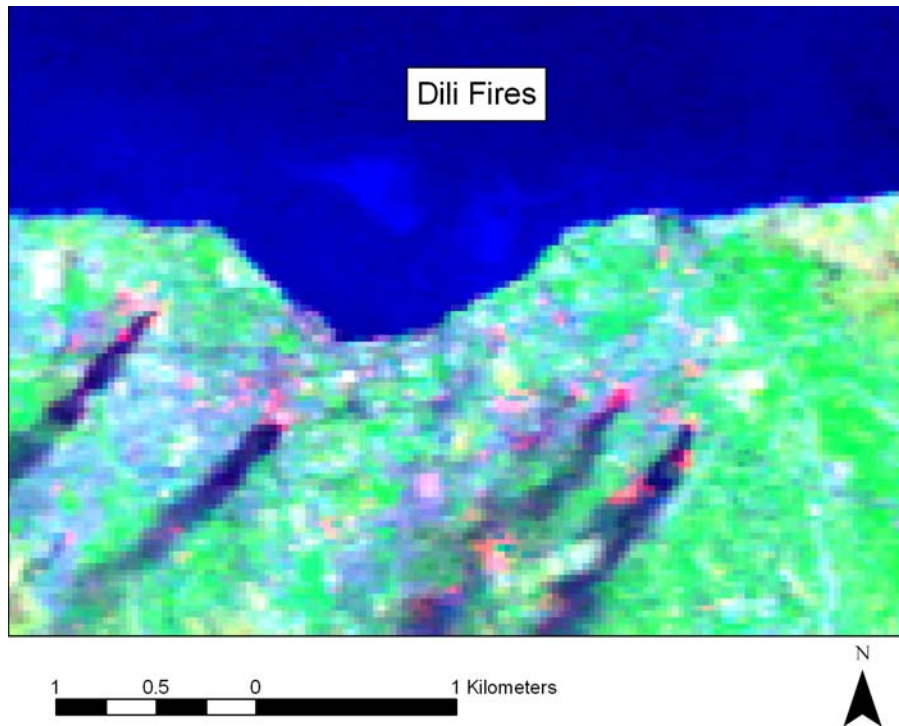


Figure 7.

- A Landsat 1999 ETM+ RGB 741 false color representation of Dili, capital of East Timor, on September 8, 1999, four days after the pro-independence referendum result was announced.
- The light violet colored pixels represent the focus points of the fires and the black smoke produced by the fires can be seen streaking southwest across the image.

Because of how the remote sensing ERMMapper software evaluates and assigns arbitrary DN pixel values for each band based on the most dominant reflective values contained in an individual pixel for that band, the results do not reflect the actual number of fires. Ultimately, the primary goal was to assess, by location, areas with the highest concentration of fires, as well as the overall frequency and concentration of fires and how they related to national and regional boundaries, and known villages, towns, and cities. Therefore, this data *should not* be used as a mechanism to count a number of fires based on number of pixels containing the fire signature. The data does, however, prove that there are correlations and patterns based on numbers of positively-identified fires and concentrations of fires by location with eyewitness reports. Furthermore, the data locates, within the boundaries of the satellite image, other areas that were probably subjected to similar types of destruction, although not officially reported.

The Findings

Some of the largest concentrations and, indisputably, intense fires on September 8, 1999, were in Dili (Figures 3-10). On September 11, 1999, a United Nations Security Council delegation visited East Timor, where they reported evidence of mass atrocities, looting, and wanton destruction. The East Timorese capital had been burned, looted, and ransacked. There was no sign of normal life. The streets were almost completely deserted but for some stray pigs and dogs. Entire neighborhoods had been reduced to

ashes—whole rows of houses burned down.¹ During the previous days, eyewitness reports claimed that pro-Indonesian/anti-independence militants had set houses alight with hoses spraying gasoline—not with petrol cans. Eye witnesses claimed that buildings were burning and it was not only difficult to see, but also impossible to breathe.² Over 120,000 people had become refugees; and according to the army's own statistics at the time, only 27 militiamen had been arrested by a total of 15,000 Indonesian soldiers.³



The sight that met the UN team as they flew into Dili September 11, 1999.⁴

Figure 8.



Burning building in Dili September 10, 1999.⁵

Figure 9.

¹ Frei, Matt. "Dili: Back to year zero." BBC, World: Asia-Pacific, Saturday, September 11, 1999, Published at 22:06 GMT 23:06 UK.

² Frei, Matt. "Eyewitnesses speak of Timor devastation." BBC, World: Asia-Pacific, Friday, September 10, 1999, Published at 16:06 GMT 17:06 UK.

³ Frei, Matt. "Dili: Back to year zero."

⁴ Ibid.

⁵ Frei, Matt. "Eyewitnesses speak of Timor devastation."

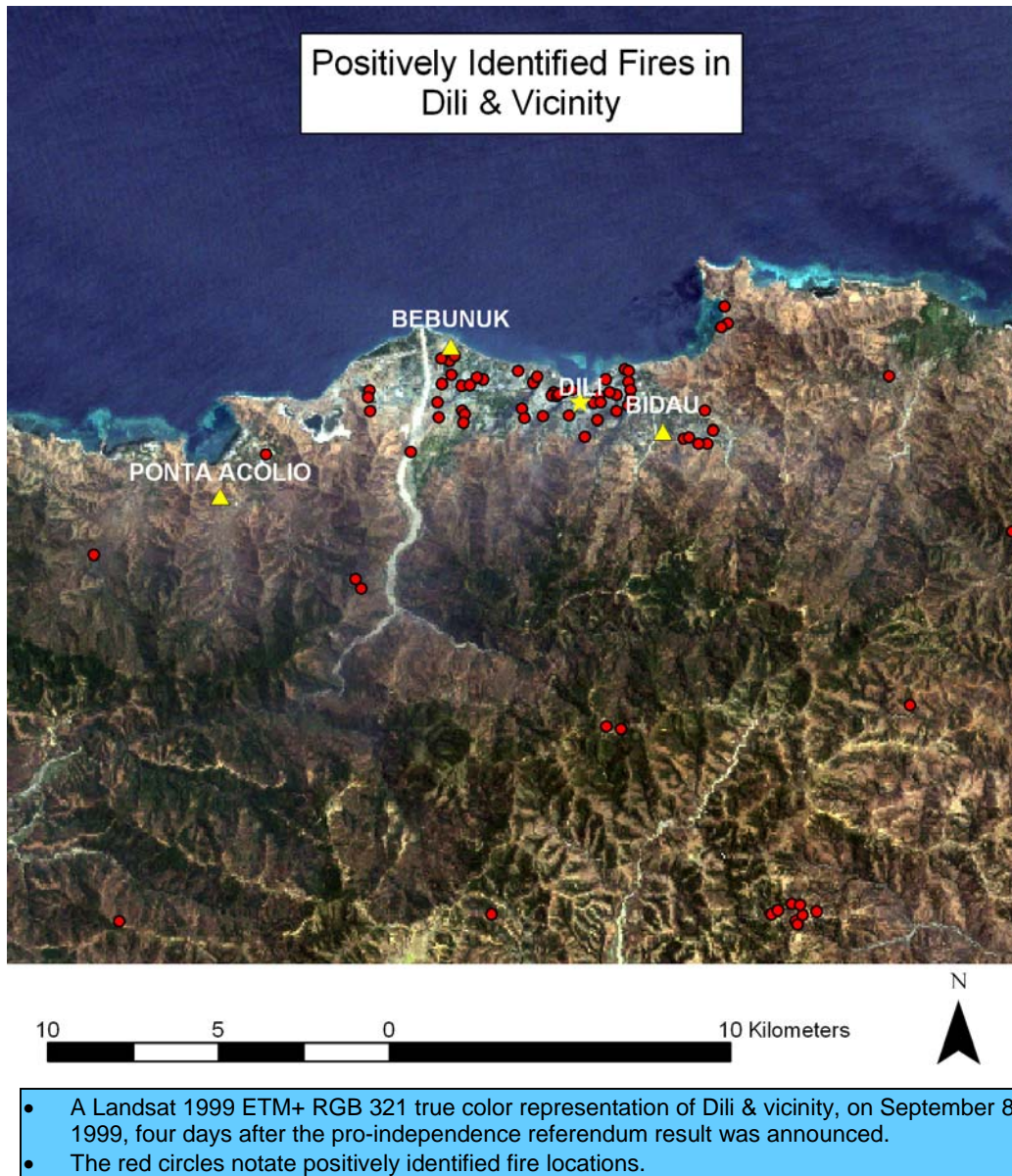


Figure 10.

Beyond Dili

Communicating to Portuguese radio from somewhere in the Timorese jungle, a pro-Independence leader, Commander Taur Matan Ruak from Falintil (the East Timor National Liberation Armed Forces), said both the Indonesian military and refugees were on the move in the province—many fleeing into the mountains. Pro-Indonesian militia leader Herminio da Costa acknowledged the extent of the destruction. He told Portuguese radio that he had the right to burn what belonged to him, particularly in light of the sweeping vote for independence, which had angered the militias.⁶ Across East Timor, few buildings had escaped without at least some form of damage and many had

⁶ Frei, Matt. "Eyewitnesses speak of Timor devastation."

been reduced to little more than a pile of smoldering ashes (Figures 11-13).⁷ Both these research findings and eyewitness accounts illustrate how extensive the destruction was within the boundaries of the satellite image (Figure 14). Even more disturbing is the fact that all of these fires were burning contemporaneously, since the satellite image represents a single moment in time.



Scorched earth: Piles of ashes are all that remain of many homes September 27, 1999 (location unknown).⁸



Scenes of burning houses during aftermath of September 8, 1999 (locations unknown).⁹

Figures 12 & 13.

⁷ Frei, Matt. "Timor refugees return to shattered land." BBC, World: Asia-Pacific, Monday, September 27, 1999, Published at 14:20 GMT 15:20 UK.

⁸ Ibid.

⁹ Frei, Matt. "Timor militias face atrocities probe." BBC, World: Asia-Pacific, Tuesday, September 28, 1999, Published at 11:10 GMT 12:10 UK.

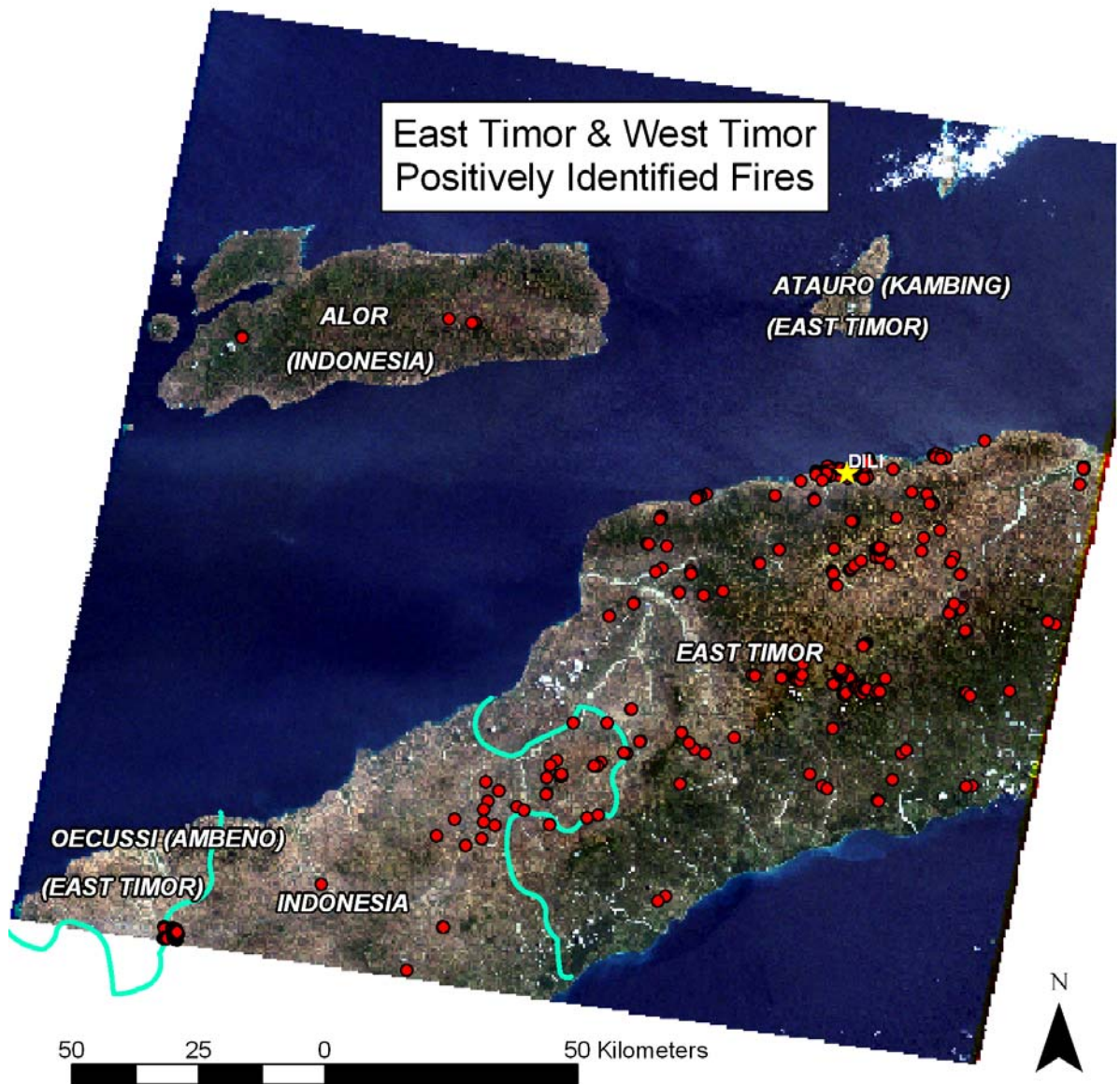


Figure 14.

- A Landsat 1999 ETM+ RGB 321 true color representation of the full satellite image, on September 8, 1999, four days after the pro-independence referendum result was announced.
- The red circles identify positively identified fire locations.
- The turquoise lines demarcate the international border between East Timor and Indonesia.

The following eyewitness accounts are corroborated by images, which mark positively identified fires at the locations named in these accounts: Along the coast 20 miles west of the capital, Dili, in the town of Liquica (Figure 15), Australian peacekeepers found more than 20 bodies in the town, following a tip-off from some local residents.¹⁰ In 2002, Human Rights Watch reported that seven men, including three senior officials, were charged with genocide and crimes against humanity for a massacre

¹⁰ Frei, Matt. "Mass grave unearthed in Timor." BBC, World: Asia-Pacific, Tuesday, October 19, 1999, Published at 21:29 GMT 22:29 UK.

in a church in Suai on September 6, 1999, in which at least fifty people were killed (Figure 16). The report stated that the events leading to the Suai massacre began on September 4, the day the results of the U.N.-organized referendum were announced. Lakasur, the local pro-Indonesian militia, and Indonesian soldiers attacked a neighborhood in Suai that led hundreds to seek refuge in Our Lady of Fatima church in Suai. On the evening of September 5, the military and militia began burning houses and government buildings in the town.¹¹



Figure 15.

- A Landsat 1999 ETM+ RGB 321 true color representation of Liquica & vicinity, on September 8, 1999, four days after the pro-independence referendum result was announced.
- The red circles identify positively identified fire locations.

¹¹ Human Rights Watch, February 21, 2002, New York. <http://hrw.org/>

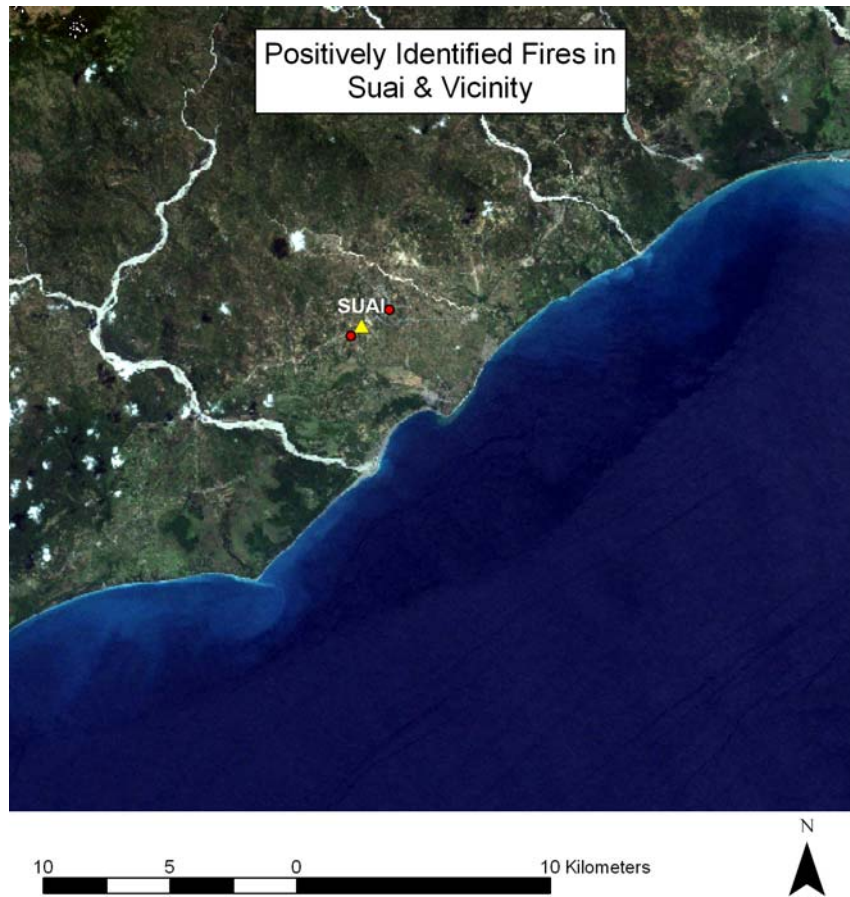


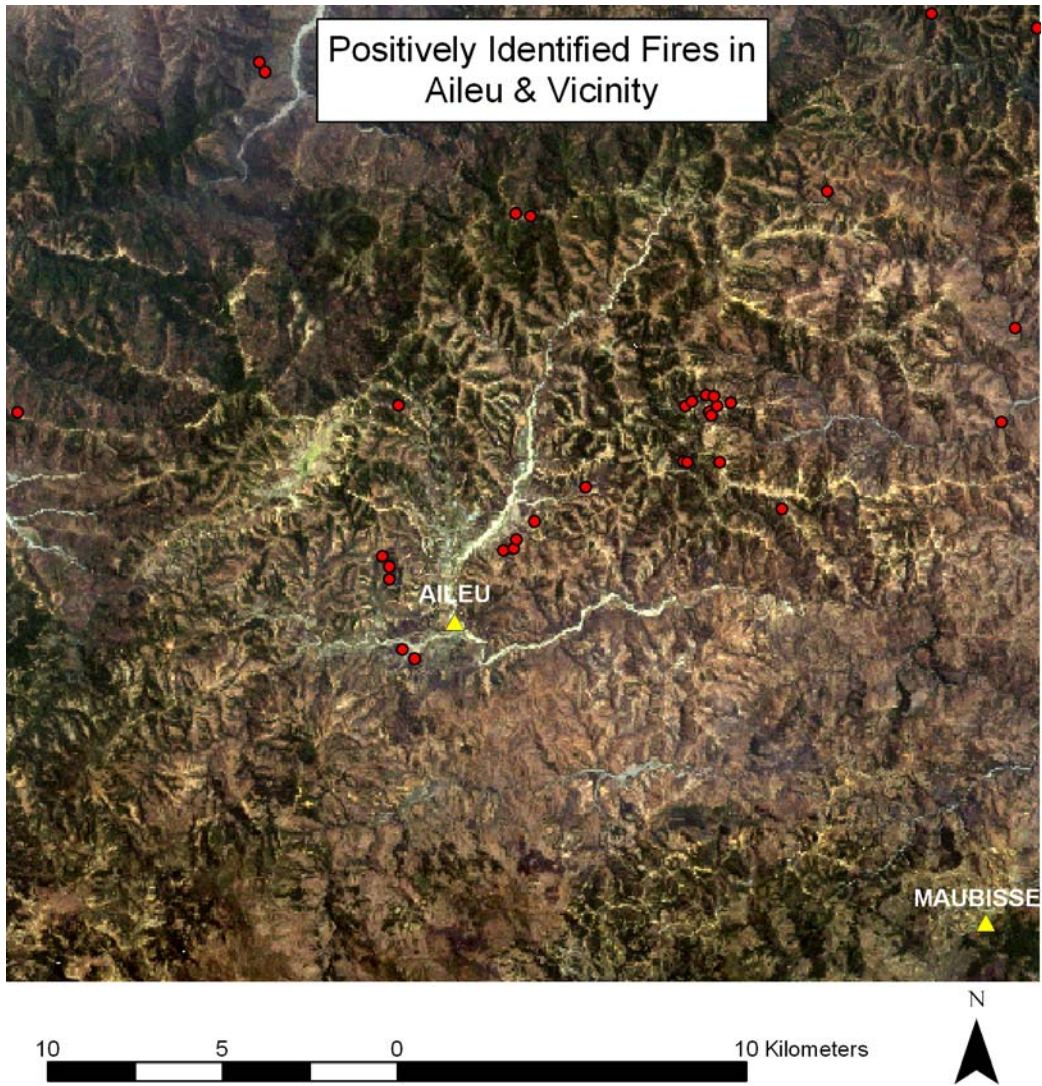
Figure 16.

- A Landsat 1999 ETM+ RGB 321 true color representation of Suai & vicinity, on September 8, 1999, four days after the pro-independence referendum result was announced.
- The red circles identify positively identified fire locations.

On October 6, 1999, the Human Rights Watch and Amnesty International issued a statement at the United Nations General Assembly. They reported that in the town of Aileu, only the church and police station were left standing, and the population of 17,000 was gone (Figure 17). Other towns, like Balibo and Maliana (Figure 18), were reported to have been 70 percent destroyed and equally deserted.¹² Inland, five miles from the border with West Timor, near the town of Maliana, UN soldiers found piles of clothing beside a lake and a police station where it is thought at least 40 people had been killed.¹³

¹² Statement of Human Rights Watch and Amnesty International at the 54th Session of the United Nations--General Assembly. Special Political and Decolonization Committee/ Fourth Committee. Agenda item No. 96 - on the Question of East Timor. New York, October 6, 1999.

¹³ Frei, Matt. "Killings and rapes in Timor enclave." BBC, World: Asia-Pacific, Monday, October 18, 1999, Published at 09:49 GMT 10:49 UK.



- A Landsat 1999 ETM+ RGB 321 true color representation of Aileu & vicinity, on September 8, 1999, four days after the pro-independence referendum result was announced.
- The red circles identify positively identified fire locations.

Figure 17.

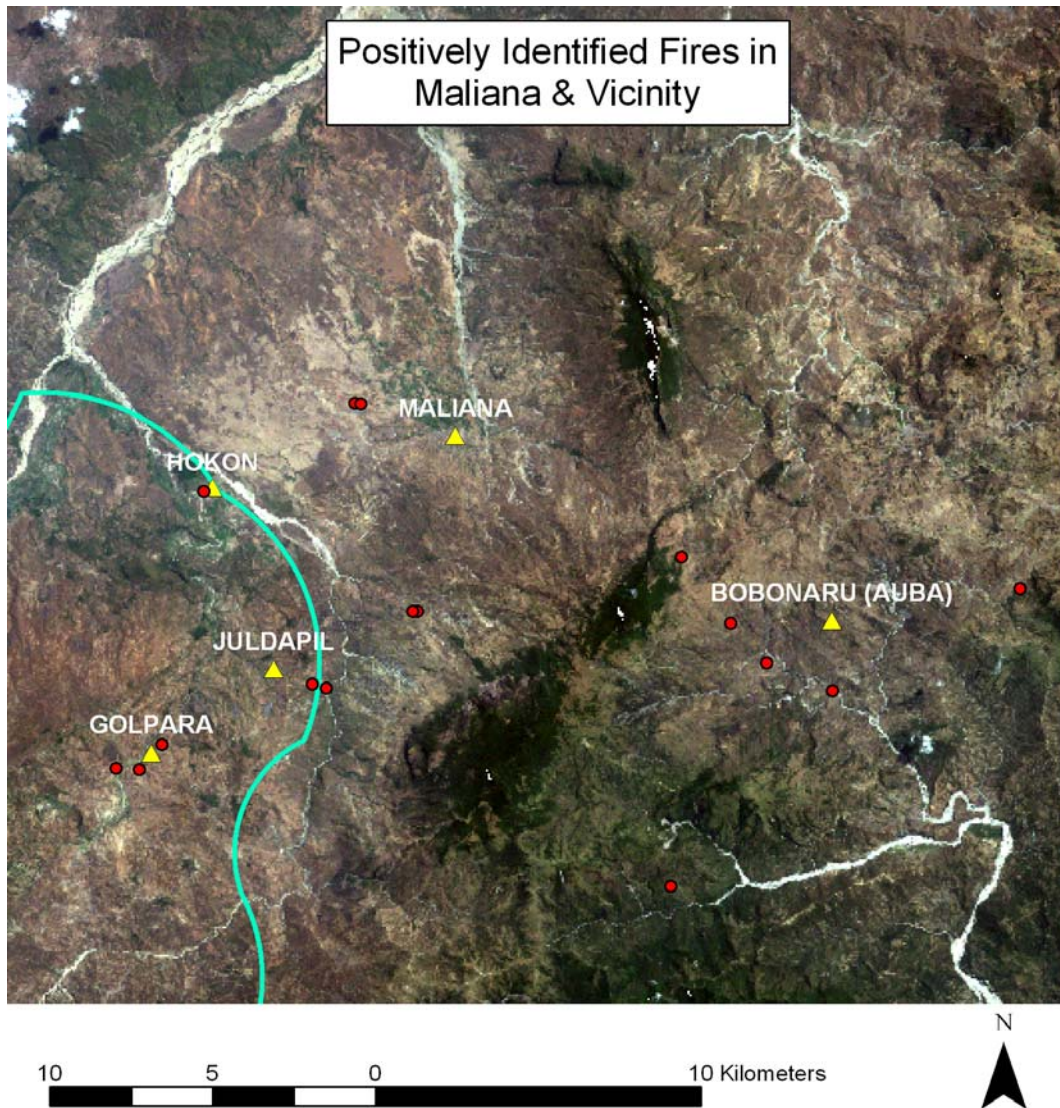


Figure 18.

- A Landsat 1999 ETM+ RGB 321 true color representation of Maliana & vicinity, on September 8, 1999, four days after the pro-independence referendum result was announced.
- The red circles identify positively identified fire locations.
- The turquoise lines demarcate the international border between East Timor and Indonesia.

Tens of thousands of refugees were being held in camps against their will just across the border in West Timor. Reports say as many as 230,000 refugees had crossed into the western half of the island, some telling aid workers and journalists that retreating Indonesian troops had forced them across the border at gunpoint.¹⁴ The Indonesian government claimed that by August 30 some 150,000 East Timorese had arrived in West Timor. Facilities housing the displaced in West Timor were severely overcrowded, with inadequate food, medical supplies, and sanitation facilities. Some 98,000 East Timorese were packed into schools and churches in the districts of Belu and North Central Timor

¹⁴ Frei, Matt. "Timor refugees return to shattered land." BBC, World: Asia-Pacific, Monday, September 27, 1999, Published at 14:20 GMT 15:20 UK.

alone, with most of the rest in camps in and around the city of Kupang (located on the western tip of Indonesian Timor). Moreover, anti-independence militants infiltrated these refugee camps to intimidate the pro-independence refugees and multiple random acts of violence were reported. The following image (Figure 19) demonstrates a high frequency of fires in a concentrated area just west of the East Timor border. Further west of the immediate East Timor/Indonesian international border, the frequency and concentration of positively identified fires decreases noticeably (Figure 14).

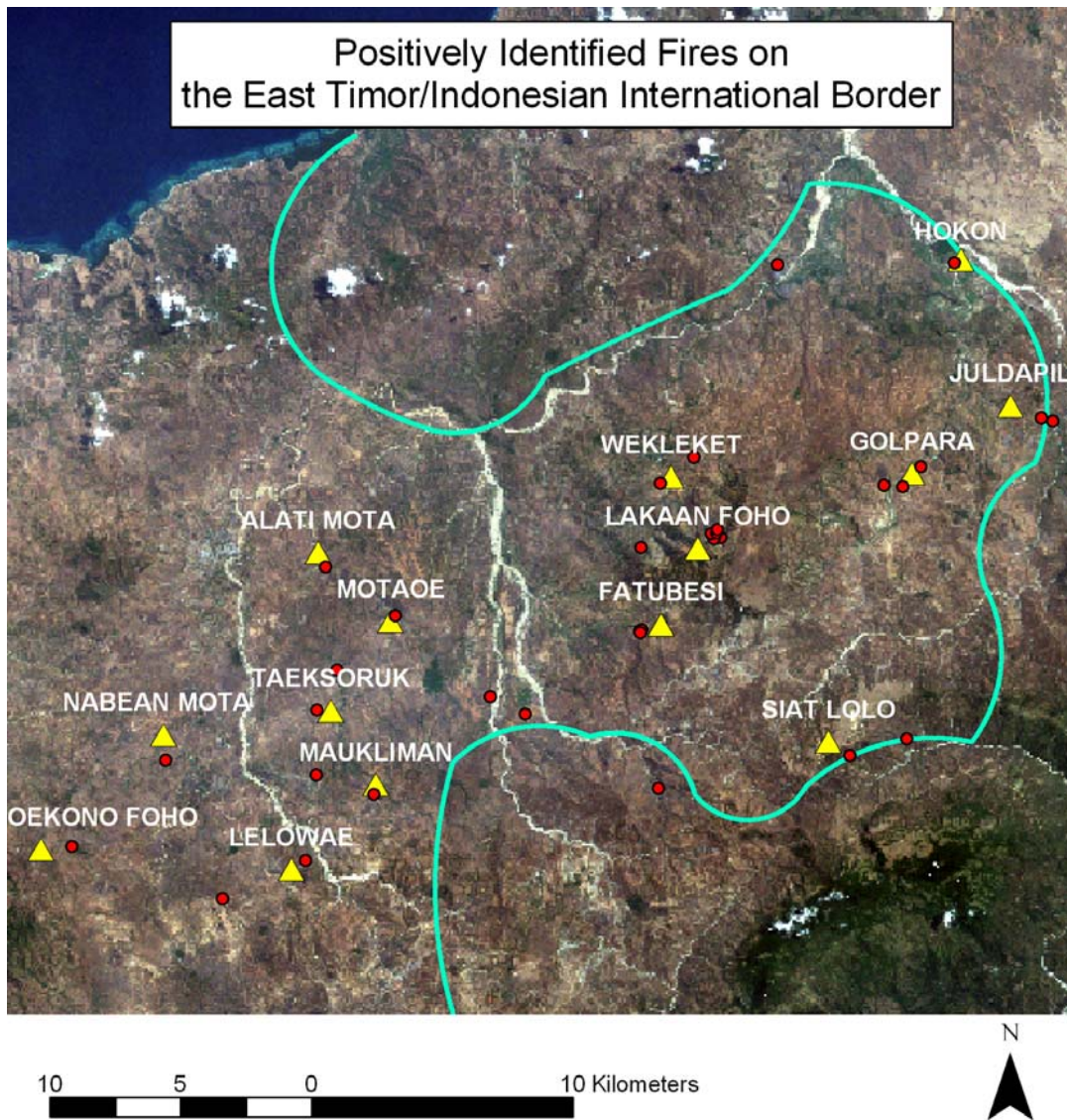


Figure 19.

- A Landsat 1999 ETM+ RGB 321 true color representation of the East Timor/Indonesian international border, on September 8, 1999, four days after the pro-independence referendum result was announced.
- The red circles identify positively identified fire locations.
- The turquoise lines demarcate the international border between East Timor and Indonesia.

Oecussi/Oecusse (Ambeno) is an East Timorese enclave wholly surrounded by West Timor (Figure 20). It is connected to the rest of East Timor only by an 80 km stretch of road. On September 5, according to Human Rights Watch sources, some 15,000 of the displaced from the tiny enclave were in camps in a district along the north coast of West Timor.¹⁵ As the violence continued into September, an East Timor pro-independence leader accused peacekeeping forces of ignoring the plight of the people in Oecusse. Taur Matan Ruak, a commander of East Timor's pro-independence Falintil rebels, claimed that Indonesian troops and their militia allies had killed 50 people and raped many women in the enclave.¹⁶

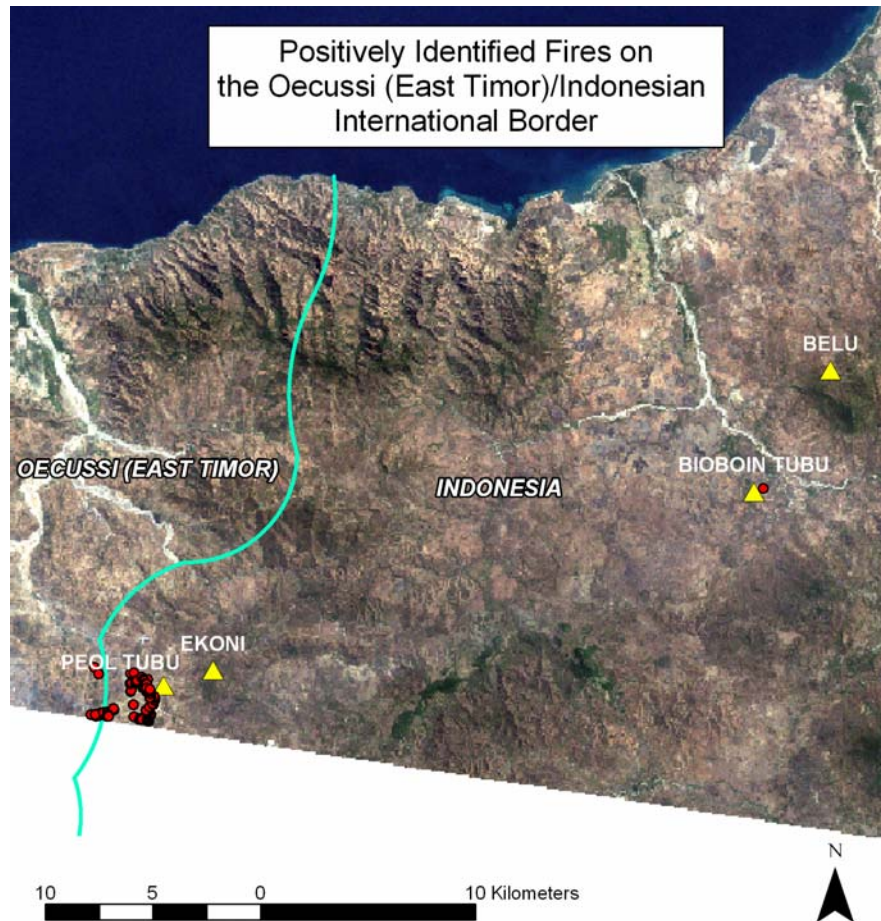


Figure 20.

- A Landsat 1999 ETM+ RGB 321 true color representation of the Oecussi (East Timor)/ Indonesian international border, on September 8, 1999, four days after the pro-independence referendum result was announced.
- The red circles identify positively identified fire locations.
- The turquoise lines demarcate the international border between East Timor and Indonesia.

¹⁵ Statement of Human Rights Watch and Amnesty International at the 54th Session of the United Nations--General Assembly. Special Political and Decolonization Committee/ Fourth Committee. Agenda item No. 96 - on the Question of East Timor. New York, October 6, 1999.

¹⁶ Frei, Matt. "Killings and rapes in Timor enclave."

By October, the army-backed militias declared at least six western districts of East Timor a supposedly pro-integration (i.e. pro-Indonesian) zone: Bobonaro, Covalima, Ermera, Liquica, Ainaro, and Oecusse (Figure 21). These are districts that had a high frequency and concentration of positively identified fires on the September 8th image—Covalima seems to be the least effected on this date.

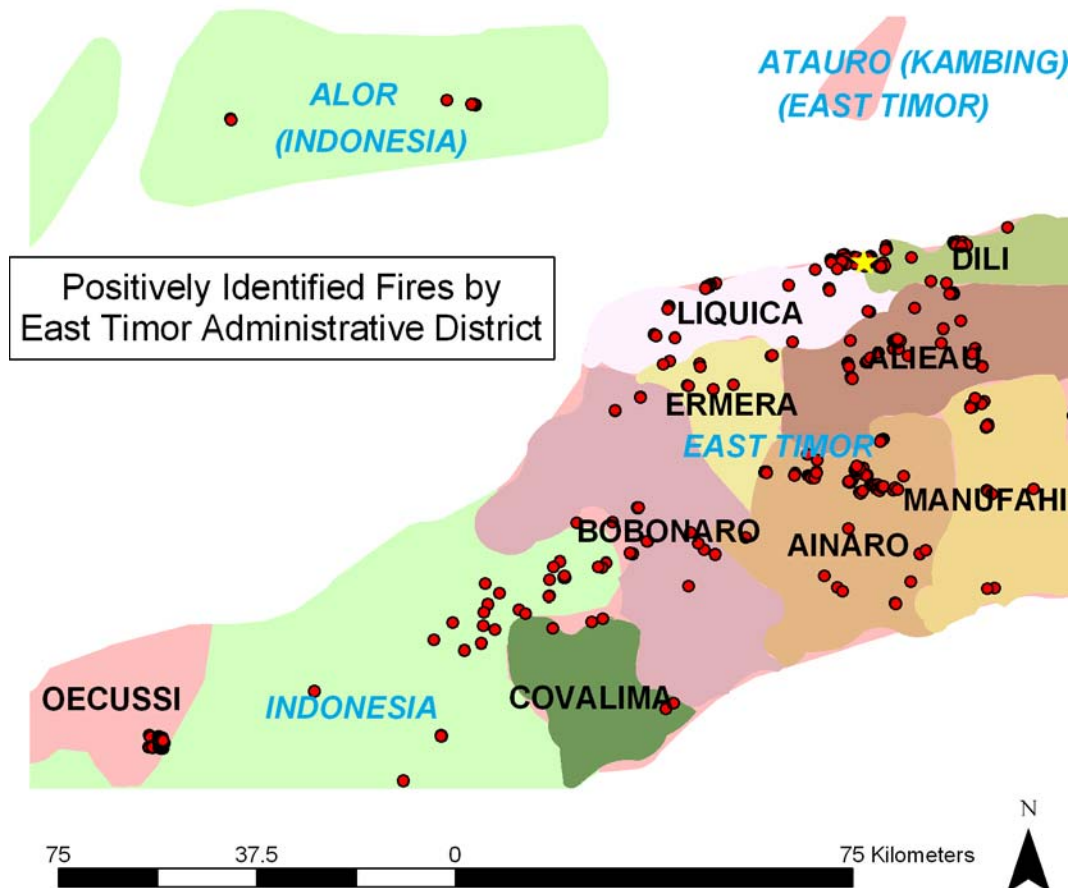


Figure 21.

In conclusion, although this report relies primarily on the ability to positively identify fires during a single moment in time in order to assess the extent of violence and destruction East Timor experienced as a direct result of the Indonesian and pro-Indonesian militias' response to the independence referendum result, the resulting data are quite revealing and supportive of eyewitness reports that document how widespread fire was utilized during the post-referendum violence and terror. Furthermore, an accepted error in the process of positively locating pixels containing the fire signature must be assumed. The report does not claim 100 percent accuracy in these results—either that all fires were located, or that all positively-identified fires designate actual fire locations. However, based on the systematic remote sensing procedure administered to locate these fires, the findings do demonstrate a consistency and symmetry in locating evidence of fires where it would be expected to find the fires, and, for multiple locations, these findings are corroborated by eyewitness reports; and, therefore, should be considered to have a high degree of accuracy.