Introduction

This supporting information section contains a histogram showing the forest loss for 14 years and the size of the respective recovery areas (fig. S1) and a schematic drawing of the recovery analysis (fig. S2). Additionally, a discussion of a time lag found in the analyzed forest change data including a map (Text and fig. S3), as well as a table of the albedo for each year of recovery (tab. S4) and the related radiative forcing (tab. S5) are provided.
Figure S1. Top: Histogram of the forest loss area per year, covering the period 2001-2014. The last bar to the right (‘control’) indicates the area where no loss was detected from 2001-2014. This area was used as ‘control area’ in the study. Bottom: Histogram of the size of areas analyzed per year of recovery.
Figure S2. Schematic drawing of the albedo for the years of recovery after disturbance. The two dotted lines represent areas burned in 2001 and 2002. They follow different patterns after the forest loss detection. The solid grey line and shading display all areas that did not experience forest loss during 2001 – 2014 (i.e. control) and represent the natural, seasonal albedo variation.
Text S3.

According to local researchers and media coverage (e.g. Pravda, 2002) the biggest fires around Yakutsk occurred in 2012 – 2 million hectares and 2002 – 1.5 million hectares. Additionally, 2008 and 2011 were very fire intensive years. Based on this knowledge and according to Oleg A. Tomshin (personal communication, July 5, 2017) the loss peak in 2003 was not explicable. To investigate this further the MODIS active fire data were visualized for comparison with the forest change data (fig. S3). A high spatial correlation is visible. The temporal correlation is low. This is especially apparent in the intense fire years of 2002 and 2011, for which most disturbed areas are detected as forest loss in the years 2003 and 2012.

This time lag indicates that the algorithm of the forest change data does not include all the loss detected in the Landsat and MODIS scenes and some of the loss pixels will be classified as forest loss of the following year, implying various issues for using the forest change data. To find the underlying problem we analyzed the data in more detail. In figure S3 the loss detected by the forest change data of 2002 and 2003 and the MODIS active fire data of 2002 are visualized. The map reveals that in the forest change data most August fires are wrongly classified as 2003 loss. Additionally, some June and July fires are also counted towards 2003 loss. This time lag justifies the peak in 2003, even though the severe fires occurred in 2002. The forest loss in 2003 and 2009 is overestimated and should be lower than in 2002 and 2008. Possible explanations could be issues with the cloud cover or the frequency of overpasses. It is important to state that the active fire data and the forest change data have a very different initial spatial resolution. Nevertheless, clear patterns in the misclassifications of the 2002-2003 fire seasons are visible. Most August and September fires are not categorized correctly. On the other hand, many patches burned in 2011 are correctly categorized, suggesting early forest fires in May, June and July, which were also the topic of a NASA article in 2011 (Allen et al., 2011). The time-lag discovered between the MODIS active fire data and the forest change data causes some uncertainty in using the forest change data in this area and in analyzing the albedo and surface shortwave radiative forcing because the albedo will change from the exact starting date of the fire, not one year later. Therefore, the albedo time-series generated may contain some uncertainties for the year before the loss event detection and the year of the detection itself.
Figure S3. Top: Map of burned areas in 2002 according to the active fire data set. Colors indicate in which month they burned, the shade intensity indicates if they were detected by Hansen’s annual forest loss data in the year 2002 or with a time lag in 2003. The map shows that most of the areas burned in June 2002 are assigned to forest loss of the year.
2002, therefore they are correctly classified. On the other hand, mainly areas that burned in August 2002 are assigned to the loss year 2003 in the forest change data by Hansen et al. (2014). Bottom: Count of active fire pixels (y-axis) of the year 2002 (x-axis) as they were classified in the forest change data (2002, 2003 or Not detected). Confidence estimate (quality of the fire pixel) are shown in red = 0-50% and blue = 51-100%. Most of the August and September fires were either not detected or falsely classified whereas June and July fires were counted towards 2002 fires.
Table S4. Seasonal albedo of disturbed forest areas and difference to the undisturbed control areas for the years 1-13 after forest loss detection. Seasonal values are integrated for three months each (winter (Dec., Jan., Feb.), spring (March, April, May), summer (June, July, Aug.) and fall (Sept., Oct., Nov.)). SD is the standard deviation.

| Year after forest loss | Albedo | Albedo SD | Control | Control SD | Difference | Albedo | Albedo SD | Control | Control SD | Difference |
|------------------------|--------|-----------|---------|------------|------------|--------|-----------|---------|------------|------------|
| Fall                   |        |           |         |            |            |        |           |         |            |            |
| 1                      | 0,238  | 0,118     | 0,218   | 0,025      | -0,020     | 0,436  | 0,032     | 0,423   | 0,013      | -0,014     |
| 2                      | 0,237  | 0,114     | 0,218   | 0,025      | -0,020     | 0,442  | 0,031     | 0,423   | 0,013      | -0,020     |
| 3                      | 0,244  | 0,117     | 0,218   | 0,025      | -0,026     | 0,447  | 0,030     | 0,423   | 0,013      | -0,025     |
| 4                      | 0,245  | 0,115     | 0,218   | 0,025      | -0,027     | 0,450  | 0,032     | 0,423   | 0,013      | -0,027     |
| 5                      | 0,249  | 0,116     | 0,218   | 0,025      | -0,031     | 0,461  | 0,030     | 0,423   | 0,013      | -0,039     |
| 6                      | 0,247  | 0,117     | 0,218   | 0,025      | -0,029     | 0,452  | 0,028     | 0,423   | 0,013      | -0,029     |
| 7                      | 0,250  | 0,119     | 0,218   | 0,025      | -0,032     | 0,457  | 0,033     | 0,423   | 0,013      | -0,034     |
| 8                      | 0,248  | 0,112     | 0,218   | 0,025      | -0,030     | 0,449  | 0,038     | 0,423   | 0,013      | -0,026     |
| 9                      | 0,268  | 0,119     | 0,218   | 0,025      | -0,051     | 0,462  | 0,028     | 0,423   | 0,013      | -0,039     |
| 10                     | 0,268  | 0,124     | 0,218   | 0,025      | -0,051     | 0,460  | 0,036     | 0,423   | 0,013      | -0,038     |
| 11                     | 0,262  | 0,124     | 0,218   | 0,025      | -0,045     | 0,462  | 0,033     | 0,423   | 0,013      | -0,040     |
| 12                     | 0,272  | 0,131     | 0,218   | 0,025      | -0,054     | 0,454  | 0,031     | 0,423   | 0,013      | -0,032     |
| 13                     | 0,310  | 0,144     | 0,218   | 0,025      | -0,093     | 0,459  | 0,043     | 0,423   | 0,013      | -0,037     |
| Seasonal average       | 0,257  | 0,121     | 0,218   | 0,025      | -0,039     | 0,453  | 0,033     | 0,423   | 0,013      | -0,031     |

| Year after forest loss | Albedo | Albedo SD | Control | Control SD | Difference | Albedo | Albedo SD | Control | Control SD | Difference |
|------------------------|--------|-----------|---------|------------|------------|--------|-----------|---------|------------|------------|
| Summer                 |        |           |         |            |            |        |           |         |            |            |
| 1                      | 0,104  | 0,012     | 0,120   | 0,005      | 0,016      | 0,330  | 0,142     | 0,311   | 0,041      | -0,019     |
| 2                      | 0,107  | 0,009     | 0,120   | 0,005      | 0,012      | 0,338  | 0,151     | 0,311   | 0,041      | -0,027     |
| 3                      | 0,114  | 0,006     | 0,120   | 0,005      | 0,006      | 0,346  | 0,156     | 0,311   | 0,041      | -0,035     |
| 4                      | 0,118  | 0,004     | 0,120   | 0,005      | 0,002      | 0,350  | 0,158     | 0,311   | 0,041      | -0,039     |
| 5                      | 0,119  | 0,004     | 0,120   | 0,005      | 0,000      | 0,354  | 0,160     | 0,311   | 0,041      | -0,043     |
| 6                      | 0,121  | 0,005     | 0,120   | 0,005      | -0,001     | 0,354  | 0,161     | 0,311   | 0,041      | -0,043     |
| 7                      | 0,122  | 0,004     | 0,120   | 0,005      | -0,002     | 0,350  | 0,163     | 0,311   | 0,041      | -0,039     |
| 8                      | 0,123  | 0,004     | 0,120   | 0,005      | -0,003     | 0,344  | 0,167     | 0,311   | 0,041      | -0,033     |
| 9                      | 0,124  | 0,003     | 0,120   | 0,005      | -0,004     | 0,350  | 0,170     | 0,311   | 0,041      | -0,039     |
| 10                     | 0,125  | 0,003     | 0,120   | 0,005      | -0,005     | 0,352  | 0,171     | 0,311   | 0,041      | -0,041     |
| 11                     | 0,125  | 0,003     | 0,120   | 0,005      | -0,006     | 0,351  | 0,171     | 0,311   | 0,041      | -0,040     |
| 12                     | 0,125  | 0,003     | 0,120   | 0,005      | -0,006     | 0,326  | 0,171     | 0,311   | 0,041      | -0,015     |
| 13                     | 0,126  | 0,002     | 0,120   | 0,005      | -0,006     | 0,326  | 0,196     | 0,311   | 0,041      | -0,015     |
| Seasonal average       | 0,119  | 0,005     | 0,120   | 0,005      | 0,000      | 0,344  | 0,164     | 0,311   | 0,041      | -0,033     |
Table S5. Seasonal radiative forcing (W/m²) by forest disturbance in comparison to undisturbed control areas for the years 1-13 after forest loss detection. Seasonal values are integrated for three months each (winter (Dec., Jan., Feb.), spring (March, April, May), summer (June, July, Aug.) and fall (Sept., Oct., Nov.)). The standard deviation is listed in brackets.

| Year after forest loss | Spring       | Summer       | Fall         | Winter        | Weighted average |
|------------------------|--------------|--------------|--------------|---------------|------------------|
| 1                      | -4.449 (0.142) | 5.441 (0.012) | -5.060 (0.117) | -3.738 (0.032) | -1.935           |
| 2                      | -6.581 (0.151) | 4.310 (0.008) | -4.936 (0.113) | -4.670 (0.031) | -2.956           |
| 3                      | -8.439 (0.156) | 1.934 (0.006) | -6.667 (0.117) | -5.441 (0.030) | -4.644           |
| 4                      | -9.309 (0.157) | 0.716 (0.004) | -6.861 (0.115) | -5.868 (0.032) | -5.324           |
| 5                      | -10.396 (0.160) | 0.050 (0.004) | -7.855 (0.116) | -7.678 (0.030) | -6.460           |
| 6                      | -10.408 (0.161) | 0.344 (0.005) | -7.297 (0.117) | -6.208 (0.028) | -6.060           |
| 7                      | -9.442 (0.163) | -0.725 (0.004) | -8.134 (0.119) | -6.931 (0.033) | -6.300           |
| 8                      | -7.831 (0.167) | -1.086 (0.004) | -7.582 (0.112) | -5.718 (0.038) | -5.548           |
| 9                      | -9.437 (0.170) | -1.381 (0.003) | -12.831 (0.119) | -7.744 (0.028) | -7.835           |
| 10                     | -9.874 (0.171) | -1.762 (0.003) | -12.787 (0.124) | -7.517 (0.037) | -7.974           |
| 11                     | -9.665 (0.171) | -1.946 (0.003) | -11.281 (0.124) | -7.843 (0.033) | -7.673           |
| 12                     | -3.634 (0.171) | -1.932 (0.003) | -13.638 (0.131) | -6.566 (0.031) | -6.422           |
| 13                     | -3.512 (0.196) | -2.167 (0.002) | -23.322 (0.144) | -7.373 (0.044) | -9.063           |

Total over 13 years: -102.977 1.108 -128.249 -83.295

Annual average over 13 years: -7.921 0.085 -9.865 -6.407 -6.015