HOTSPOT TEMPERATURE ESTIMATION BASED ON HIMAWARI-8 USING MODIS

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Abstract

Himawari-8 data are used by BMKG for operational purposes. Himawari-8 channel IR-4 can be used to monitor the temperature of the heat source. Himawari-8 satellite image data channel IR-4 used satellite data dated August 12 to 15, 2015 at 06 UTC. MODIS data is used as reference in the form of coordinates of hot spots on August 12 to 14, 2015 at 06 UTC. On the coordinates of the point value of temperature observed by Himawari-8 satellite imagery used a SATAID applications. Analysis of the results obtained limit temperature values (threshold) that considered hot spots on Himawari-8 satellite images is 35°C. This value is obtained after the temperature observed on the Himawari-8 satellite image coordinates of hot spots obtained from MODIS sensing began on 12 – 14 August, 2015, then the temperature values obtained were made on average. The threshold tested on IR4 Himawari-8 satellite image dated August 15, 2015 as a point coordinates of hot spots based sensing by satellite Himawari-8

Keywords: himawari-8, hotspot, satellite threshold, SATAID

Introduction

Forest fire is one of biggest problems that affect the balance of nature which cause the detriment in the terms of economy and politic. In the term of economy, it probably causes massive losses and devastation of forest natural resources and also interference on the balance of forest ecology. In the term of politic, forest fire may ruins relationship between neighbored countries due to the haze. The haze that appeared will disrupt the traffic and also polluting the air. Therefore, in order to anticipate those problems, an effort to monitor the hotspots is needed, especially by utilizing remote sensing technology (inderaja). The utilization of remote sensing technology (inderaja) is expected to be able to provide accurate information, to cover large area relatively fast (Binery, 2013)

As a state institution which is obliged to provide weather information and weather service to the people, Indonesian Meteorological, Climatological and Geophysical Agency (BMKG) also provide spreading hotspots data. The data can be obtained from satellite image of Terra and Aqua that are equipped with MODIS censor. BMKG have several ground receiver satellites namely MODIS, NOAA, Himawari-8 and FY2C. Those ground receiver satellites of BMKG are deployed at 31 points across Indonesia (Hartoyo, 2007)

Hotspot detection by MODIS data can be done by using channels that have wavelength of 11 um and 4 um. This censors can’t penetrate clouds, smoke and aerosol. It would be so detrimental if conflagration occurred because the area would be covered by smoke. This accident usually occur during wildfires, hence amount of detected hotspots probably fewer than actual number (Binery, 2013). In addition, the utilization of Himawari-8 is expected to be able to monitor the spread of hotspots, and the satellite data will be regularly received every 10 minutes by BMKG in Jakarta.
Materials and Methods

This paper has two kinds of data namely satellite image data of Himawari-8 Channel IR-4 and hotspot coordinate data from MODIS image. Both of data are obtained from BMKG, particularly Subdivision of Management of Satellite Data. The used data of Himawari-8 satellite image is dated on 12th until 15th of August 2015 and also MODIS hotspot coordinate data which is chosen with level of confidence above 80%.

The method is processing data of Himawari-8 satellite image IR-4 use SATAID. The processing data of SATAID uses temperature data obtained from MODIS with level of confidence above 80%, then analyze the temperature value on Himawari-8 satellite image.

Moreover, we can also use statistic method by counting average values which are obtained from analyzing temperature values on Himawari-8 on 12th -14th of August 2015, in accordance with the MODIS hotspot coordinate. Then, hotspot map processing method is based on Himawari-8 image, to use the application of GRADS.

Results and Discussion

Hotspot coordinates of MODIS on 12th of August 2015 06 UTC, there are 17 points with level of confidence above 80% shown in Figure 1. The hotspot coordinate to be used to analyze the temperature values on Himawari-8 satellite image on August 12th 2015 shown in Figure 2.

![Figure 1. MODIS Hotspot](image1)

![Figure 2. Himawari-8 Channel IR4](image2)

Hotspot coordinates of MODIS on 13th of August 2015, there are 47 points with level of confidence above 80%, shown in Figure 3. The hotspot coordinate to be used to analyze the temperature values on Himawari-8 satellite image on August 13th 2015 shown in Figure 4.
Hotspot coordinates of MODIS on 14th of August 2015, there are 21 points with level of confidence above 80% shown in Figure 5. The hotspot coordinate to be used to analyze the temperature values on Himawari-8 satellite image on August 12th 2015 shown in Figure 6.

According to analysis of temperature values on Himawari-8 satellite image which is in accordance to hotspot coordinate of MODIS on 12th-14th of August by using SATAID, found average of temperature values that is 35°C. This result is considered as a threshold that will be made to be hotspot map based on Himawari-8 satellite image on 15th of August 2015. After processing data by GRADS, here is the hotspot map from Himawari-8 satellite image shown in Figure 8.
Conclusion

According to the explanations above, we can make conclusion that the analysis of temperature values on Himawari-8 image is in accordance with MODIS hotspot coordinates by using SATAID, from 12th-14th of August 2015, found that the average of temperature values is 35°C. This result is considered as a threshold that will be made to be hotspot map based on Himawari-8 satellite image on 15th of August 2015 an then it will be compared to hotspot map of MODIS on the same date. We will find the similarity of spreading hotspots pattern between hotspot map of Himawari-8 and MODIS. Thus, we expect Himawari-8 could provide supporting data in purpose to monitor the spread of hotspot when MODIS data is unreadable.

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References


