Spatial Distribution of Total Suspended Solids as Impact of Sidoarjo Mud Disaster using Sentinel-2 imagery* Filsa Bioresita ^{1,2}, Cherie Bhekti Pribadi ², Hana Sugiastu Firdaus ³, Teguh Hariyanto ², Anne Puissant¹ ¹LIVE - University of Strasbourg, France ² ITS, Surabaya, Indonesia Institut Teknologi ³ Diponegoro University, Semarang, Indonesia

Introduction

Sidoarjo mud disaster is an occurrence of hot mud bursts at drilling location of Lapindo Brantas Inc., Sidoarjo, Indonesia since 29th May 2006. In order to overcome the continuous mud flow, Indonesian government built embankment around the center of the mudflow. They also throw mud materials into the Porong River (Fig.1).









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Fig. 1: a) Center of mudflow explosion and b) Mud disposal in Porong Kiver

The large and continuous disposal of mud material leads to sedimentation in Porong River. Total Suspended Solid (TSS) calculation from satellite image can be indicator of sedimentation distribution.



Data and Study area

Fig, 2: Geographic coverage of Sentinel-2 THEIA and study site (Sidoarjo)



Fig. 3: Sentinel-2A acquired on 12th January 2016

Apply algorithm, TSS Estimation

Algorithm

TSS
$$\binom{mg}{l} = 31.420 \left(\frac{\log BoA(b2)}{\log BoA(b4)}\right) - 12.719$$

BoA (b2): BOA reflectance of band 2 BoA (b4): BOA reflectance of band 4





Fig. 4: TSS estimation resulted from Sentinel-2 using algorithm



Fig. 5: Histogram distribution of TSS image

In order to assess the performance of algorithm applied in Sentinel-2, nine pixels points were extracted from TSS image result and compared with n situ data. Table 1 showed those comparison. Correlation value about 0.72 was obtained from those comparison which indicated good result of TSS estimation from Sentinel-2 image. The correlation value meets the specified requirements, i.e. correlation \geq 0.7.

Table 1. TSS resulted from Sentinel-2 image compared with in situ data in nine points

Coordinates		TSS	
X	Y	In situ data 20 Avril 2016	Sentinel-2 12 January 2016
112.8786	-7.5507	28	17.370579
112.8798	-7.5425	42.72	17.467878
112.8786	-7.5577	48	17.103432
112.8801	-7.5337	72	18.052235
112.8693	-7.5153	74	18.247227
112.8769	-7.5194	80	19.982183
112.8945	-7.569	74	18.176249
112.8947	-7.5804	68	17.658016
112.8825	-7.5308	72	18.833309



Fig. 6: Cross-relationships of TSS values between in situ data and Sentinel-2 imagery in exponential fitting models

Cross-regression analyses between TSS values from Sentinel-2 and in situ data using exponential curve give R2 value about 0.54.

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AMONGAN INDONESIA USING SENTINEL-2 DATA

Will be presented in GeolCON 2018 (Geomatics International Conference) July 12th, 2018, Surabaya Indonesia In progress





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