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Pixel-Based Model For High Latitude Dust Detection

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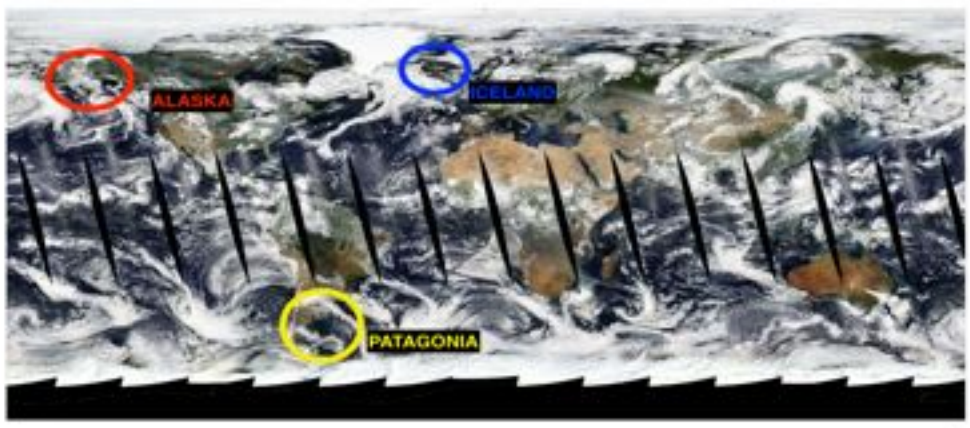
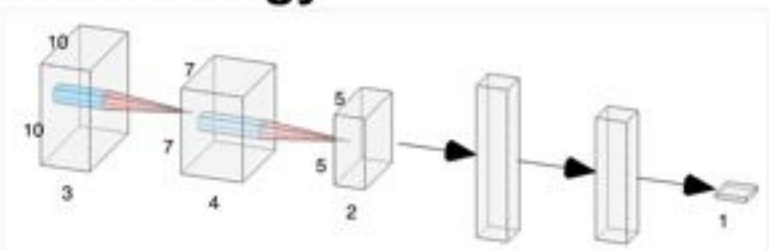
Introduction

Dust has implications on the energy budget, ocean biodiversity, and economy at regional and global scales. Dust detection relies on spectral sensitivity at visible (RGB) and infrared wavelengths. Radiative properties of high latitude dust and the background surface albedo in these regions (>40°N, >40°S) complicate current dust detection methods. Leveraging supervised machine learning (ML) methods, we propose a new method accounting for regional differences of dust occurrence.

MODIS TRUE COLOR

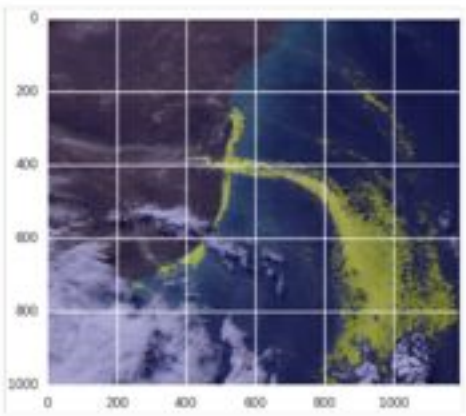


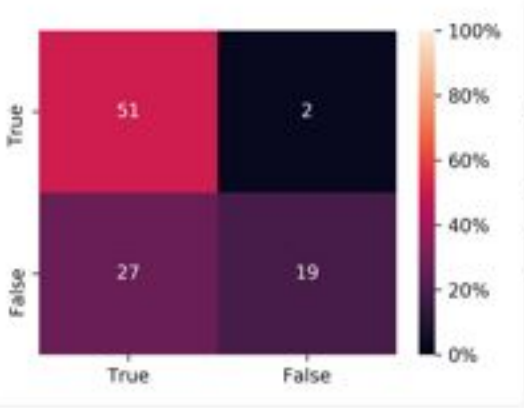
Methodology



- Model input: Aqua- and Terra-MODIS true color imagery
- Images for classification are split for training (80%) and validation (20%)

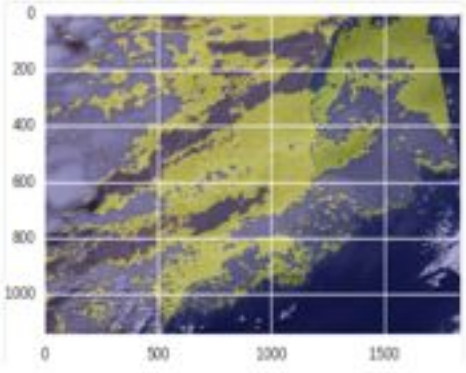
Results





Performance metrics

- Precision: 0.91
- Recall: 0.41
- Accuracy: 0.7



Strengths	Weaknesses
Detection of dust over the ocean	Sedimentation near the coast leads to false detection
Ability to distinguish between clouds and dust	Over land detection efficiency decreases
The detection efficiency doesn't degrade over different areas	RGB bands alone might not provide enough spectral discrimination

Conclusions

Machine learning methods facilitate the detection of high latitude dust events over different regions using a variety of training samples. The pixel-based model is able to detect dust, however false detections are present in complicated scenes.

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