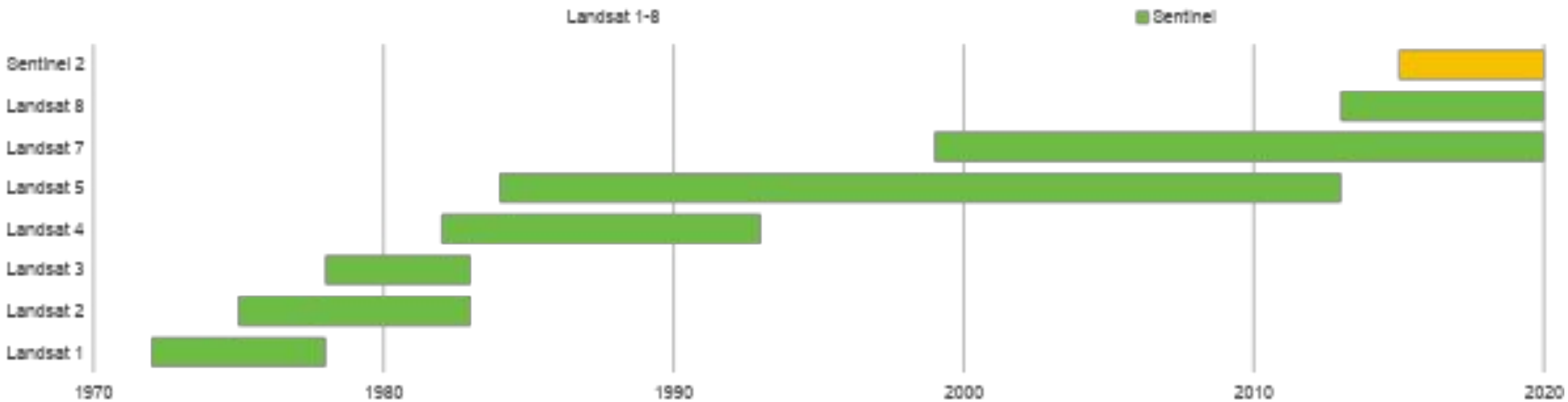
SUPERSAT

Boosting remotely sensed data with deep learning

Jesse Greenslade
Nick Wright

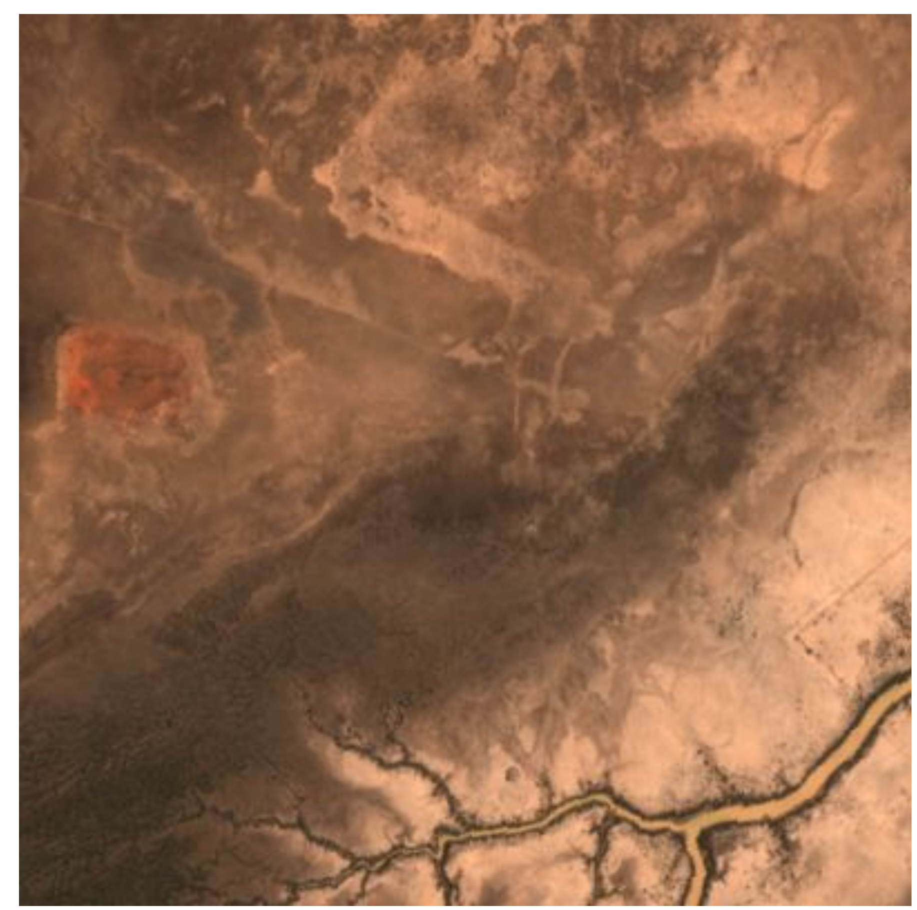
PROBLEM



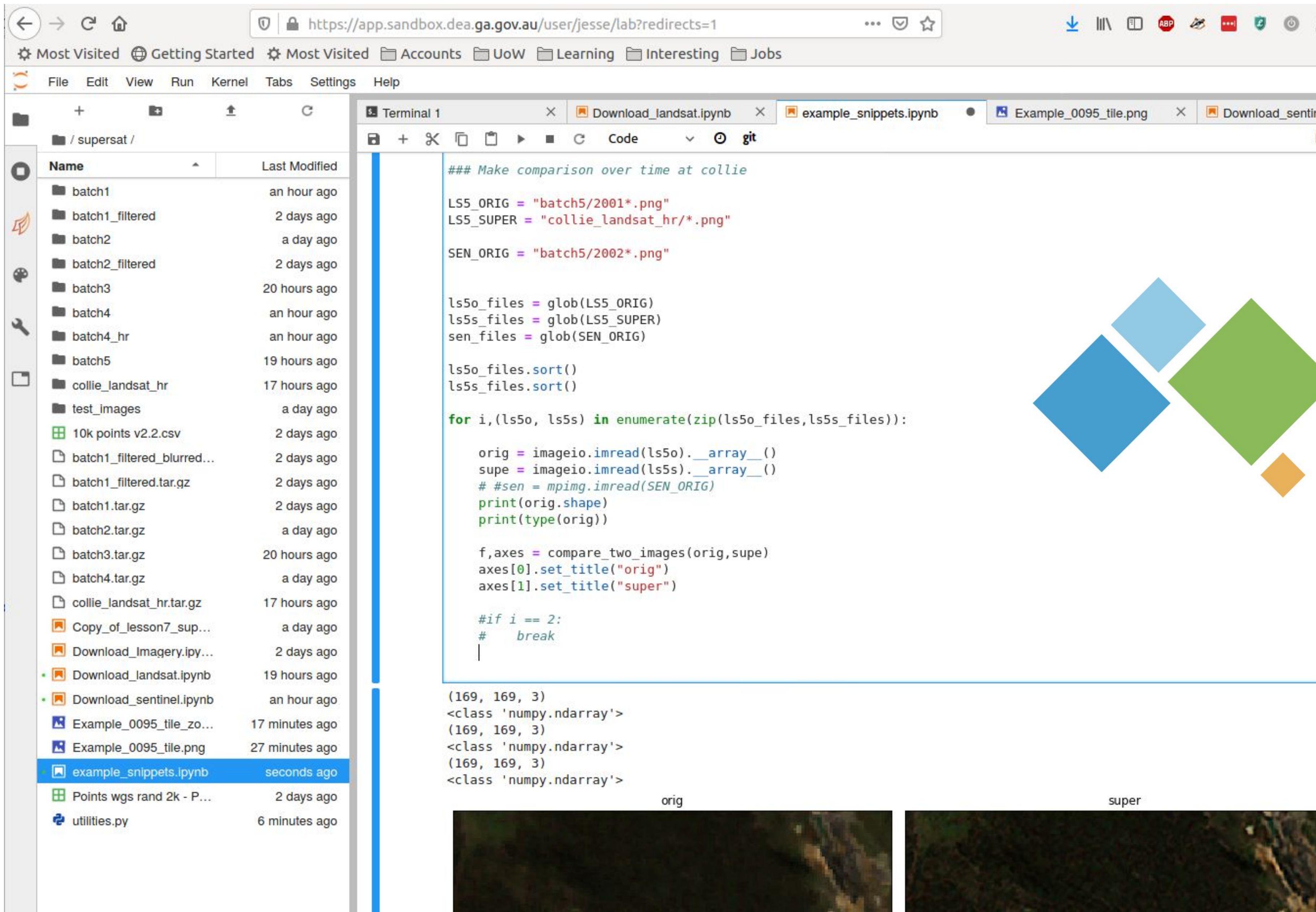
Landsat

?

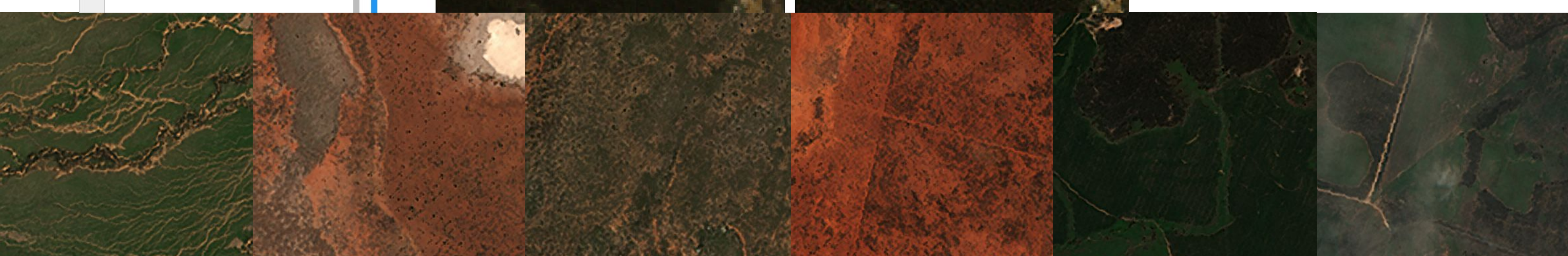
Sentinel 2



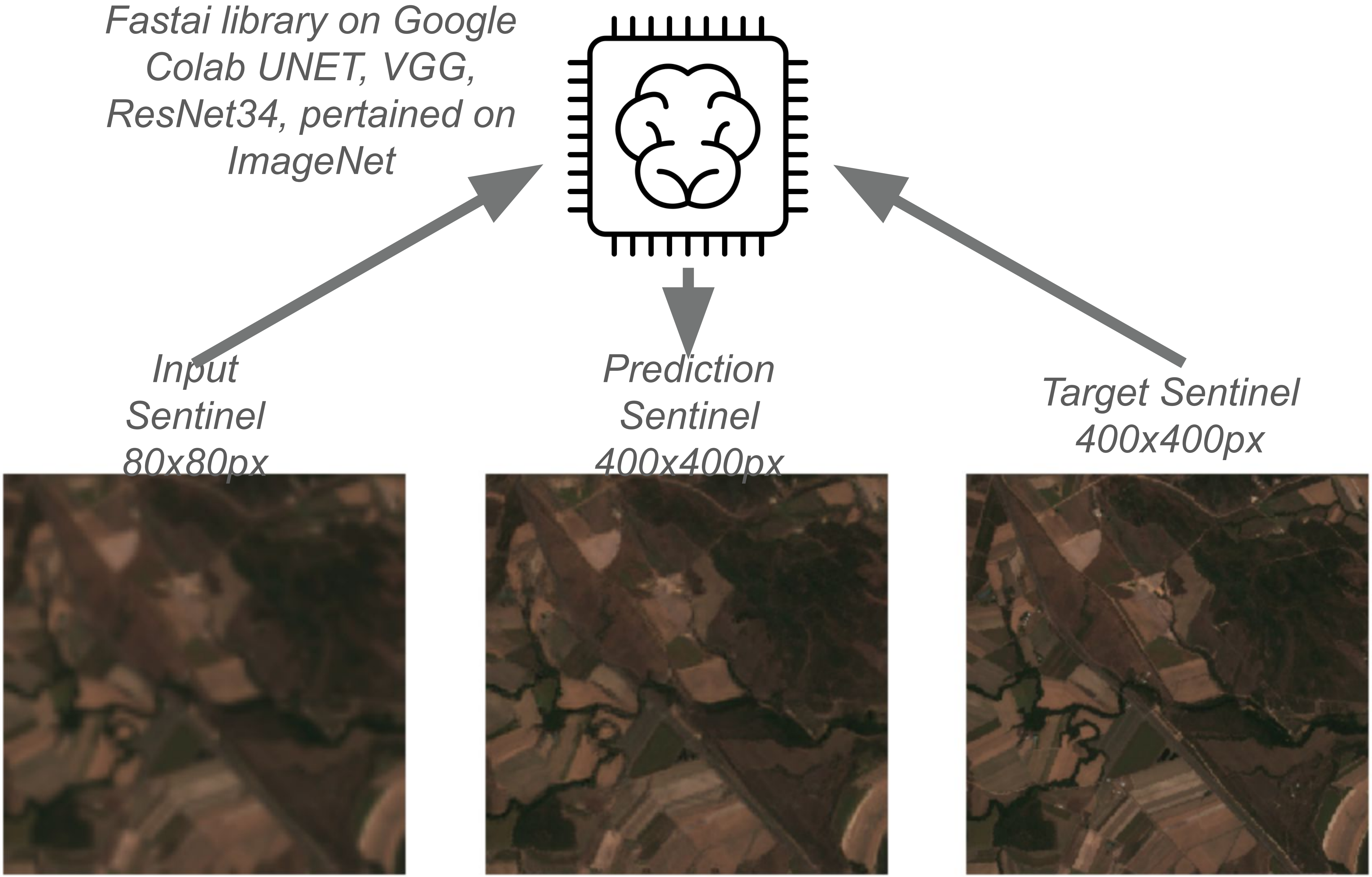
GETTING THE DATA



Digital Earth
AUSTRALIA

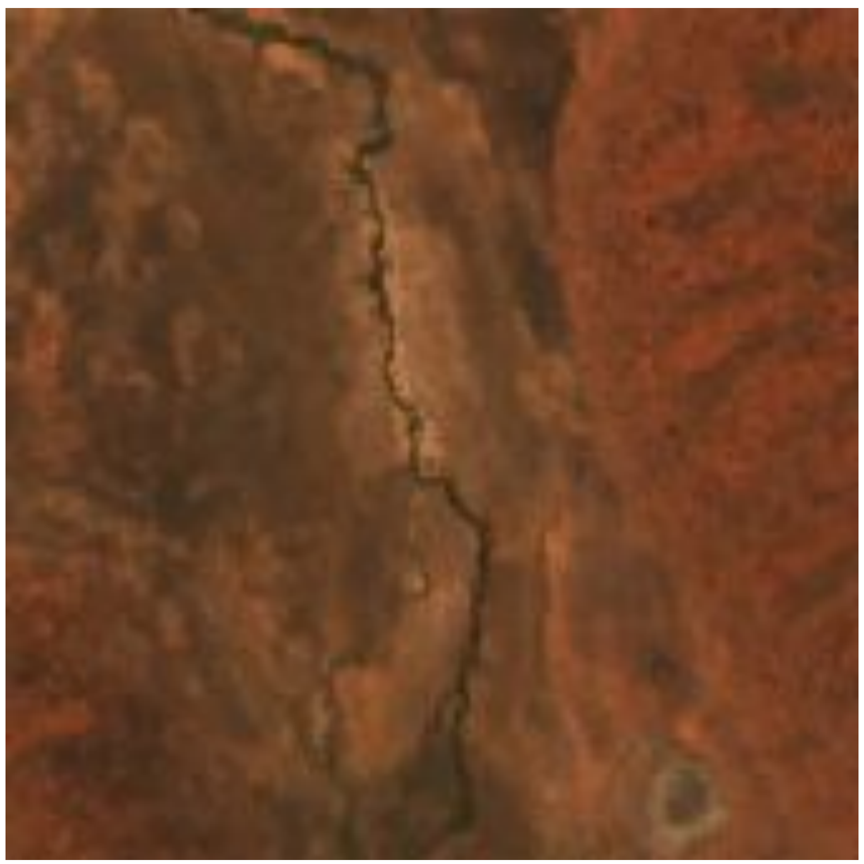


TRAINING THE MODEL

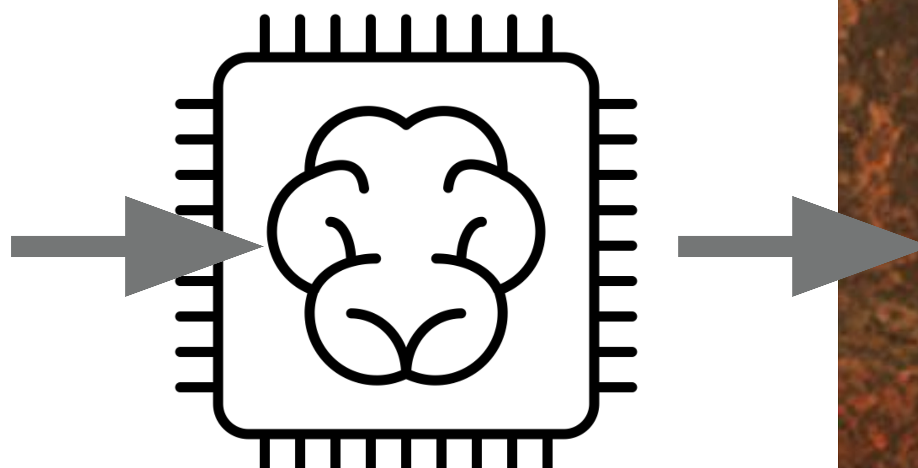


MAKING PREDICTIONS

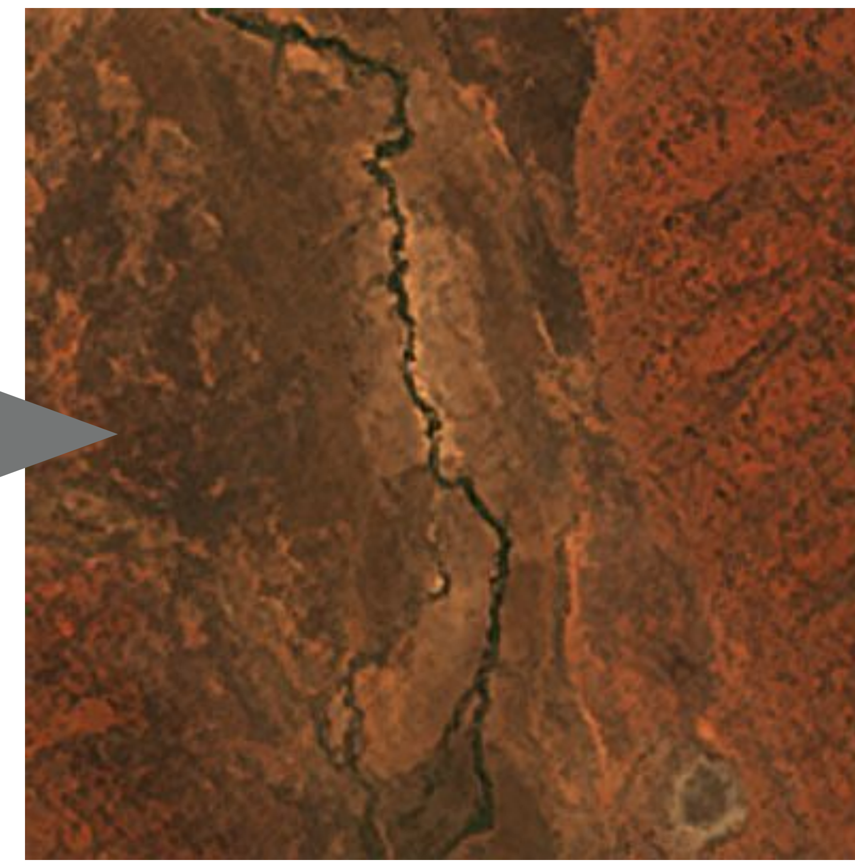
Input



Landsat 8
25m/pixel



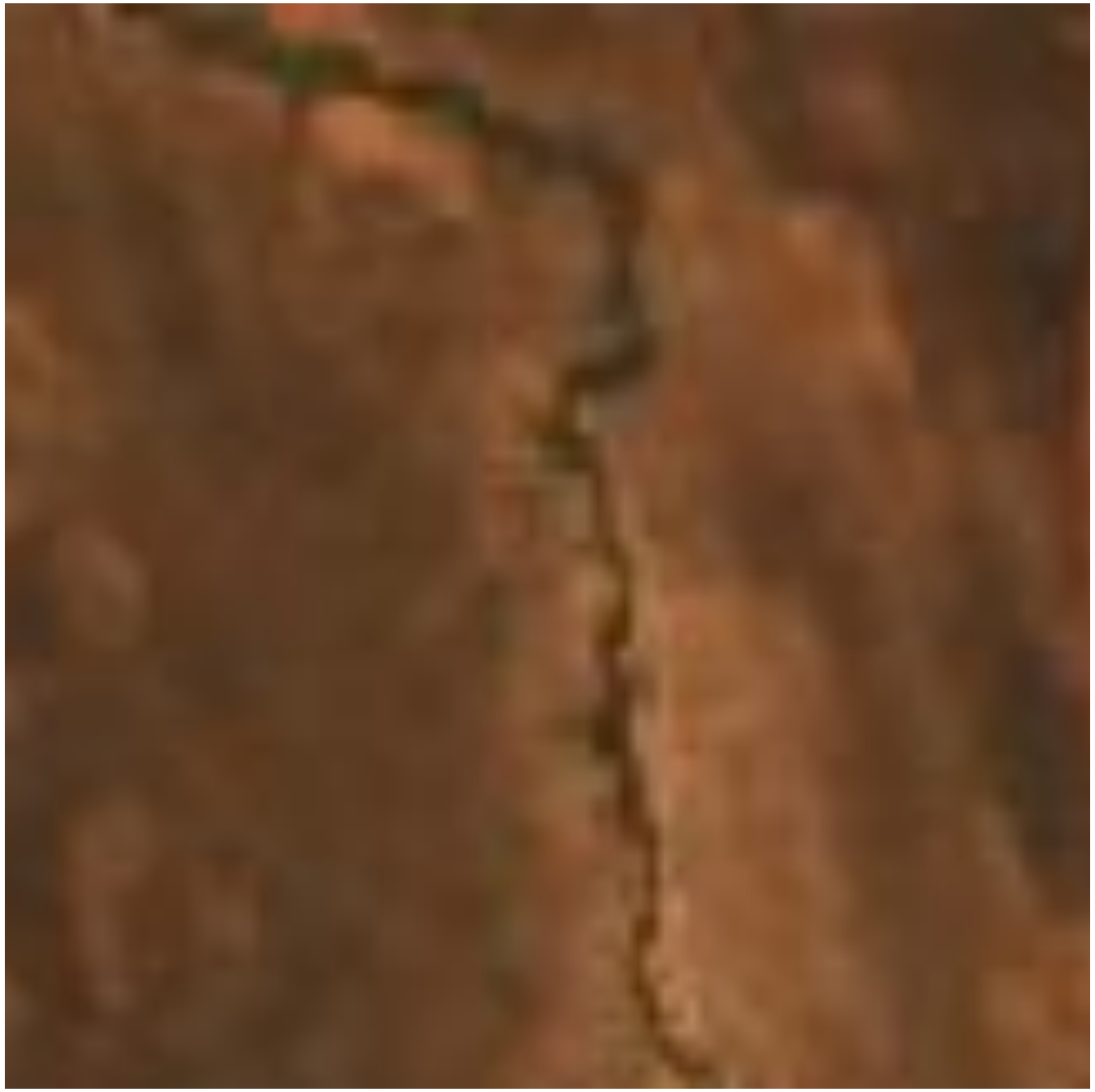
Prediction



Landsat 8
10m/pixel

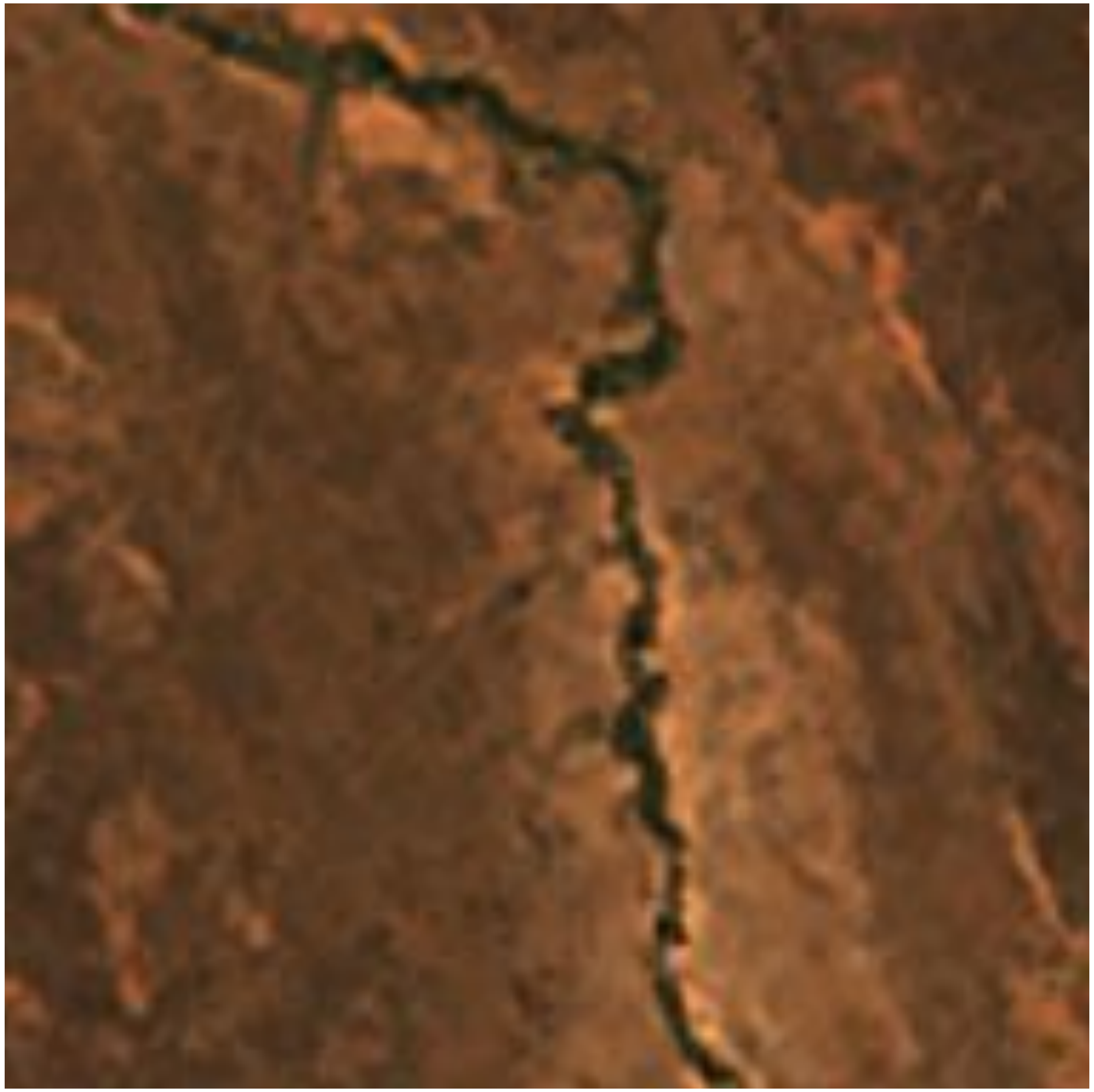
PREDICTIONS

Input



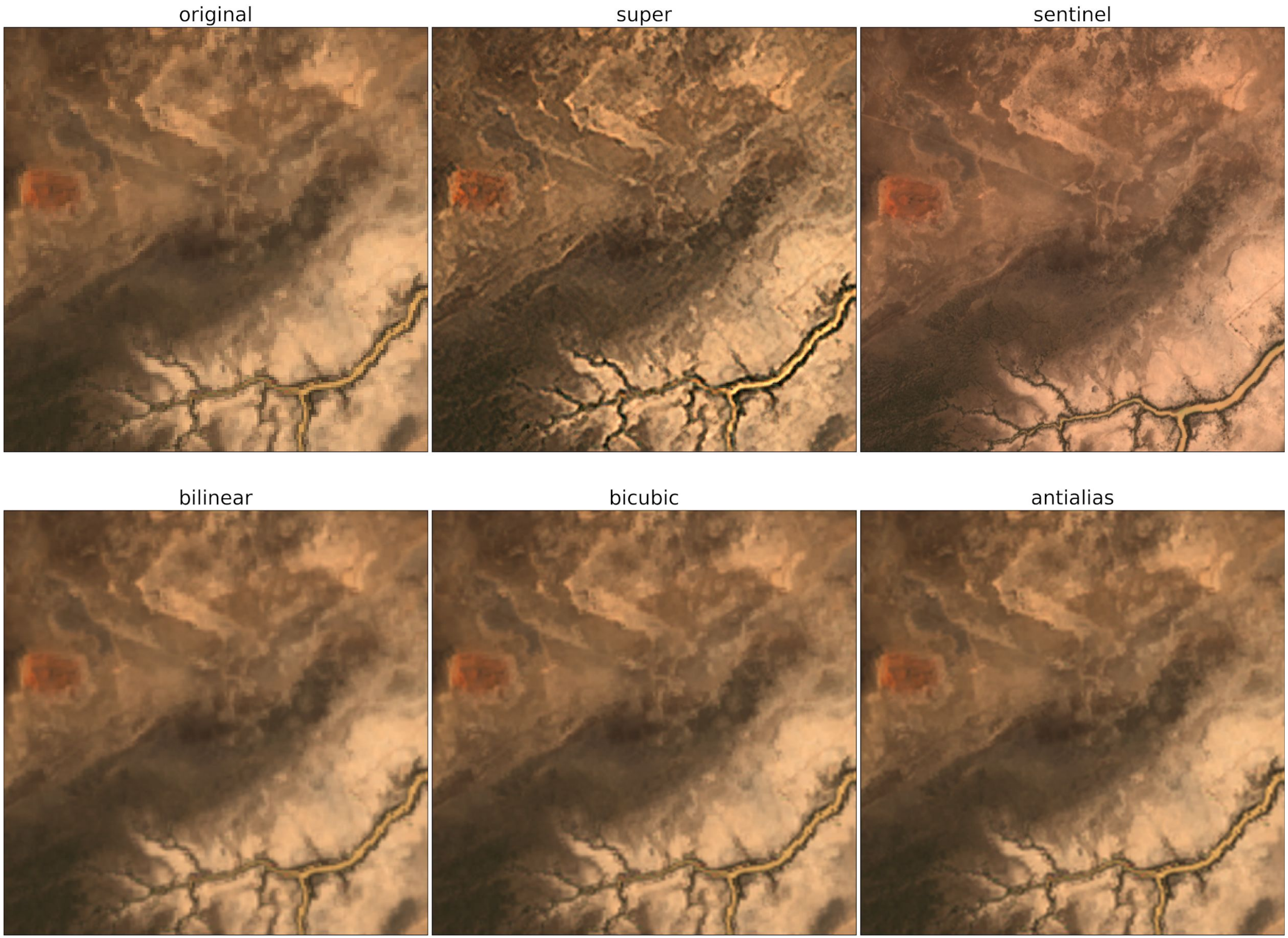
Landsat 8
25m/pixel

Prediction

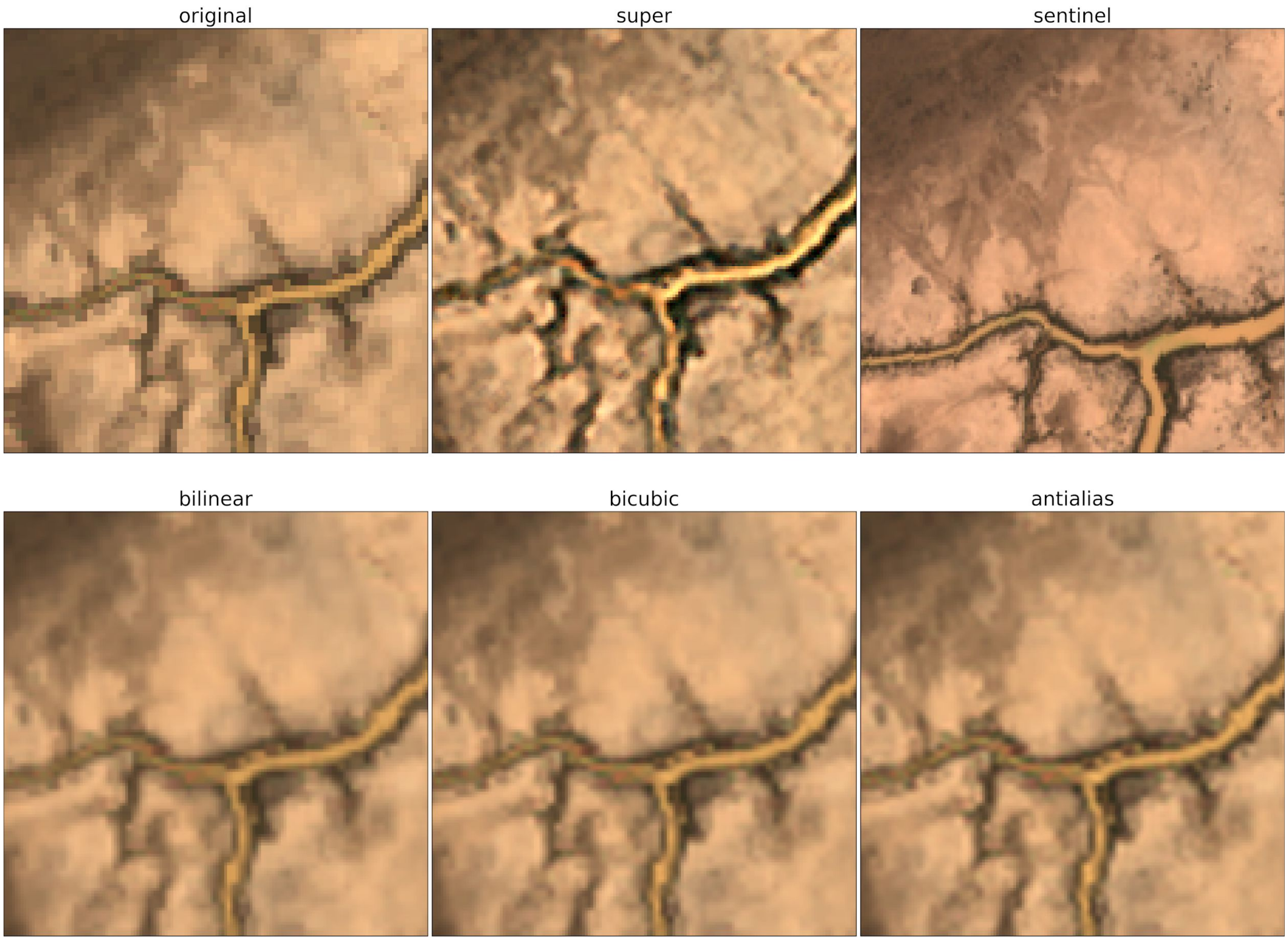


Landsat 8
10m/pixel

COMPARISON



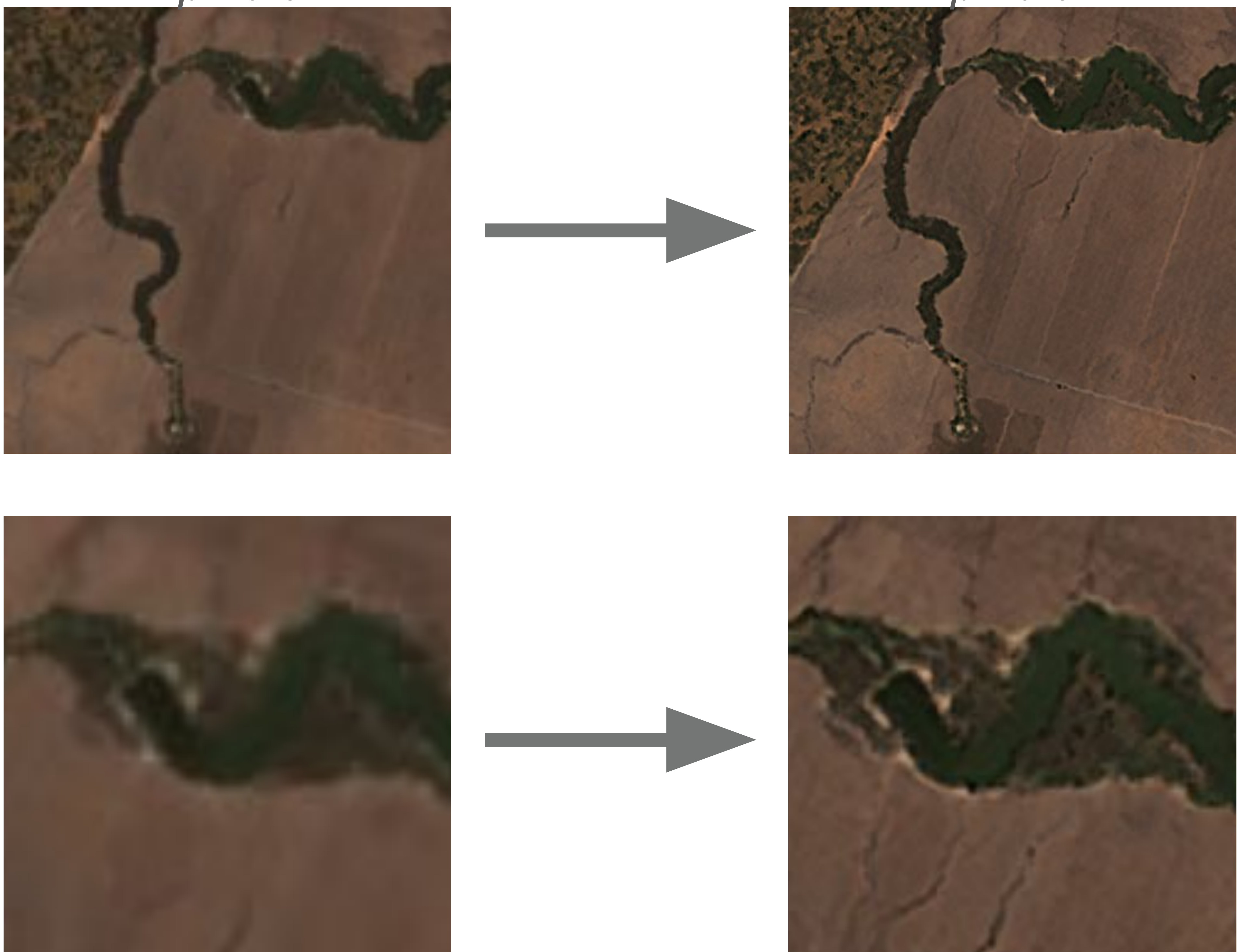
COMPARISON



WORKS ON SENTINEL!?

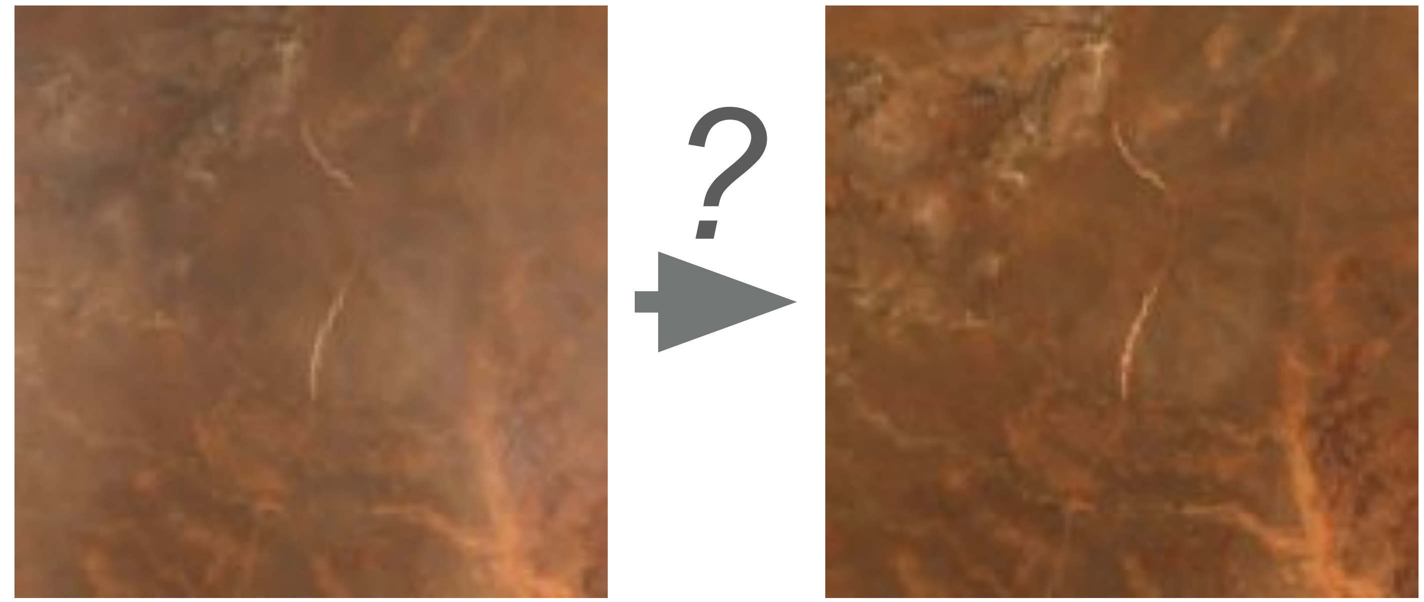
Input sentinel 10m pixels

Prediction 4m pixels



WHAT NEXT

- De-cloud images?
- More bands?
- More images 100,000?
- Train model from scratch?



THANKS AND FURTHER READING

Perceptual Losses for Real-Time Style Transfer and Super-Resolution

Justin Johnson, Alexandre Alahi, and Li Fei-Fei

Department of Computer Science, Stanford University
{jcjohns, alahi, feifeili}@cs.stanford.edu

Abstract. We consider image transformation problems, where an input image is transformed into an output image. Recent methods for such problems typically train feed-forward convolutional neural networks using a *per-pixel* loss between the output and ground-truth images. Parallel work has shown that high-quality images can be generated by defining and optimizing *perceptual* loss functions based on high-level features extracted from pretrained networks. We combine the benefits of both approaches, and propose the use of perceptual loss functions for training feed-forward networks for image transformation tasks. We show results on image style transfer, where a feed-forward network is trained to solve the optimization problem proposed by Gatys *et al.* in real-time. Compared to the optimization-based method, our network gives similar qualitative results but is three orders of magnitude faster. We also experiment with single-image super-resolution, where replacing a per-pixel loss with a perceptual loss gives visually pleasing results.