**A Sub-meter Canopy Height map of the Earth generated by a Foundational Vision Transformer**

Vegetation structure mapping is critical for understanding the global carbon cycle and monitoring nature-based approaches to climate adaptation and mitigation. Assessments of tree canopy height and crown projected area at a high spatial resolution are also important for monitoring carbon fluxes and assessing tree-based land uses, since forest structures can be highly spatially heterogeneous. Very high resolution satellite imagery makes it possible to extract information at the tree level while allowing monitoring at a very large scale. This presentation presents a global, 0.5 meter canopy height map of the planet for 2020. The maps are generated by the extraction of features from a self-supervised model trained on Maxar imagery, and the training of a dense prediction decoder against aerial lidar maps and observations from GEDI. The presentation summarizes the scaling of our teams prior work on subnational canopy height mapping to the rest of the planet, and will discuss engineering and model challenges and successes for large-scale training and inference of vision transformer models for high resolution imagery.