A seismic shift in the commercialization of satellite technology and its rapid deployment is steering the collection of shear volumes of high resolution imagery. As the pervasiveness of machine learning capability in geospatial applications increases, model generalization is becoming a critical challenge. In this talk, I will share lessons learnt at ORNL during our drive to create global scale data layers that are making various societal impact ranging from enabling accurate population distributions, damage assessment in wake of natural disasters, and other national security needs. I will also discuss some formidable challenges arising from consideration for trillion pixel capable machine learning systems. I will reflect on where we are and present some priority research directions and opportunities for collaboration.