Today, 55 per cent of the world's population live in cities and another 2.5 billion people is expected to move to urban areas by 2050 (UN, 2018). Rapid urbanization poses significant social and environmental challenges, including sprawling informal settlements, increased pollution, urban heat island, loss of biodiversity and ecosystem services, and making cities more vulnerable to disasters. Therefore, timely and accurate information on urban changing patterns on both 2D and 3D is of crucial importance to support sustainable and resilient urban planning and monitoring of the UN 2030 Urban Sustainable Development Goal (SDG). The overall objective of this project is to develop innovative, robust and globally applicable methods, based on Earth observation big data and AI, for urban land cover mapping and urbanization monitoring. The innovative aspects of this research include development of novel methodology through interdisciplinary research and supporting planning smart, sustainable and resilient cities. The proposed methodology includes the development of semantic segmentation with better generalization with weakly supervised and self-supervised training for urban land cover mapping, deep Siamese convolutional neural network for change detection, and unsupervised temporal anomaly detection for time series analysis. In addition, two SARbased methods, i.e, SAR interferometry and radargrammetry, will be explored for 3D change detection as urban areas not only expend in 2D but also in the 3rd dimension. Open and free Earth observation big data will be used to demonstrate the new deep learning-based methods in Jing-Jin-Ji, Yangtze River Delta, Yellow River Delta and Pear River Delta in China plus ten cities around the world including Stockholm, Lagos, Mumbai. It is anticipated that detailed urban land cover information and their changes will be mapped detected in a timely and accurate manner. The urban change in 3D will be estimated to better understand urban density and environmental impact. This research is expected to contribute to 1) advance EO science, technology and applications beyond the state of the art, 2). timely and reliable updating of urban databases to support sustainable planning at municipal and regional levels, 3) the monitoring objectives of the national authorities and the UN SDG 11: make cities and human settlements inclusive, safe, resilient and sustainable. The project is partially funded by the projects that the team partners have been secured. Specifically, the EOAI4ChangeDetection project funded KTH Digital Futures, Sentinel4Urban project is funded by SNSA, ESA CCI HR Landcover. The Chinese partners also have existing projects will apply for the funding from Natural Science Foundation of China and related provinces to support this project.