



CYCLE DE CONFÉRENCES

Séminaire général de physique de l'Institut Polytechnique de Paris  
Département de physique de l'École polytechnique

# DEEP LEARNING FOR EARTH OBSERVATION CHALLENGES



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The rise of open-data makes it possible to promote the use of deep learning in many areas. In this context, the field of earth observation by remote sensing, - i.e. the scanning of the earth by satellite or airplane in order to obtain information on it - adds specific challenges regarding machine learning algorithms. Indeed, the acquisition conditions of the sensors are very constrained and thus pave in a discontinuous way the space of the acquisition parameters, whereas these will continue to evolve in the future space missions. Moreover, the difficulty of obtaining ground truth or labels is a crucial issue.

Thus, the purpose of this seminar is to present the progress made in remote sensing thanks to the recent development of deep learning techniques. We do it by means of a presentation of the various activities carried out in this field. It covers a large part of the observation problems: image quality improvement, object detection, land-use classification, change or anomaly detection, and biomass estimation. In light of these activities, we highlight the practical challenges of deep learning, mainly physical feature definition and training database construction. We also give some directions for future research, such as the development and use of dedicated remote sensing platforms; hybrid supervised/ unsupervised strategies, and the further exploitation of multimodal/multitemporal data.

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