

IAF EARTH OBSERVATION SYMPOSIUM (B1)  
Interactive Presentations - IAF EARTH OBSERVATION SYMPOSIUM (IP)

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## FLOOD SUSCEPTIBILITY MAPPING USING EARTH OBSERVATION DATA AND TREE-BASED ENSEMBLE MACHINE LEARNING: CASE STUDY OF WOURI ESTUARY IN CAMEROON

### Abstract

The REFRA-SOS (Realtime Flood Risk Assessment in developing countries using Social media, Optical and SAR satellite data) project aims to mitigate flooding disaster risk in Cameroon by using the latest technologies available. To date, our studies have mapped communities located in flood prone areas of Doula Estuary in Cameroon. The impact of flooding is debilitating on livelihoods and socio-economic activities. In the present study, we adopt tree-based ensemble machine learning algorithms integrated with earth observation data for flood susceptibility mapping in Douala. Tree-based ensembles present several advantages such as interpretability, less data preparation, tolerance to multicollinearity, versatility, and ability to handle non-linear and complex relationships. Eleven flood conditioning factors (elevation, slope, topographic wetness index, terrain ruggedness index, distance to water bodies, drainage density, annual rainfall distribution, land use/land cover, soil texture, normalised difference vegetation index and modified normalised difference water index) will be integrated for flood prediction using the random forest (RF), extreme gradient boosting (XGBoost), light boosting machine (LightGBM) and categorical boosting (CatBoost) algorithms. The overall accuracy of the flood susceptibility map will be assessed to determine its sensitivity and robustness, and the performance models will be compared in terms of training speed and prediction accuracy. The findings will have important implications for policy makers involved in flood management and disaster risk reduction in coastal cities, particularly in Cameroon. By promoting the use of satellite-based data and machine learning approaches, the study aims to improve disaster risk reduction strategies and promote sustainable development in coastal cities.