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# Coupling radar and lightning data to improve the quantitative estimation of precipitation

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Forecasts in hydrology require rainfall intensity estimations at temporal scale of few tens of minutes and at spatial scales of few kilometer squares. Radars are the most efficient apparatus to provide such data. However, estimate the rainfall intensity (R) from the radar reflectivity (Z) is based on empirical Z-R relationships which are not robusts. Indeed, the Z-R relationships depend on hydrometeor types. The role of Lightning flashes in thunderclouds is to relax the electrical constraints. Generations of thundercloud electrical charges are due to thermodynamical and microphysical processes. Based on these physical considerations, Blyth et al. (2001) have derived a relationship between the product of ascending and descending hydrometeor fluxes and the lightning flash rate. Deierling et al. (2008) succesfully applied this relationship to data from the STERAO-A and STEPS field campains. We have applied the methodology described in Deierling et al. (2008) to operational radar (Météo-France network) and lightning (LINET) data. As these data don't allow to compute the ascending hydrometeor flux and as the descending mass flux is highly parameterized, thundercloud simulations (MésoNH) are used to assess the role of ascending fluxes and the estimated precipitating fluxes. In order to assess the budget of the Blyth et al. (2008) equation terms, the electrified version of MésoNH, including lightning, is run.