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Analysis of diurnal cycles of interferometric coherence and backscattering coefficient measured on an irrigated wheat field in Morocco

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C-band radar observations have shown a high sensitivity to the water status of vegetation, including forests and crops. Several studies conducted mainly on forests have observed daily changes of the backscattering coefficients between ascending and descending orbits and have suggested that these differences are related to the diurnal cycle of vegetation water content. Likewise, the water movement within annual crops could be associated to change of the phase centre locations leading to a daily cycle of the interferometric coherence as well that has already been observed on tropical forest using C-band in situ acquisitions. In this context, an experimental setup composed of 4C-band antennas targeting an irrigated wheat field was installed at the top of a 20 m tower near Chichaoua (Morocco) from January to June 2020. The collected data includes measurements of the backscattering coefficient at both cross- and parallel polarizations and the interferometric coherence with a 15 mns time step. The field is also equipped with an eddy-correlation station for half hourly measurements of convective fluxes, soil moisture and temperature profiles. Simultaneously, measurement of above-ground biomass, leaf area index, canopy height and surface roughness are also carried out every 15-days during the agricultural season. The preliminary results of the experiment reveal the existence of strong correlation between the daily evolution of interferometric coherence and the physiological activity of wheat at dawn while the changes observed in the afternoon are rather related to the wind peaks. For the backscattering coefficient, a good agreement is observed between the evolution of its daily average and the evolution of evapotranspiration. These open insights for the monitoring of the crops water status using radar data acquired at sub-daily timescale.