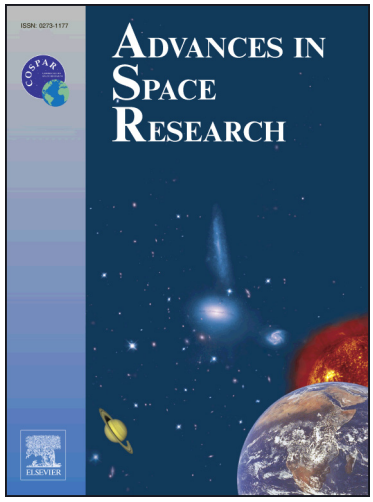

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Bistatic measurements for the estimation of rice crop variables using artificial neural network

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Abstract

An outdoor rice crop bed (4×4 m^2) was specially prepared for a bistatic ground based scatterometer measurements at various growth stages of rice crop from transplanting to ripening stage at like polarizations (HH- and VV-) in the angular range of 20^0 to 70^0 at the steps of 5^0. The computed scattering coefficients showed increasing behavior from transplanting to reproductive stage and started decreasing at ripening stage. The angular dependency of scattering coefficient was found to decrease initially with age and became negligible near the ripening stage of rice crop. The polynomial regression analysis showed higher values of coefficient of determination (R^2) at 30^0 incidence angle for both like polarizations. Two types of feed forward back propagation neural network (FFBPNN) models were developed for the estimation of rice crop growth variables namely FFBPANN-I and FFBPANN-II model. The FFBPANN-I model was developed with one input neuron (HH- or VV- polarized scattering coefficient) and one output neuron (biomass or leaf area index or plant height or chlorophyll content) while the FFBPANN-II model was developed with two input neurons (HH- and VV-polarized scattering coefficient) and four output neurons (biomass, leaf area index, plant height and chlorophyll content). Performances of both the types of FFBPANN models were found good for the estimation of rice crop variables. However, the performance of FFBPANN-II