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Calibration of ALOS PALSAR polarimetric modes

In this study, a new model is developed for polarimetric SARs equipped with an active antenna that operates at long wavelength, and as a result are sensitive to Faraday rotation. The model separately consider system parameters that are independent of target illumination angle, and those with illumination angle dependence, thus allowing calibration approaches which are valid for targets at different illumination angles. PALSAR active antenna system is described briefly and the polarimetric model that takes into account SAR system specifications, as well as Faraday rotation, is adapted to PALSAR. A step-by-step procedure is then introduced for calibration of PALSAR quad-polarizations and dual-polarizations modes. The Amazonian forest near to the equator is used for scattering matrix symmetrization, antenna gain and cross-talk removal, and correction of channel imbalance at low Faraday rotation conditions. The variation of transmitter-receiver gains with temperature is also discussed, and internal signal measurement is proposed to ease the calibration. Various methods are proposed for Faraday rotation removal as a function of the availability of the system internal measurements. For practical reasons, the use of man-made symmetric targets is investigated and shown to be efficient for Faraday rotation angle correction.