Invited session: Advanced Methods for polarimetric information extraction

URBAN FEATURE CHARACTERIZATION USING POLARIMETRIC AND POL-IN SAR DATA

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ABSTRACT

Interest in urban feature characterization has increased with the potential of polarimetric satellite SAR data from ALOS (already in orbit), Radarsat-2, TerraSAR, and Cosmo-SkyMed. The Touzi-Decomposition [1] has been introduced for both coherent and incoherent decomposition of target scattering using polarimetric SAR data. In contrast to the existing scattering decompositions [2, 3], the Touzi decomposition characterizes target scattering in terms of unique and roll invariant target parameters that do not depend on the transmitting-receiving antenna polarization basis. Target scattering type is represented in terms of three parameters; the symmetric scattering type magnitude and phase introduced in [1], and the target helicity firstly introduced by Kennaugh [4], and validated for coherent scattering by Huynen [5] in the 1970s, but neglected since the development of Krogager's decomposition [3]. The incoherent Touzi decomposition, and in particular the scattering type phase parameter, has been shown very promising for wetland classification [1, 6]. In this study, the coherent and incoherent Touzi decomposition is investigated for urban feature characterization using single pass- and repeat-pass polarimetric C-band Convair-580 SAR and RADARSAT2 data collected over Ottawa. The Touzi-Lopes speckle filter [7] is reconsidered and enhanced for optimum matching of Touzi decomposition to signal non stationarity. The potential of the Touzi decomposition for urbane feature characterization using polarimetric data is assessed and compared with the Cloude-Pottier decomposition [2]. The potential of Pol-in SAR for building identification is investigated using the C-band repeat pass Convair-580 SAR data. Combination of the polarimetric building scattering information with the height information provided by the interferometric phase is shown to be very promising for improved characterization of building features.

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