Vegetation Mapping in Mara wetlands and Serengeti Ecosystem in Tanzania using Radarsat SAR Imagery

Joseph Mtamba[1], Rogier Van der Velde [2], Verkerdy Zoltán[2,3], Preksedis Ndomba [2] and Felix Mtalo [1]

1. Department of Water Resources Engineering, P.O Box 35131, University of Dar es Salaam, P.O Box 35131 Dar es Salaam, Tanzania. joseph.mtamba@udsm.ac.tz (J.M); pmndomba@udsm.ac.tz (P.N); mtalo@wrep.udsm.ac.tz (F.M)
2. Faculty of Geo-Information and Earth Observation , University of Twente-ITC, P.O Box 217, 7500 AE, Enschede, The Netherlands. r.vandervelde@utwente.nl (R.V); z.verkerdy@utwente.nl (Z.V)
3. Department of Water and Waste Management, Szent István University, 2100 Gödöllő, Páter Károly utca 1., Hungary; z.vekerdy@utwente.nl (Z.V)

* *Author to whom correspondence should be addressed; E-Mail: joseph.mtamba@udsm.ac.tz (J.M);Tel.: +254-784-635-977; Fax: +255-222-410-029.*

1.Introduction

- Wetlands and national parks are sensitive ecosystem for wildlife and humans (Evans *et al.,*2010).
- Monitoring vegetation dynamics is essential for sustainable conservation planning and monitoring of ecosystems
- This study shows application of Radasat 2 (W3) VH and VV polarizations for vegetation types and height mapping in the lower Mara basin in Tanzania

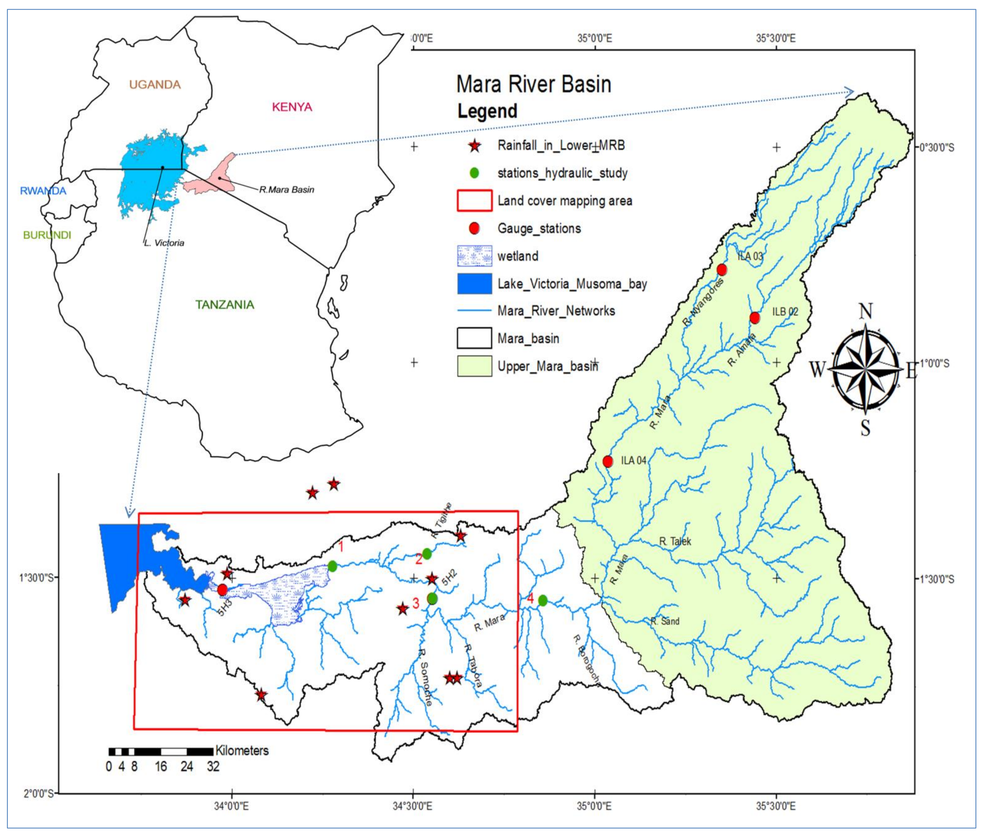


Figure 1. Study area and Mara River flow regime

2.Methodology

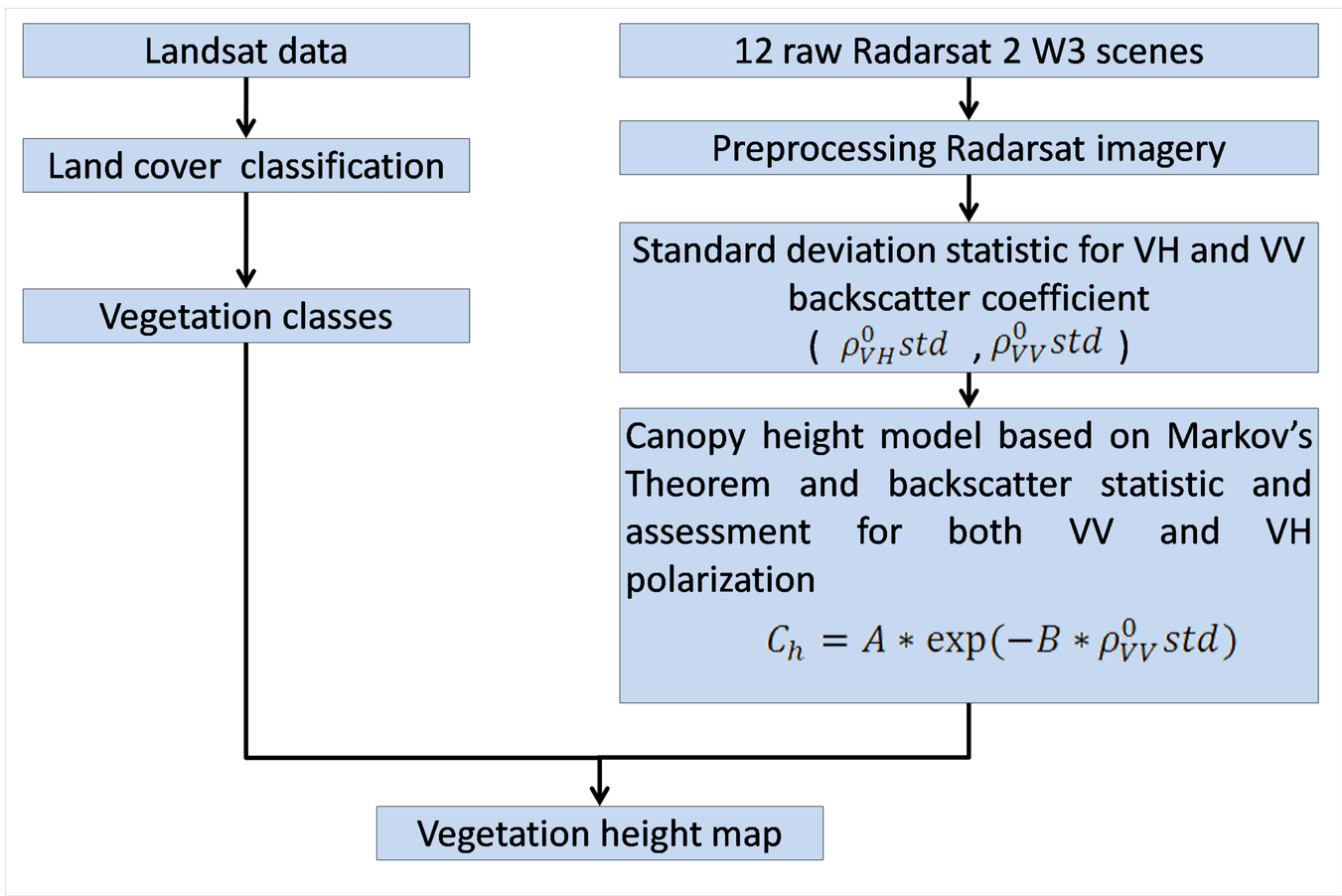


Figure 2. Conceptual Methodology approach

3.Results

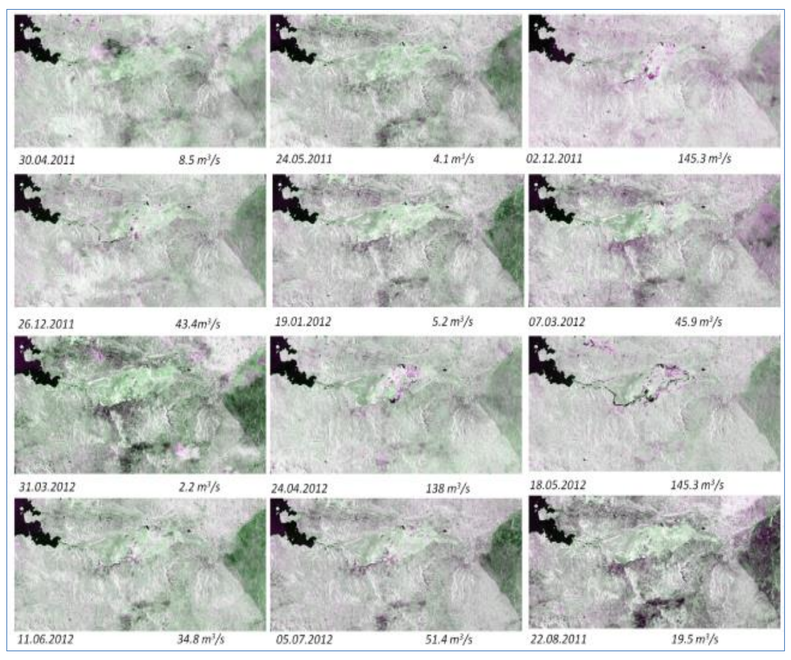


Figure 3. RGB composite for VV, VH and VV polarization at different dates and river discharges

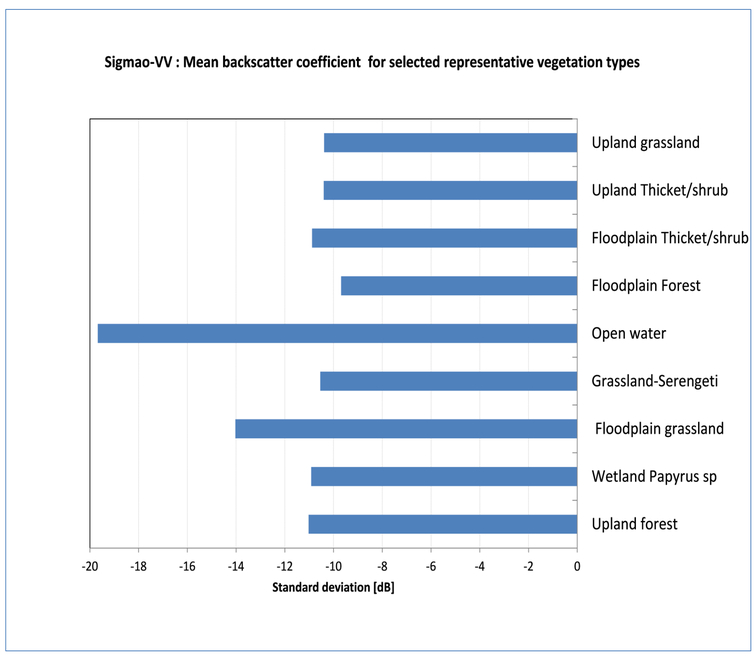


Figure 4. Mean backscatter coefficient for VV polarization for each vegetation types

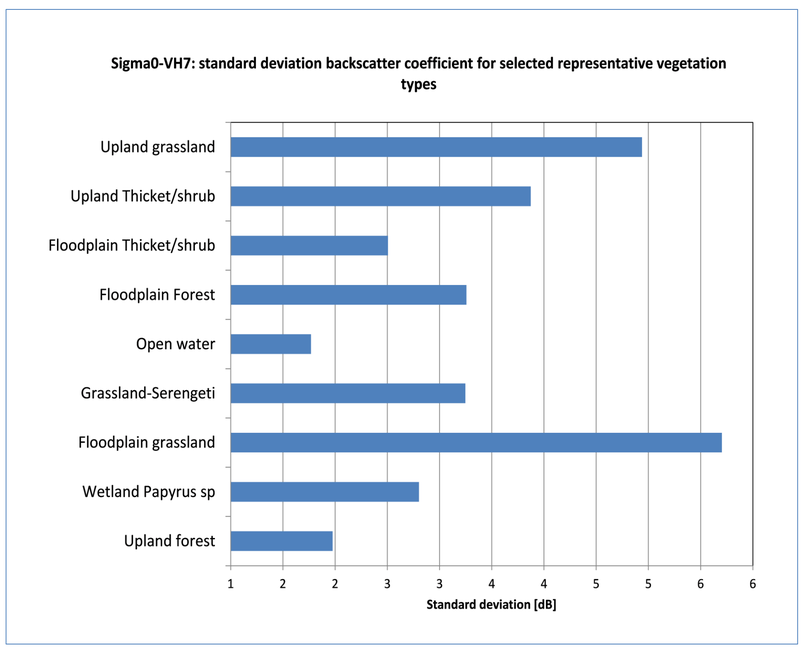


Figure 5. standard deviation of backscatter coefficient for VV polarization for each vegetation types

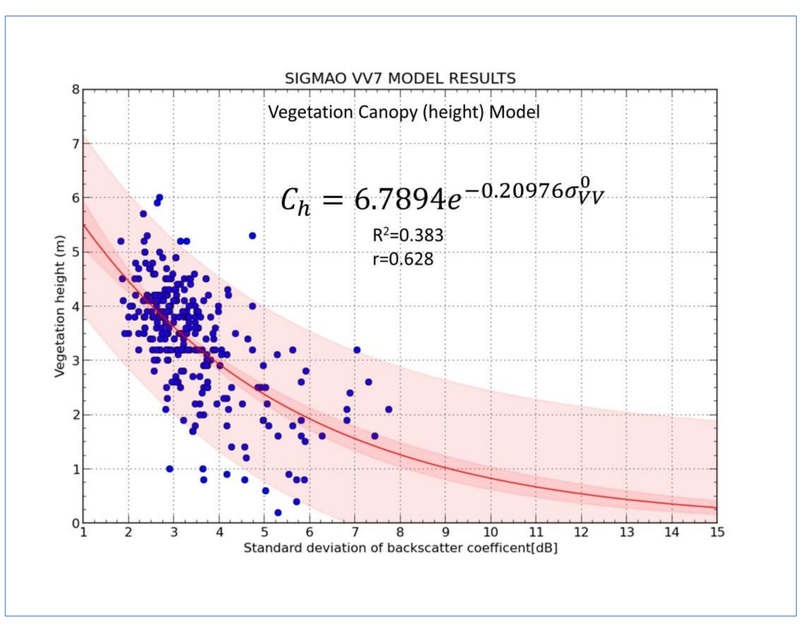
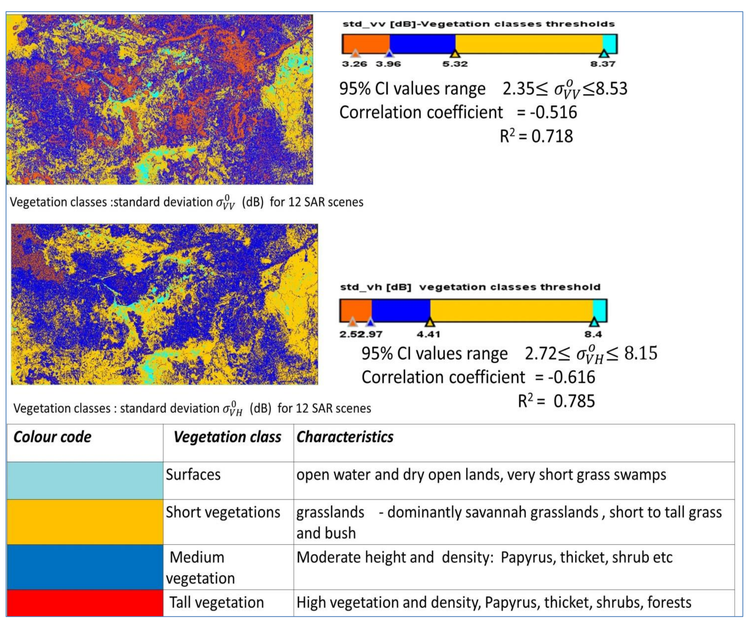


Figure 6. Canopy height model for VV backscatter polarization



Colour code	*Vegetation class*	*Characteristics*
	Surfaces	open water and dry open lands, very short grass swamps
	Short vegetations	grasslands - dominantly savannah grasslands , short to tall grass and bush
	Medium vegetation	Moderate height and density: Papyrus, thicket, shrub etc
	Tall vegetation	High vegetation and density, Papyrus, thicket, shrubs, forests

Figure 7. Vegetation types

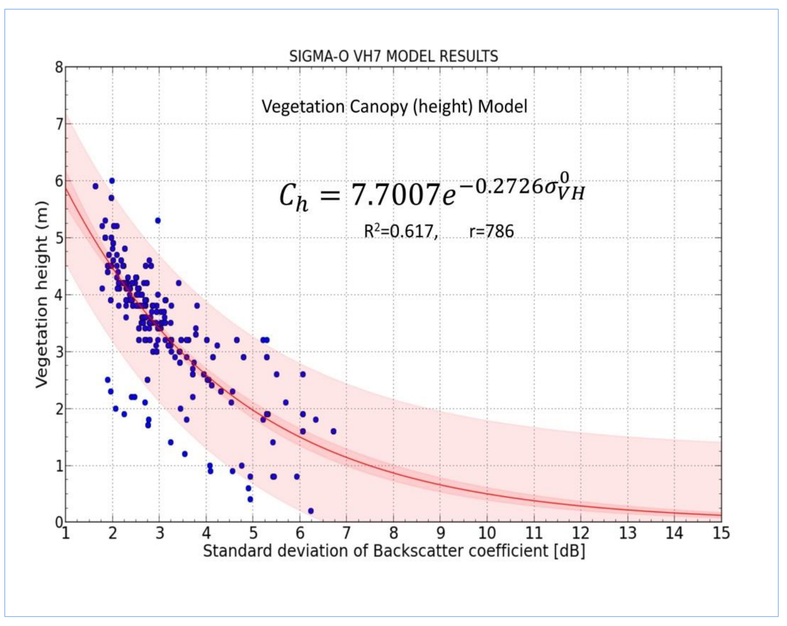


Figure 8. Canopy height model for VH backscatter polarization

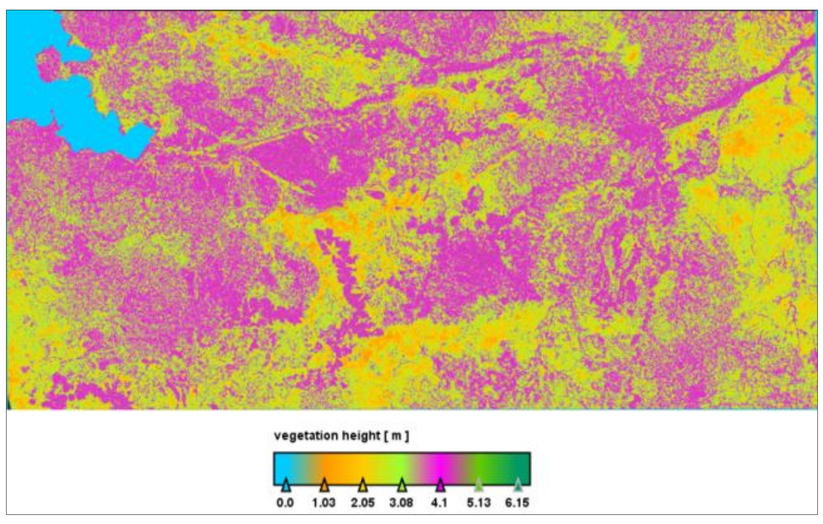


Figure 9. Spatial vegetation height map

4.Conclusion

- A combination standard deviation statistic for VH polarization was found to map vegetation attributes (height) more accurately than VV polarization backscatter coefficient.
- Application of segmentation algorithm in mapping vegetation types had accuracy higher than 80% and 75% for vegetated areas of the wetlands and higher lands respectively.
- use of temporal variability statistics for Radarsat-2 VH polarization can accurately map aquatic vegetation types and height in the Lower Mara basin wetland and Serengeti ecosystems.