

# SAR Backscatter & Forest Type

A quick reference to expected backscatter responses from Synthetic Aperture Radar for a variety of forest types. For more information, check out the SAR Handbook: Comprehensive Methodologies for Forest Monitoring and Biomass Estimation and associated training materials at [SERVIRglobal.net](http://SERVIRglobal.net)

		VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH	
WAVELENGTH	POLARIZATION	RESPONSE BY FOREST TYPE					
		Sparse Forest DRY SOIL	Sparse Forest FLOODED	Degraded Forest DRY SOIL	Degraded Forest FLOODED	Dense Forest DRY SOIL	Dense Forest FLOODED
C-band backscatter ( $\gamma^0$ )	VV	<b>MEDIUM TO HIGH</b> Highly variable; depends on forest floor roughness and moisture levels	<b>LOW TO MEDIUM</b> Depending on forest density, lots of forward scattering	<b>MEDIUM TO HIGH</b> Most scattering from crown	<b>MEDIUM TO HIGH</b> Most scattering from crown	<b>MEDIUM TO HIGH</b> Most scattering from crown. Can be low in scenarios where absorption dominates, diminishing backscatter	<b>MEDIUM TO HIGH</b> Most scattering from crown. Can be low in scenarios where absorption dominates, diminishing backscatter
	VH	<b>MEDIUM TO HIGH</b> Highly variable; depends on forest floor roughness and moisture levels	<b>LOW TO MEDIUM</b> Depending on forest density, lots of forward scattering	<b>MEDIUM TO HIGH</b> Most scattering from crown	<b>MEDIUM TO HIGH</b> Most scattering from crown	<b>MEDIUM TO HIGH</b> Most scattering from crown. Can be low in scenarios where absorption dominates, diminishing backscatter	<b>MEDIUM TO HIGH</b> Most scattering from crown. Can be low in scenarios where absorption dominates, diminishing backscatter
	VV/VH Ratio	<b>MEDIUM TO HIGH</b>	<b>MEDIUM TO HIGH</b>	<b>MEDIUM</b>	<b>MEDIUM</b>	<b>MEDIUM</b>	<b>MEDIUM</b>
L-band backscatter ( $\gamma^0$ )	HH	<b>LOW TO MEDIUM</b> Lower than dense or flooded sparse forest; at steep incidence angles, backscatter can be medium to high	<b>MEDIUM TO HIGH</b> Depends on how much double bounce contributes to the signal	<b>MEDIUM TO HIGH</b>	<b>HIGH TO VERY HIGH</b> Double bounce contributes to high backscatter	<b>HIGH TO VERY HIGH</b> Higher than degraded forest; at very high biomass levels, saturation occurs (no distinction from degraded forests)	<b>HIGH TO VERY HIGH</b> Double bounce contributes to high backscatter
	HV	<b>LOW TO VERY LOW</b> Depends on soil dryness	<b>LOW TO VERY LOW</b> Most scattering is in the forward direction due to specular reflection	<b>MEDIUM TO HIGH</b>	<b>MEDIUM TO HIGH</b> No seasonal variation with flooded forest floor	<b>HIGH TO VERY HIGH</b> Volume scattering dominates; best sensitivity to biomass	<b>MEDIUM TO HIGH</b> No seasonal variation with flooded forest floor
	HH/HV Ratio	<b>MEDIUM</b>	<b>HIGH</b>	<b>MEDIUM</b>	<b>HIGH</b>	<b>MEDIUM</b>	<b>HIGH</b>

SOURCE: KelIndorfer, J., Chapter 3. Use of SAR data for mapping deforestation and forest degradation. SAR Handbook: Comprehensive Methodologies for Forest Monitoring and Biomass Estimation. Eds. Flores-Anderson, A., Herndon, K., Thapa, R., Cherrington, E. NASA. 2019. DOI: 10.25966/68c9-gw82