v3.0

# SARPOLTOOL

#### **INSTALLATION GUIDE**

MPSDD/MDPG/DPA/NRSC



National Remote Sensing Centre Indian Space Research Organization, Department of Space Hyderabad-500037

## **Table of Contents**

Table of Contents	2
Introduction	
Prerequisites	4
QGIS Installation	
H5PY Installation	4
Steps for Installation	5
Python Libraries Installation	
Steps for Installation	
SARPOLTOOL Installation	
Steps to Install	

## Introduction

SARPOLTOOL v3.0 is a comprehensive plugin for QGIS that enables advanced Synthetic Aperture Radar (SAR) and polarimetric SAR (PolSAR) data processing and analysis. Designed with researchers, analysts, and operational users in mind, SARPOLTOOL offers a streamlined interface for handling both full-polarimetric and hybrid-polarimetric SAR datasets, including emerging formats such as those from the NISAR mission. The plug-in supports key functionalities such as sigma0 generation, coherency and covariance matrix generation, speckle filtering, polarimetric decomposition, and thematic product generation, making it a valuable tool for applications in agriculture, forestry, urban mapping, water resource monitoring, and disaster response.

This manual provides detailed installation instructions of SARPOLTOOL v3.0. It is intended for users with a basic understanding of SAR data and QGIS workflows. The installation section guides users through setting up the required dependencies and plug-in files within the QGIS environment, ensuring that SARPOLTOOL functions smoothly across platforms.

With SARPOLTOOL v3.0, users can perform both scientific-grade polarimetric analysis and thematic product generation from within the familiar and extensible QGIS platform. The plug-in is actively maintained and continues to evolve to support the latest SAR missions, including those using compact-pol formats. Whether you're a remote sensing expert or a new SAR user, this manual will help you quickly get started and make the most of what SARPOLTOOL has to offer.

## **Installation Guide**

### Introduction

In this section, the basic steps required for installing SARPOLTOOL are highlighted. The section is divided into pre-requisites for installation and the final Installation of SARPOLTOOL plug-in (which is delivered as a zip) in QGIS.

Parameter	Required	Recommended
Operating System	Windows 7	Windows 10 & Above
QGIS	v3.0 & Above	v3.24 & Above
python3-h5py	v3.8.0	v3.10.0
dask	Compatible with QGIS	Compatible with QGIS
spectral	Compatible with QGIS	Compatible with QGIS
tqdm	Compatible with QGIS	Compatible with QGIS
xmltodict	Compatible with QGIS	Compatible with QGIS

## **Prerequisites** QGIS Installation

QGIS (Quantum Geographic Information System) is a free and open-source Geographic Information System that enables users to create, edit, visualize, analyze, and publish geospatial information across a wide range of formats. It supports both raster and vector data and offers a user-friendly interface, powerful plugins, and advanced tools for mapping and spatial analysis. QGIS is a versatile platform that integrates well with various geospatial data sources and processing libraries.

The current version is QGIS 3.42.1 'Münster' and was released on 2025-03-21.The long-term builds currently provide 3.40.5 'Bratislava'. Long Term Release (LTR) builds are intended for those who value stability over having the latest features. SARPOLTOOL is only supported on Windows Platform on QGIS. Please visit <u>https://qgis.org/download/</u> to continue with installation of QGIS on windows platform.

#### **H5PY Installation**

To enable support for HDF5 file formats used in NISAR Data Products within QGIS, it is necessary to install the <code>python-h5py</code> package using the OSGEO4W Network Installer. This package provides the required interface to work with HDF5 datasets, which are the standard format for storing and distributing NISAR mission outputs. The latest release now includes enhanced support for NISAR Data Products through direct

integration with HDF5 structures. Ensuring that python-h5py is properly installed guarantees full compatibility and functionality when working with these advanced remote sensing datasets in QGIS.

#### Steps for Installation

- **1.** Open **OSGeo4W Setup**from Start Menu (it comes installed along with QGIS installation using OSGeo4W installer).
- 2. Select Advanced Install option from the options and click Next.
- **3. Left click** on **"Next"**after selection of appropriate installation directory. It is recommended that the same be kept the default location.

elect Root Install Directory Select the directory where you want to insta few installation parameters.	ill OSGeo4W. Also choose a		۲
Root Directory			
CAPROGRA~1AQGIS32~1 12		Browse	
<ul> <li>All Users (RECOMMENDED) OSGeo4W will be available to all users of the system.</li> <li>Just Me OSGeo4W will only be available to the current user. Only select this if you lack Admin. privileges or you have specific needs.</li> </ul>	Create icon on Desktop		

Figure 1: Denoting the directory selecting where the installation will take place

4. **Left click** on **"Next"** after selecting appropriate directory where the local h5py library will be installed. It is recommended that the same can be kept as the default location.

S	ackage Directory	-	L	~
Select Local Package Directory Select a directory where you want downloads. The directory will be o	t Setup to store the installation files it created if it does not already exist.		4	•
Local Package Directory				
C:\Users\ADMINI~1 DES\AppData	a\Local\Temp	Browse.	ù.	
Start menu name				
OSGeo4W		]		
-			1	
	< Back	Next >	Can	ncel

Figure 2: Selection of Local Package Directory

5. Left click on "Next" after selecting the required setting for connecting to Internet. It is important to make the right selection. If you are working behind proxy you can select the "Use HTTP/FTP Proxy:", if not you can skip the next step as well and select "Direct Connection" or "Use System Proxy Settings".

the appropria	e settings below.		 44
(	Use System Proxy Settings		
(	Direct Connection		
	Use HTTP/FTP Proxva		
	Proxy Host 172 31.7.55		
	D ( 0000		
	Port 8080		

Figure 3: Selection of proper option to connect to the Internet for downloading the packages

6. If you have selected "Use HTTP/FTP Proxy" kindly fill the **appropriate Proxy Details**. You can contact your local system Administrator in case you are unaware of the details. Click **Next**.

Select Your Internet Connection			1
Setup needs to know how you want it to connect to the internet. Choose the appropriate settings below.			ψ
O Use System Proxy Settings			
O Direct Connection			
Use HTTP/FTP Proxy:			
Proxy Host 172.31.7.55			
Port 8080			
1			
	-	1922	
		10 101010	

Figure 4: Filling up of appropriate proxy details for connecting to package repository.

7. Fill required **Proxy Authentication** Details for allowing the Installer to connect via the proxy. Click **OK** 

	Proxy Authentic	ation required	×
Down	۲	Proxy Authorization Required	
Conn	Proxy User ID Password	r tapopr	
Раск		OK) Com	
4		Canc	

Figure 5: Filling up of Proxy Details for Authenticating via configured Proxy

8. **Select** appropriate **Download Site** for your location, the list of sites should load automatically if the Network Installer is able to connect to the repository. Click **Next** after you select the appropriate Download Site.

Available Download Stee	 
https://download.osgeo.org	
https://www.norbit.de	

Figure 6: Selection of Appropriate Download Site for download of Required Libraries

9. Select **Keep** in the page to retain all the existing library versions, our goal is to only upgrade the "python-h5py" package to latest version. Alternatively if you select **Current** in this step all the packages will be upgraded and you can skip the next step.

es to install											C
	Clear						O Prev ) Curr	() Exp	View	Catego	ry
Current	New	B	S	Size	Package						
											>
ackages											
	es to install Current Current Unitides & Defau Default aut fault ackages	es to install Clear Current New Le_Utilities I Default Default aut fault ackages	es to install Clear Current New B  re_Utilities I Default Default aut fault ackages	es to install Clear Current New B S e_Utilities I Default Default aut fault ackages	es to install Clear Current New B S Size ne_Utilities & Default Default aut fault ackages	es to install  Clear  Current New B S Size Package  e_Utilities I Default Default ault ault ackages	es to install Clear Current New B., S., Size Package  e_Utilities & Default Default ault aault aault	es to install Clear Current New B S Size Package e_Utilities & Default Default ault aault aault	es to install  Clear  Current New B S Size Package  e_Utities & Default Default ault aaut aaut aaut	es to install  Clear  Current New B, S Size Package  e_Utities & Default Default ault aault aault aault	es to install  Clear  Current New B.,, S.,, Size Package  e_Utities Default Default aut aut ackages

*Figure 7: Selecting Appropriate Versions to be Installed for different packages* 

10. Search for **h5py** in in Search bar, and select the latest version under **Libs**section. Click **Next**.

elect Package: Select package	<b>s</b> es to install					C
iearch h5py		Clear		⊚ Keep ○ Prev○ Curr ○ I	Stp View	Category
Category	Current	New	B S Size	Package		1
🗆 Libs 🚱 Defa	ault	<b>€</b> 3.10.0-1	X 🗆 3	8k python3-h5py: Read and write HDF5 files from Python		
C	arkanee					>

Figure 8: Selecting the Latest vesion of python3-h5py for Installation

11. Confirm the required packages to be upgraded, note that a list of packages may be marked for upgrade to support the installation of python3-h5py package. Please ensure the presence of python3-h5py package and click **Next**.

The fol	Unmet Dependencies Found owing packages are required but have not been selected.			-
:-blosc	(1.21.6-3)		^	
	A fast, compressed and persistent data store library for C (runtime)			Ĩ.
	Required by: gdal310-runtime			
idal310-	runtime (3.10.3-2)			
adiore	The CDAL (OCD 2.10 portions library			
	The GDAL/OGR 5.10 funitine library			
	Required by: gdal, gdal-ecw, gdal-hdf5, gdal-mrsid, gdal-mss, gdal-oracle, gdal-sosi, liblas, po	dal-libs, python3-fiona, python	3-gda	
	Required by: gdal, gdal-ecw, gdal-hdf5, gdal-mrsid, gdal-mss, gdal-oracle, gdal-sosi, liblas, po	dal-libs, python3-fiona, python	3-gda	
Irass	(84.1-4) GRASS GIS 8.4	lal-libs, python3-fiona, python	3-gda	
jrass	(8.4.1-4) GRASS GIS 8.4 Required by: grass8, ggis-Itr-grass-plugin	lal-libs, python3-fiona, python	3-gda	
Irass	(84.1-4) GRASS GIS 8.4 Required by: grass8, ggis-ltr-grass-plugin	tal-libs, python3-fiona, python	3-gda ~	
jrass c	Required by: gdal, gdal-ecw, gdal-hdf5, gdal-mrsid, gdal-mss, gdal-oracte, gdal-sosi, liblas, po     (8.4.1-4)     GRASS GIS 8.4     Required by: grass8, qgis-ltr-grass-plugin	tal-libs, python3-fiona, python	3-gda v	

Figure 9: Confirmation Step for List of Packages to be upgraded

12. Provide necessary permissions and wait patiently till all the required packages are downloaded and installed on your OSGeo4W environment.

<b>togress</b> This page displays the progress of the download or installation.			10	¢
Downloading gdal310-untime-3.10.3-2.tar.bz2.from https://download.osgeo 33 % (3784k/11139k) 596.6 kB/s	ß			
Total:				
		_		

Figure 10: Progress Bar showing Status of Installation

13. Click **"Finish"**to finalize the changes, and if required Restart your system (if prompted) to ensure all the installations are effective.

OSGeo4W Setup - Installation Status and Create Icons	- 0
Installation Status OSGeo4W installation completed successfully.	۲
Installation Complete	

Figure 11: Finalizing the Installation by clicking Finish

#### **Python Libraries Installation**

For the SARPOLTOOL plugin to function properly, the dependent libraries also need to be installed. The same can be done from the OSGeo4W Shell. In order to use the shell to install libraries for the Python environment of QGIS, kindly ensure that the proxy settings are properly configured or the **pip**command can be used with proxy configuration in the shell itself. The following steps show the case with proxy configuration in pip.

#### Steps for Installation

- 1. Open the **OSGeo4W Shell** from the Windows Program Menu. It is a shell for the QGIS Python Environment.
- 2. Run the following command in OSGeo4W Shell:
  - pip install dask rasterio spectral tqdm xmltodict



Figure 12: OSGeo4W Shell where command to install the remaining modules are run

3. Alternatively if you are working in an environment which requires SSL Certificate check and Proxy Credentials you can use the following command to install from OSGeo4W Shell:

```
pip install --trusted-host pypi.org --trusted-host pypi.python.org --
trusted-host files.pythonhosted.org --proxy http://<proxy-
credentials> dask rasterio spectral tqdm xmltodict
```

## **SARPOLTOOL Installation**

SARPOLTOOL is a QGIS plugin which can be installed from the zip provided. The same will be eventually be available for Install from the official QGIS plugin repository shortly. In order to install the same from QGIS please follow the steps in the following section.

#### **Steps to Install**

1. Left click on "Plugins (menu item)" in " QGIS"



2. Left click on "Manage and Install Plugins... (menu item)" in "QGIS3"



3. Leftclick on "Install from ZIP (list item)" in "Plugins | Installed (17)"





4. Left click on "... (button)" in "Plugins | Install from ZIP"

5. **Select** the "sarpoltool.zip" from the directory where it is stored, and click **Open**.

§ Select a file					×		· · ·		
	QGIS > QGIS3 > profiles > default > python	plugins >			v Ö Search plugina P	·	Em 9		
Organize • New folder					lii • 🖬 🔮	agin: sarpoltool 🔹 🌒	12	Steps Recorder - Reconfing Now	×
E Pictures a	n Name	Date modified	Type	Size				(III) Payse Record Q Stop Record	Add Comment
SAM	mapswipetool_plugin	03-03-2025 16:37	File folder				Ne	lare	
	OpenTopography-DEM-Downloader	15-10-2024 14:43	File folder				146		
AIS DECODING	polsar tools	16-12-2024 10:57	File folder				-		New OGIS Man
THE	, Qgis2threejs	03-03-2025 16:38	File folder				-		Gallery
THE SLAP	QuickOSM	03-03-2025 16:38	File folder					Here and the second second second	QGIS has a new map
SARONITION	Shapetools	11-10-2024 14:06	File folder					CONTRACTOR AND ADDRESS	We are looking for su of beautiful maps may
End	sarpoltool.zip	09-04-2025 14:13	WinRAR ZIP archive	44,074 KB				A STATE OF A	QGIS. The maps will b displayed on the main
EDS OF								Content - Angel and a second	at https://ggis.org if
ebojos -								Armente, anapatre (1997)	power and versatility
fuiled a									great map to share, d
POIPOI									click this article to gallery and start shari
EUH_SHN_MINS_EIMMALEUES_080002434942_17099_510Cl									submissions!
and the second s									
Secola Data									QGIS User
Sample_Cara								Original and the second	Conference 202
DnaDrive.							Q	GIS User QCIS	Sweden
	8						C	onference 2025	Save the date! The
nie name: sarpottoor.2p					<ul> <li>Progin packages (1.2p 1.204)</li> </ul>				global QGIS User Conference will be
					Oper				Norrköping, Swede 2.3 June 2025 Ou
						-			
							Pr	oject Templates	
									New Empty Pro
									EPSG:4326 - WGS 84
		Close	Help						
							100		
New QC	IS version available: Visit https://download.gob.org to	get your copy of version 3.40	.5						
ype to locato (Cb144)					Coordinate	Scale :: 29854292 -	Magnifier 2005	6 0 Rotation 0.0 ° 0 🗸 Re	nder @EP5G:4326



6. Leftclick on "Install Plugin (button)" in "Plugins | Install from ZIP"

7. Left click on "Yes (button)" in "Security warning" as we are installing from a zip.

All			- 0 1			
installed	If you are provided with a oppendage containing a plugin to install, please which the file below and click the Justal/plugerbuttor. Please note for most users this function is not applicable, as the preferable way it to install plugins from a repository.	· · · · · · · · · · · · · · · · · · ·	· 調 異 く 裕 活			
😥 Upgradeable	ZP Bir Cruisers's takens's takens's Annual Resemon XCSS XCGI Strendley Methods in the Industry Secondard an		🛞 Pagae Record ( Stop Record 🛋 Add Comment 🚱 +			
1 Install from ZIP	Pristan Le canada ante de la compansa de la compa de la compansa de la compansa de la compansa de la compa de la compansa de la Compansa de la compansa de la compansa de la compansa de la Compansa de la compansa de la compans de la compansa de		News			
🌞 Seting:	Jashid Ruga		Area GCIS Bap Galary Control of the set of t			
	CS Security warring	X m an untrututed source can harm your compare. Outy- ved the pluga from a source you hout. Continue! gain.	QGIS User Conference 2025 Conference 2025 Conference 2025 See the date There See the date There 2.3 Jane, 2025			
			Project reinplates			
	Coat Page		New Engry Project			
	New QGIS version available: Visit https://download.com/to get your copy of version 3.40.5					
Q, Type to locate (Cb1+H)		Coordinate 🛛 🗞 Scale 1:20654292 👻 🔒 Magnifier	100% 🗘 Rotation 0.0 * 😂 🗸 Render 🐠 EPSG:4326 🚳			
🗄 🔎 Type here	e to search 🛛 🚉 🕂 💽 🗮 💁 🛤 💿 📑 💽 👪		^ 12 d0 US 09-04-2025 ₹			

8. **Plugin installed successfully** message is displayed to show that the plugin was successfully installed.



9. Left click on "SARTools (button)" in "QGIS" toolbar to launch the plugin.



#### **Enquiries to Designers**

- ① Contact Number: +91 854-2225122
- The Email Address: feedback\_mpsdd@nrsc.gov.in