



Indian Institute of Remote Sensing, Dehradun

Indian Space Research Organisation



Project Report

DEM Generation Process

Submitted by:

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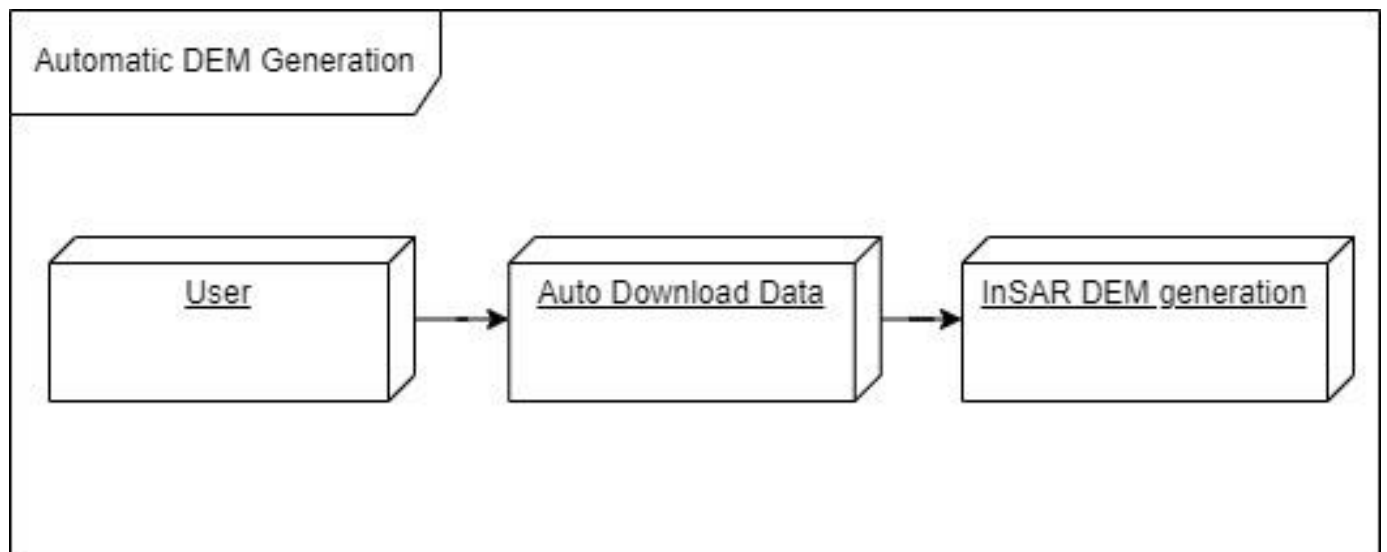
Shruti Vadrevu

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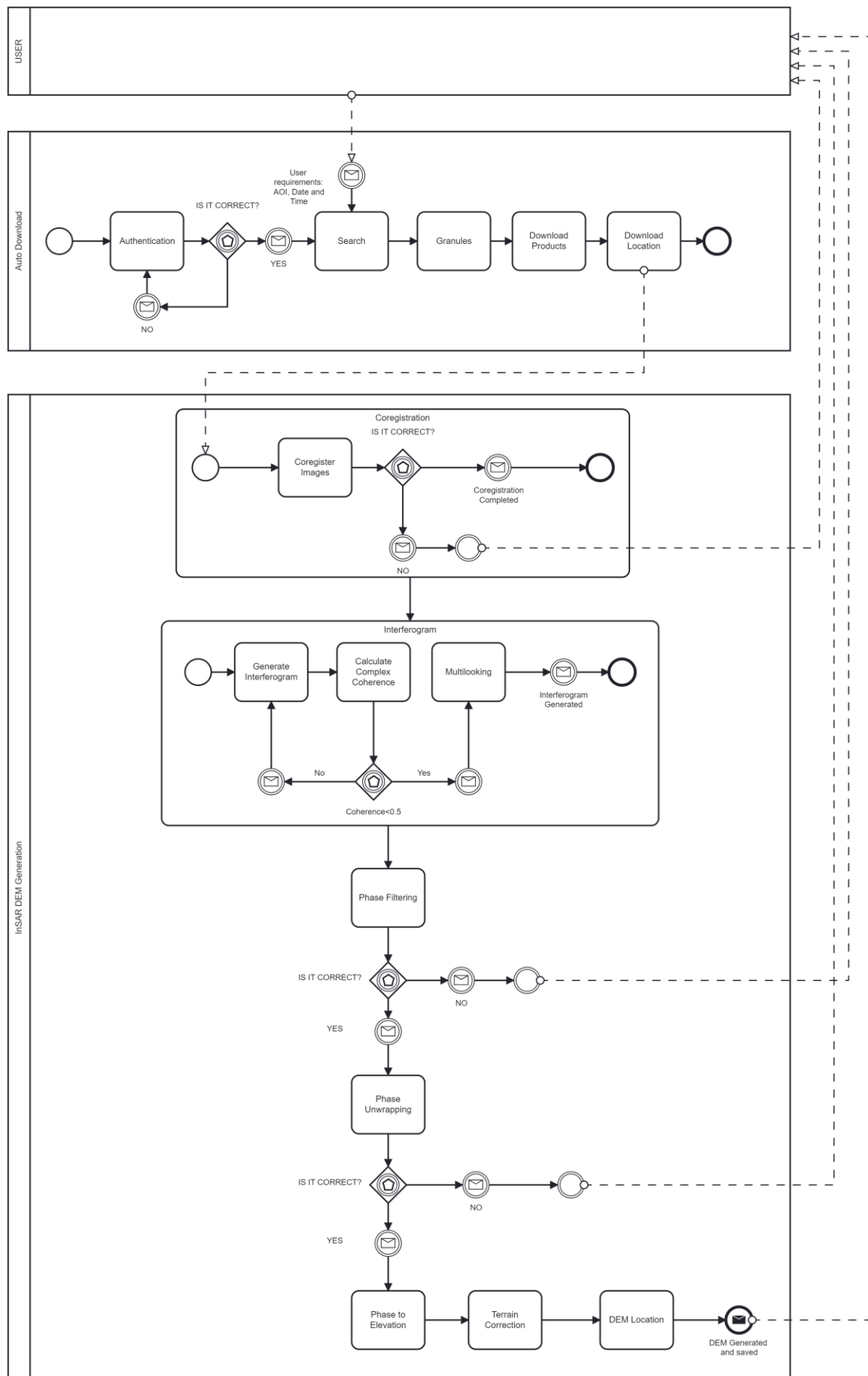
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1. Introduction

This report outlines the method and steps involved in generating a Digital Elevation Model (DEM) through an automated process using interferogram data acquired from Synthetic Aperture Radar (SAR). The DEM provides valuable information for various applications, including terrain mapping, subsidence monitoring, and surface deformation analysis. This report presents a detailed description of the process flow, including three distinct pools: Data Acquisition, Interferogram Generation, and DEM Processing. The automated process streamlines the generation of DEMs by leveraging interferogram data derived from SAR acquisitions. The interferogram serves as a powerful tool for extracting elevation information and creating high-resolution topographic maps. By automating the process, efficiency and accuracy are enhanced, enabling rapid and reliable DEM generation. The report will outline the steps involved in each pool, including automated data acquisition, interferogram generation, and subsequent processing to generate the final DEM. Through this comprehensive analysis, readers will gain insights into the automated generation of DEMs using interferogram, empowering them to leverage SAR data for precise terrain analysis and monitoring applications.

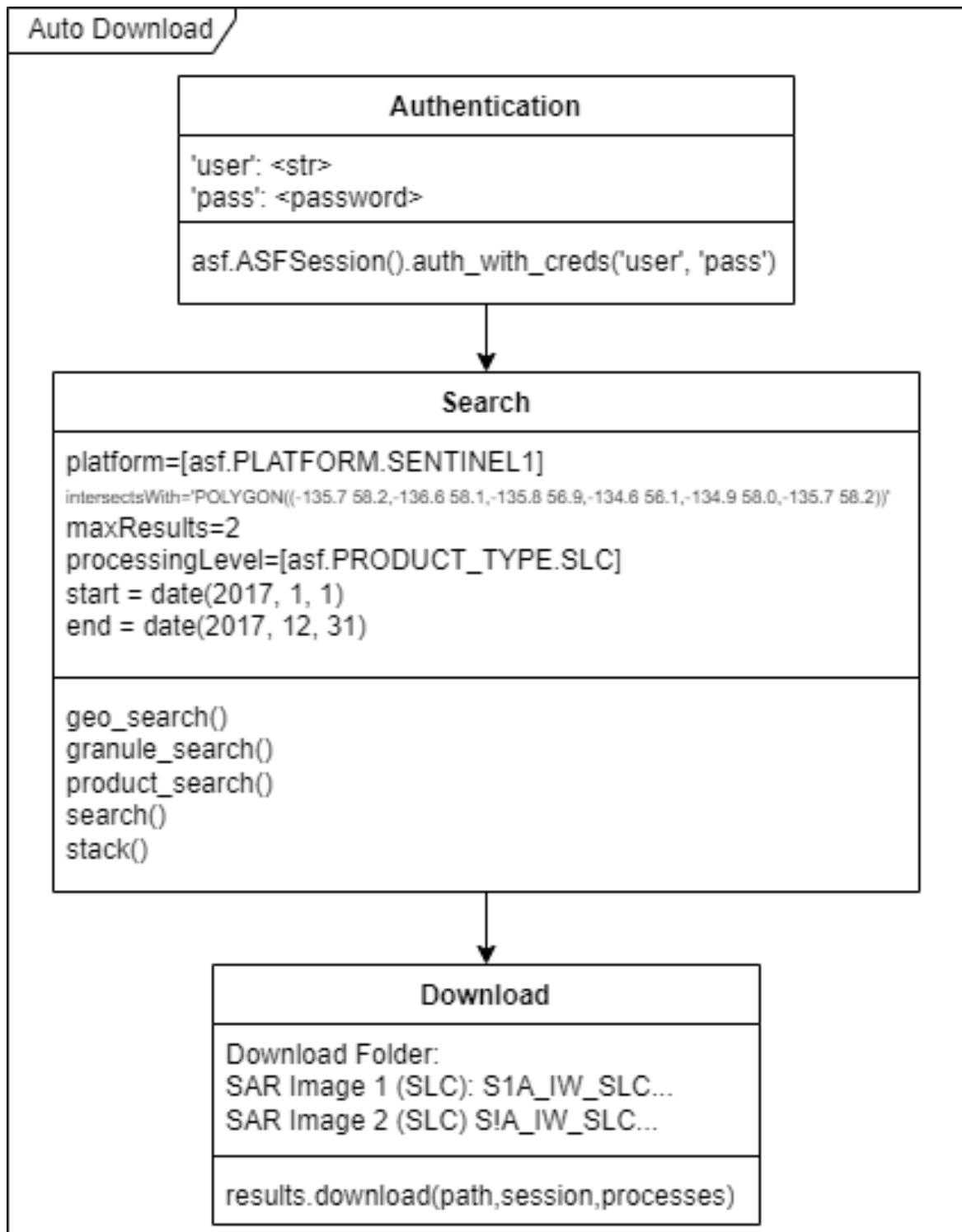


2. Business Process Modelling & Notation [BPMN] Diagram



3. Data Acquisition Pool

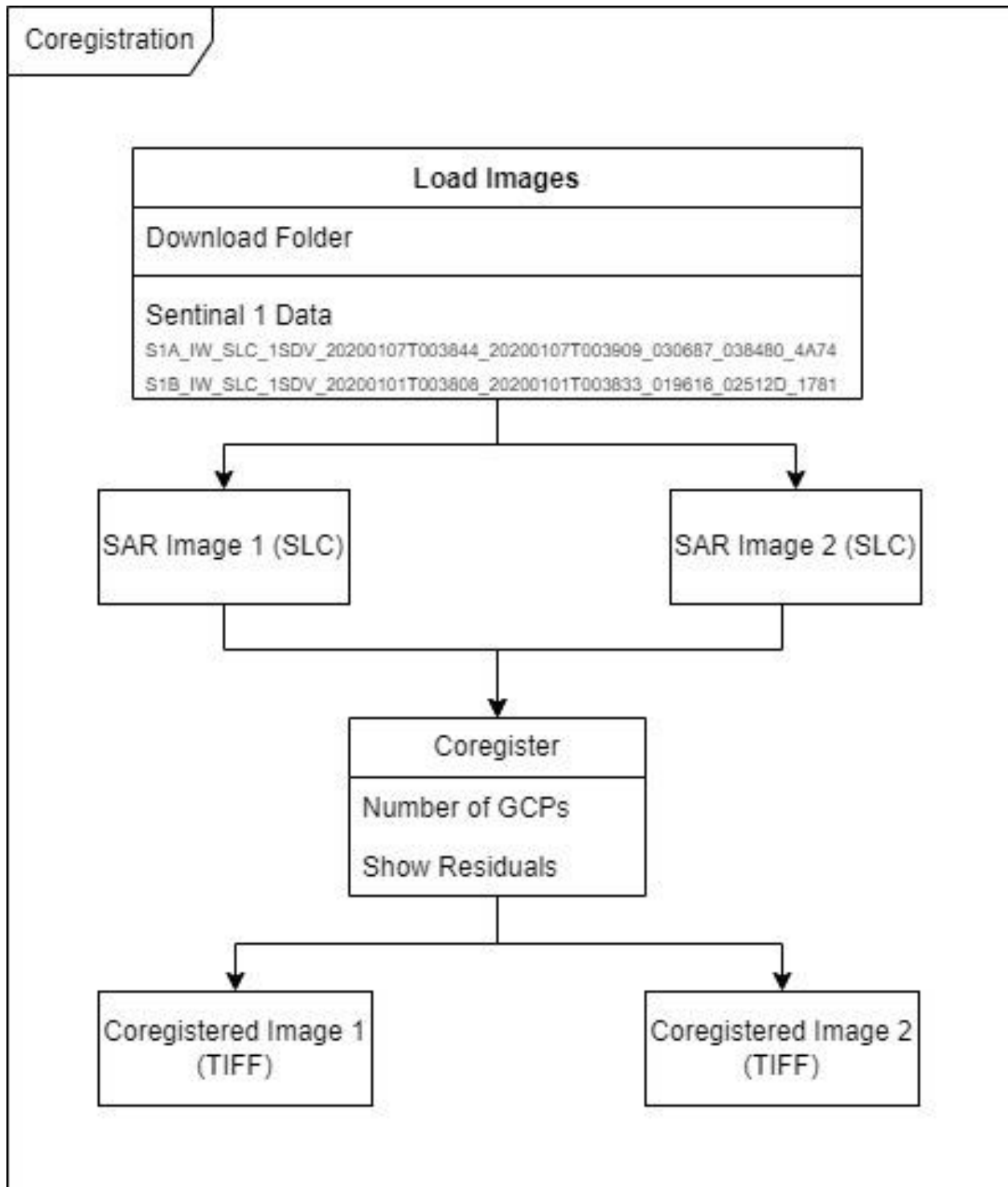
The Data Acquisition pool focuses on the automated downloading of SAR data. This pool includes the following steps:



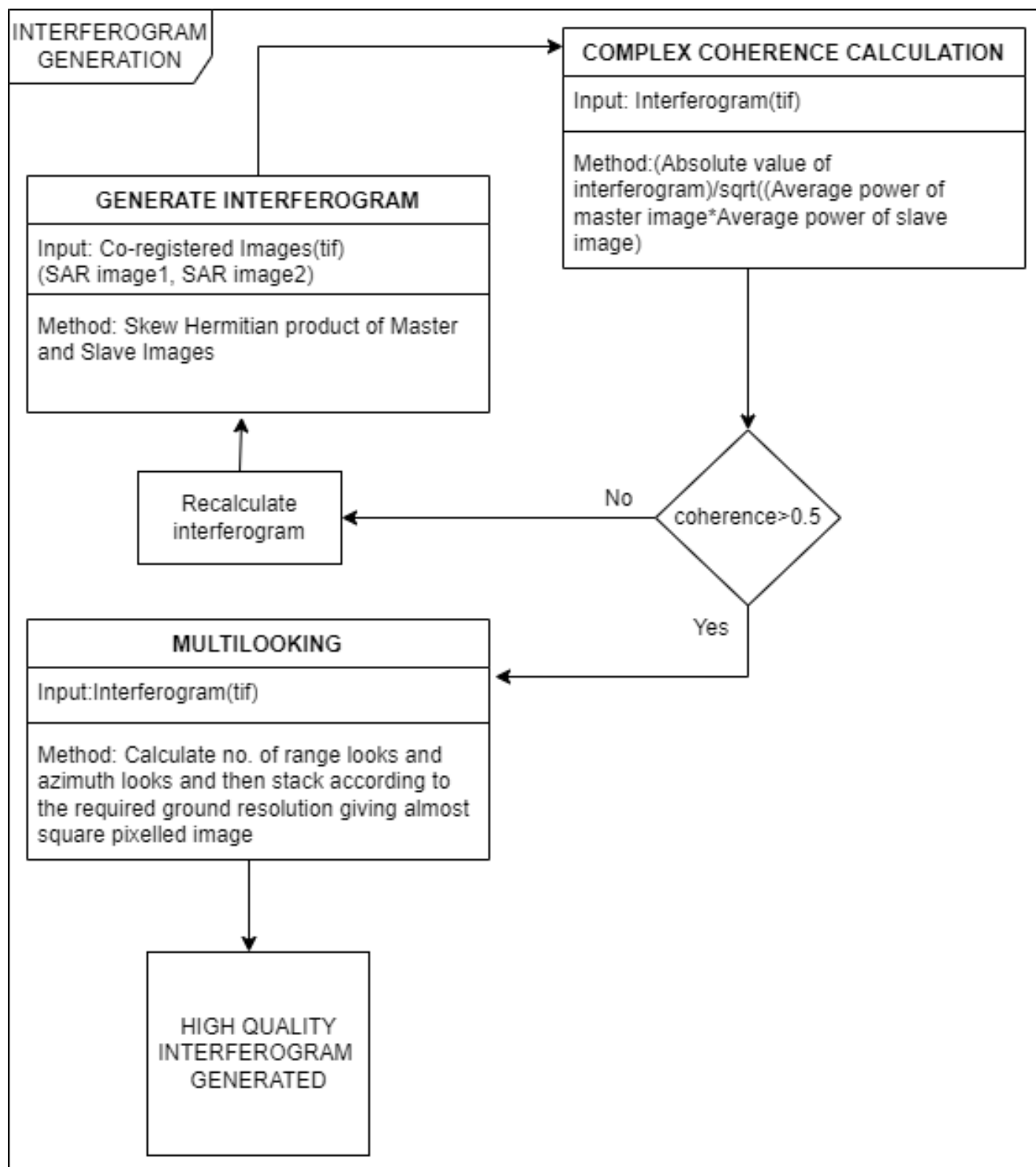
4. Interferogram Generation Pool

This pool includes the following Processes:

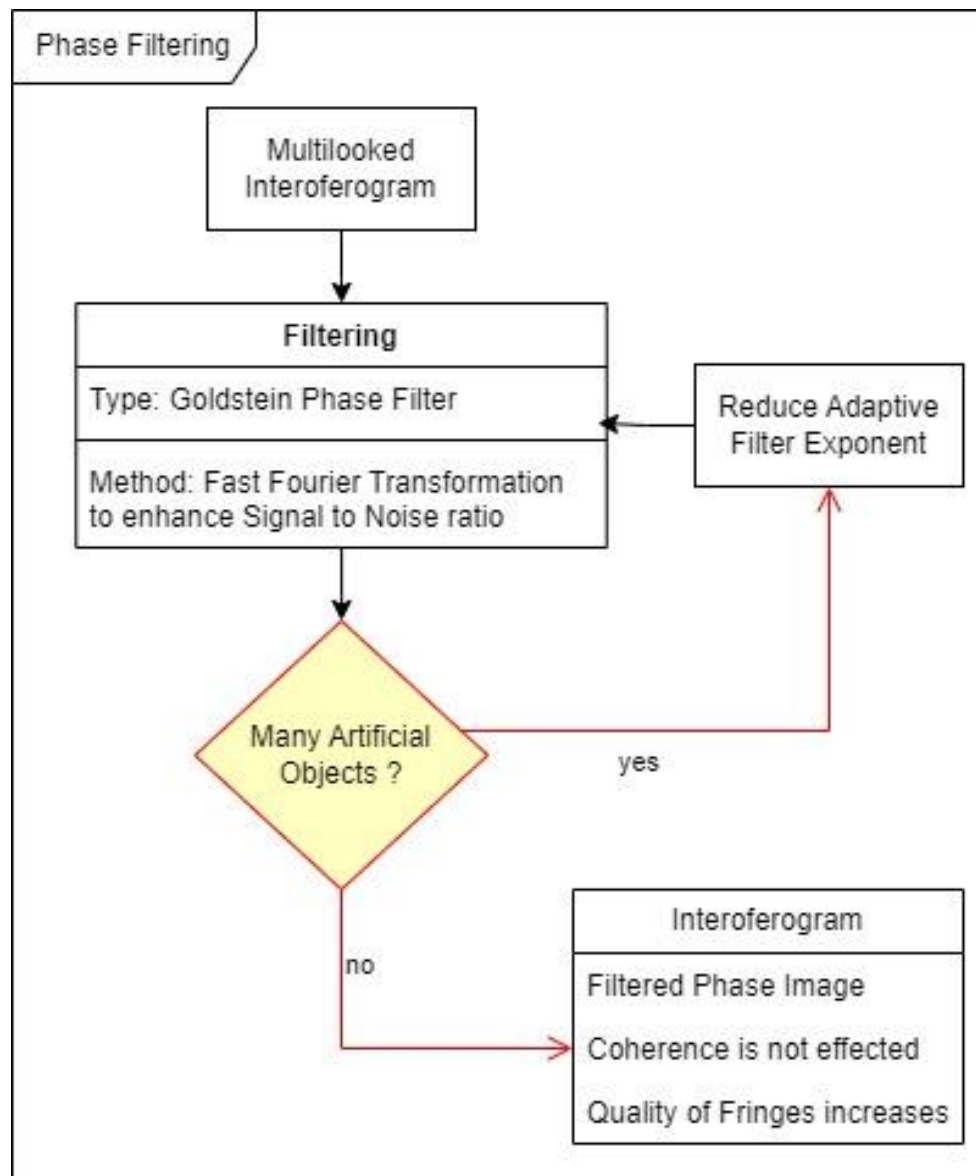
4.1. Coregistration



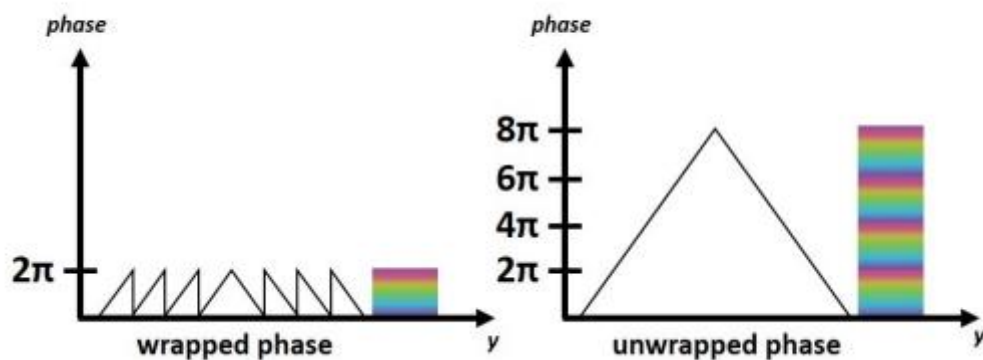
4.2. Interferogram generation



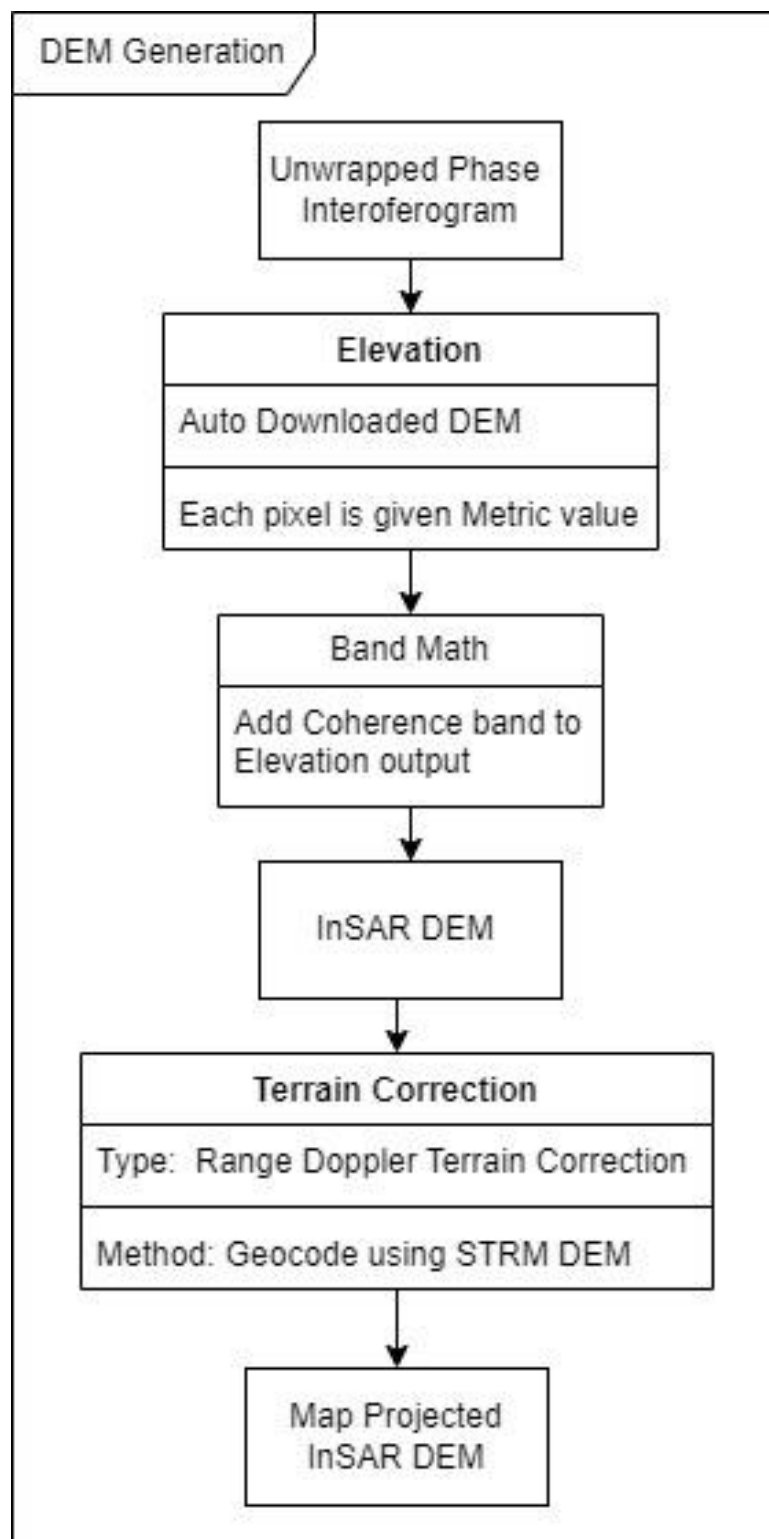
4.3. Phase Filtering



4.4. Phase Unwrapping



4.5.DEM Generation and Saving



5. Conclusion

The generation of a Digital Elevation Model (DEM) through an automated workflow using interferogram data involves two main stages: Data Acquisition, Interferogram Processing. In the Data Acquisition stage, automated processes facilitate the retrieval of Synthetic Aperture Radar (SAR) data by performing authentication, searching for relevant data granules, and determining the download location. The Interferogram Generation stage encompasses tasks such as calibration, filtering, coregistration, interferogram formation, complex coherence calculation, and multilooking. These tasks ensure the alignment of SAR images, the creation of the interferogram, and the enhancement of data quality. Once the interferogram is generated, the subsequent tasks in the Interferogram Generation stage include phase filtering, phase unwrapping, phase to elevation conversion, terrain correction, DEM location, and the actual generation and saving of the DEM. These tasks refine the interferogram, resolve phase ambiguities, convert phase differences to elevation values, correct for terrain-related errors, and produce the final DEM in a suitable format.

Overall, this automated workflow optimizes the process of DEM generation from interferogram data, improving efficiency and accuracy.