Seamless Synthetic Aperture Radar (SAR) Archive (SSARA) for Interferometry Analysis

Program: NASA ROSES 2011 ACCESS "Advancing Collaborative Connections for Earth System Science"

Quarterly Report Period: Y1, Q1-Q4

Project Team:
UNAVCO: Charles Meertens (PI), Christopher Crosby, and Scott Baker
Jet Propulsion Laboratory (JPL)**:** Eric Fielding (Co-PI)
Alaska Satellite Facility (ASF): University of Alaska, Fairbanks: Jeremy Nicoll (Co-PI), Gwen Bryson, Brian Buechler
San Diego Supercomputer Center (SDSC), University of California, San Diego: Chaitanya Baru (Co-PI), Choonhan Youn

Summary of Accomplishments (Limit 2,000 characters)

- Completed two month+ agile scrum development sprints and corresponding sprint review meetings.
- Implemented unified search APIs at ASF and UNAVCO providing agnostic search and query results for data from both SAR archives.
- Implemented federated SSARA search, to access metadata at both ASF and UNAVCO (via aligned APIs)
- Presented poster IN31A-1500 at the Fall 2012 American Geophysical Union meeting in San Francisco, CA in session IN015: "Data Interoperability and Inter-Use Solutions" detailing SSARA project and unified Seamless SAR Archive API.
- Initiated InSAR product format and metadata definition and terrain correction service development.
- Held project kickoff meeting in Fairbanks, AK at ASF, and follow on planning and coordination calls w/ SSARA team.

Current Progress Description (Limit 2,000 characters)

Primary activities for the past year of SSARA project work have been focused on project initiation and coordination, and efforts to align ASF and UNAVCO SAR metadata and web service API definitions and functionalities and begin product format and metadata definitions. We've completed year one with the development of a federated query service able to retrieve data from both ASF and UNAVCO SAR archives.

The first ASF coordinated agile scrum sprint was completed on 19 October 2012 with a Sprint Review meeting. The outcome of the development sprint was a unified API that provides agnostic searches of ASF and UNAVCO archives as well as agnostic search results from both. The primary development team for this sprint included: Gwendolyn Bryson, Brian Buechler, Kirk Hogenson and Gregory Short at ASF, and Scott Baker at UNAVCO. Christopher Crosby, David Phillips, and Charles Meertens from UNAVCO,

Eric Fielding from JPL, participated in the Sprint Review meeting. The API was moved into production at UNAVCO.

The SSARA project team presented a poster (IN31A-1500 - http://fallmeeting.agu.org/2012/eposters/eposter/in31a-1500/) at the Fall 2012 American Geophysical Union meeting in San Francisco, CA in Session IN015. The poster covered an overview of the SSARA project, highlighting the tasks already implemented by the project and tasks to be implemented in the future. Details about the unified SSARA API implemented at ASF and UNAVCO were presented including the standard set of query fields and JSON result parameters that can be implemented at other data archives.

Coordination with JPL led to a preliminary list of metadata items necessary for InSAR products. This list of metadata requirements will help define the produce archive schema and guide the development of InSAR product archives at ASF and UNAVCO.

Most recently, in Q4 of Y1, a second agile scrum sprint was completed with a beta SSARA federated query Web service that is able to access APIs at both ASF and UNAVCO to retrieve metadata and return results in a variety of formats (e.g., interactive map view, JSON, CSV). As part of this release, users are provided with the ability to create and execute beta SSARA Federated Queries by accessing ASF's Interactive API Tool at: https://portal.asf.alaska.edu/api/tool. E. Fielding at JPL has been testing and providing feedback on the federated query service and has demonstrated its utility by using the service to retrieve UAVSAR data from ASF.

E. Fielding made a presentation at JPL during Y1Q4 to Martha Maiden, Program Executive for Earth Science Data Systems, NASA, on the SSARA project and expected outcomes. This was a nice opportunity to highlight the project and preliminary results.

Work Plan for Next Reporting Period (Limit 2,000 characters)

The SSARA work plan notes the following tasks for Y2Q1:
- Establish NSAR Product Archives at ASF and UNAVCO
- Implement NSAR federated query and InSAR product download API
- Beta test ASF InSAR processing service with NSAR terrain correction
- Project team meeting at UNAVCO
- Add federated query and download for InSAR products in ASF and UNAVCO web tools
- Discuss InSAR interferometric product metadata (metadata shipped w product?) (possibly based on ARIA) Deferred from Y1Q2.
- Submit quarterly report to NASA

However, for a variety of reasons noted below, we expect that the tasks for Y2Q1 will differ somewhat from those described in the workplan.

Schedule Status (Limit 2,000 characters)

Aspects of the SSARA project are currently on schedule, while we are slightly behind in other areas. Delays are described below

Delays/Problems Experienced (Limit 2,000 characters)
The SSARA project is slightly behind the project workplan in the areas of QC metrics and InSAR product archives. We attribute this delay to two factors: 1) Although the project initiated April 1, 2012, ASF did not receive its funding until at least one quarter later, delaying project progress and setting us behind from day one. 2) The SSARA project has chosen to use an Agile Scrum sprint approach to software development. This approach has proven to be very effective at achieving project goals, but it is not well aligned with the planned incremental and continuous work approach defined in the work plan. Thus the plan and actual development tasks have fallen out of sync.

Corrective Actions/Recovery Plan (Limit 2,000 characters)
Following the submission of this annual report, we intend to revisit and revise the SSARa workplan for Y2. As part of this process we will review task status and attempt to better align project work with planned Agile sprints that will occur. We will submit the revised work plan to our NASA program officer upon completion.

Technology Readiness Level Assessment (Limit 2,000 characters)
TRL = 5

Comments (Limit 2,000 characters, or about 200 words)

AGU Abstract #IN31A-1500: The NASA Advancing Collaborative Connections for Earth System Science (ACCESS) Seamless Synthetic Aperture Radar (SAR) Archive (SSARA) project is a 2-year collaboration between UNAVCO/WInSAR, the Alaska Satellite Facility (ASF), the Jet Propulsion Laboratory (JPL), and the San Diego Supercomputer Center (SDSC) to design and implement a seamless distributed access system for SAR data and derived data products (i.e. terrain corrected interferograms). A seamless SAR archive increases the accessibility and the utility of SAR science data to solid Earth and cryospheric science researchers. Building on the established webs services and APIs at UNAVCO and ASF, the SSARA project will provide simple web services tools to seamlessly and effectively exchange and share space- and airborne SAR metadata, archived SAR data, and on-demand derived products between the distributed archives and individual users. Development of standard formats for data products and new QC/QA definitions will be implemented to streamline data usage and enable advanced query capabilities. The new ACCESS-developed tools will help overcome the obstacles of heterogeneous archive access protocols and data formats, data provider access policy constraints, and will also enable interoperability with key information technology development systems such as the NASA/JPL QuakeSim and ARIA projects, which provide higher level resources for geodetic data processing, data assimilation and modeling, and integrative analysis for scientific research and hazards applications. The SSARA project will significantly enhance mature IT capabilities at ASF's NASA-supported DAAC, the GEO Supersites archive, supported operationally by UNAVCO,

and UNAVCO's WInSAR and EarthScope SAR archives that are supported by NASA, NSF, and the USGS in close collaboration with ESA/ESRIN.

Available online at: http://fallmeeting.agu.org/2012/eposters/eposter/in31a-1500/