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Title:

APPLICATION OF JPL/NASA AIRSAR AND TOPSAR DATA TO SAN
CLEMENTE ISLAND ARCHAEOLOGY

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The US Departments of Defense and Energy are required to locate and care for archaeological resources on lands they control. Over 19 million acres of DoD land alone remains unsurveyed, and current methods are both slow and expensive. In the western US basic or "phase one" surveys cost \$30-\$35 per acre, far more in the heavily vegetated eastern US. These surveys are important as

inadvertent discovery of significant archeological sites during military training or development activities result in delays as evaluation and mitigation are required before site disturbance. Therefore, improvements to phase one surveys are desired.

We seek to evaluate JPL AIRSAR multiparameter radar imagery and TOPSAR high resolution digital elevation data (<http://airsar.jpl.nasa.gov/>) as a tool to help locate environments likely to contain sites, or even directly detect some classes of sites. Our goal is to develop specific procedures for incorporation of radar image data, and high resolution DEMs into standard archaeological phase one regional surveys. The diversity of AIRSAR radar parameters will allow evaluation of the most useful band and polarization combinations for this application. The radar imagery is collected at three wavelengths (~68cm, ~24cm, and ~5.6cm P, L and C-Band respectively) and full polarization diversity (HH, HV, VV, VH). Resolution for the 80 MHz L band image data is up to 1.6m per pixel. TOPSAR digital elevation models (DEMs) have vertical resolutions as high as 1.5 m.

Our initial study location is San Clemente Island, offshore southern California. The island has many positive attributes as an initial study area. The northern part is well surveyed archaeologically, and data for the island is available in GIS format. The southern part is less well characterized, providing an "unknown" area in an identical environment. The US Navy has controlled the island for many years, so modern overprint is reduced. Meanwhile, the Native American cultures are identical to those well studied onshore. AIRSAR and TOPSAR data have been collected and analysis is underway. We have found some types of sites are directly detectable on the radar image data. Shelter platforms are made of rock, and are typically bright in the radar images due to scattering from both the rocks and preferentially associated vegetation. Critically important is accurate georeferencing of the image data. Work to date indicates that AIRSAR data will be very useful for assessment of DoD/DoE lands, and the procedures developed will provide an additional tool for archaeological assessments.