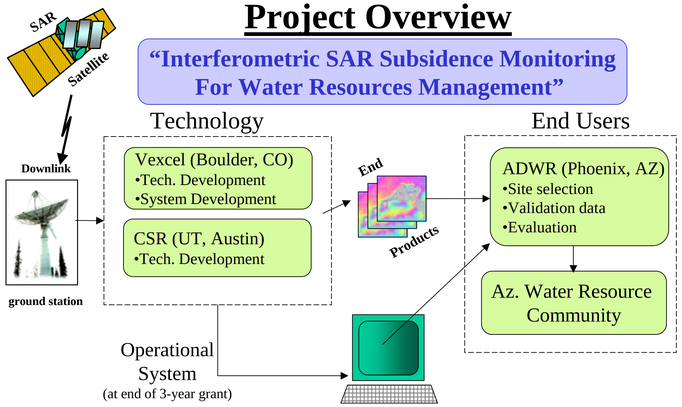
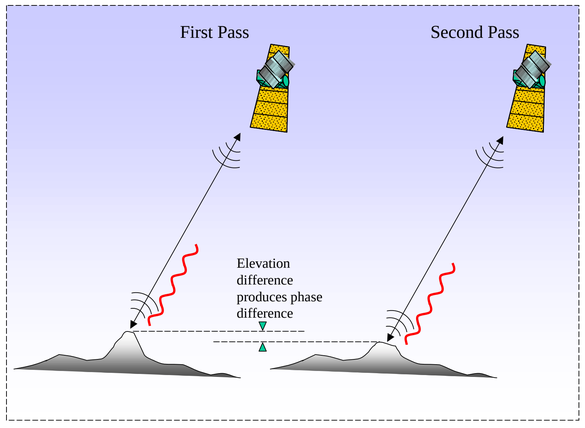
Project Overview

"Interferometric SAR Subsidence Monitoring For Water Resources Management"



SAR Platforms

In *conventional* differential SAR interferometry (DIFSAR), the SAR satellite collects data over the same region at two different times. Elevation changes on the surface create phase changes in the received signal and ground motion may be inferred.



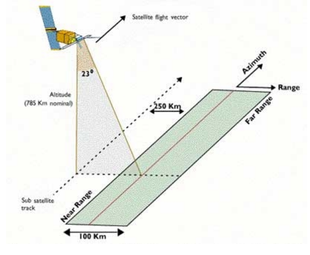
Characteristics of Synthetic Aperture Radar

two-dimensional imagery

- transmits pulsed cosine wave
- pulse, sample, pulse, sample, …
- range direction
- azimuth direction (along-track)
- geocoded imagery pixel size ~ 10-25 meters
- geocoded InSAR pixel size ~ 50 meters

contains phase information

- coherent imaging
- complex-valued pixels convert to amplitude & phase



$C = I + jQ = Ae^{j\psi}$ where

$A = \sqrt{I^2 + Q^2}$ = amplitude

$\psi = \tan^{-1}(Q/I)$ = phase

InSAR uses phase difference of two SAR images phase values between 0 and 2*pi*

0 — 2π

Purpose of the Project

Develop an application/service to provide reliable, routine, and affordable land subsidence measurements over large areas, derived from DIFSAR data.

RELIABLE

Data the user community can trust and rely upon to make difficult decisions concerning water resources and land management

AFFORDABLE

Minimize the COST/VALUE ratio for all users

ROUTINE

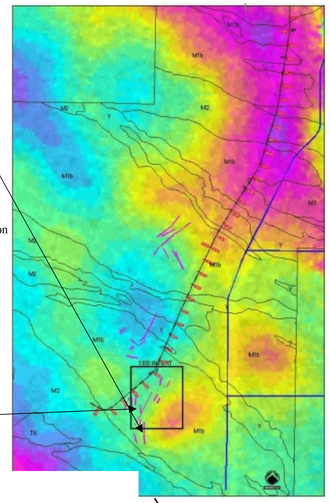
Purchase new data and produce new interferograms on at least an annual basis

Project End Products

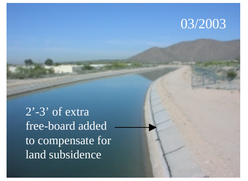
McMicken Dam Feature

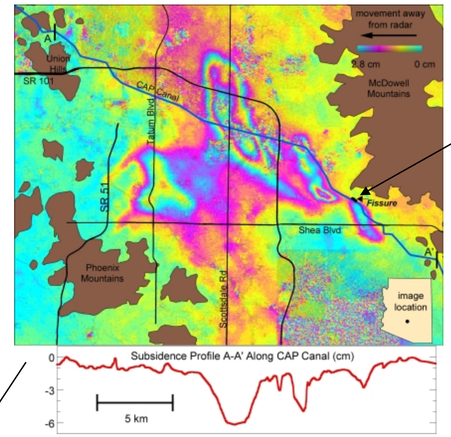
Fissure with surface expression

Fissure without surface expression (exposed in trench)



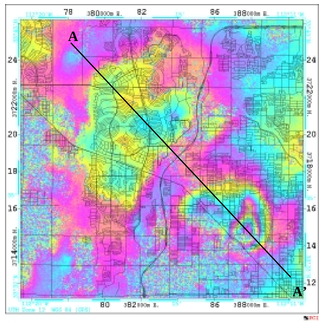
East Phoenix, North Scottsdale Feature

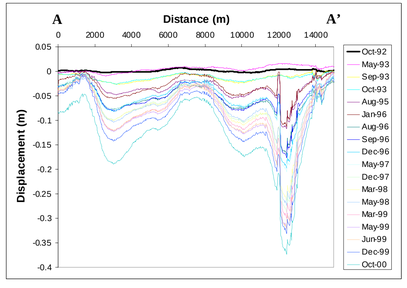




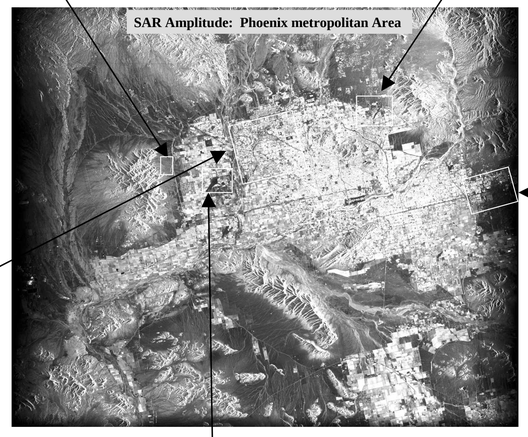
Fissure with surface expression

SunCity/Peoria/Glendale Feature

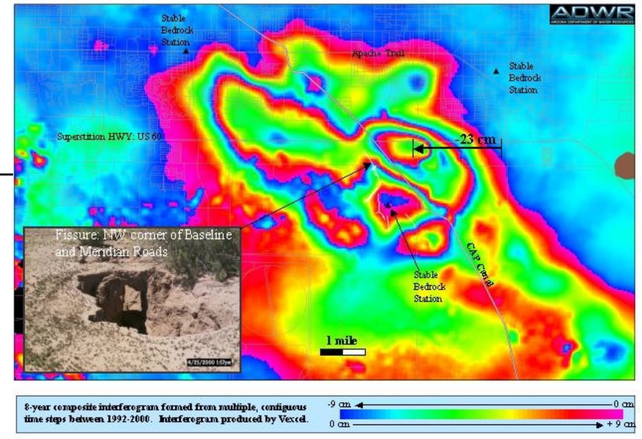




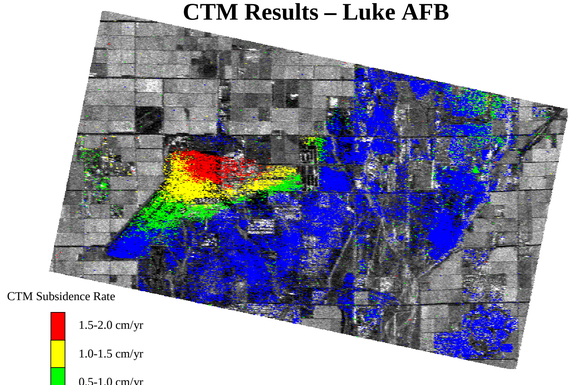
SAR Amplitude: Phoenix metropolitan Area



Composite Interferogram: 1992-2000 East Salt River Valley



CTM Results – Luke AFB



Superstition Highway Deformation 05/17/92 to 04/19/2000