

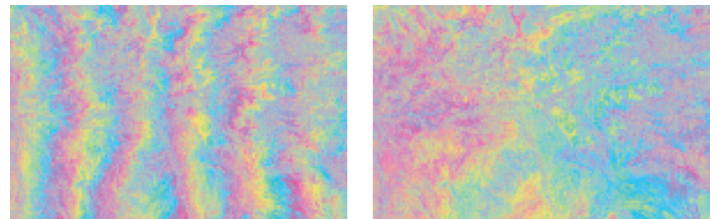
AGI Technology Helps MDA Refine Their Enhanced Definitive Orbit Tool (EDOT)

SAR Imagery Product Benefits from AGI Accuracy

THE VIEW FROM ABOVE: MacDonald, Dettwiler and Associates Ltd (MDA) owns and operates RADARSAT-2—a Synthetic Aperture RADAR (SAR) Earth observation satellite. For years, RADARSAT-2 has produced SAR imagery for clients around the world. MDA wanted higher quality Interferometric SAR (InSAR) images and hoped that improving their ability to determine the orbit of RADARSAT-2 would allow for better determination of phase difference between two satellite images of the same area. The more accurately they can determine this difference, the higher the resolution they could provide.

MAKING IMPROVEMENTS: MDA wanted to improve SAR imaging capabilities for Interferometry (InSAR), Digital Elevation Mapping (DEM) and geolocalization. They felt that better knowledge of the spacecraft's position and attitude could achieve this. The goal was to reduce the number of fringes on interferograms by achieving submeter position accuracy of the SAR antenna. MDA worked with AGI's Orbit Determination Tool Kit (ODTK) to allow for sub-meter orbit determination accuracy—an approximate tenfold improvement. Tom Johnson, AGI's Orbit Dynamics Expert and Vice-President of Engineering Solutions, provided direct support to process necessary satellite GPS information into ODTK for satisfactory orbit determination.

MDA improved SAR imaging capabilities for Interferometry (InSAR), Digital Elevation Mapping (DEM) and geolocalization with better knowledge of spacecraft position and attitude. They used AGI's Orbit Determination Tool Kit (ODTK) to reduce the number of fringes on interferograms with submeter position accuracy—providing an approximate tenfold improvement in current orbit determination.



Example of interferograms processed with previous orbit data (left) and EDOT orbit data (right)



Results show an order of magnitude improvement in orbit accuracy over previous tools. Validation using InSAR interferograms shows reduced fringes and geolocalization using ground-based corner reflectors suggests submeter orbit accuracy. EDOT—proven robust and reliable—is now part of regular satellite operations..

SEEING THE BIGGER PICTURE: MDA refined orbit determination parameters to optimize performance over all conditions RADARSAT-2 faces. They integrated the Enhanced Definitive Orbit Tool (EDOT) into RADARSAT-2 in 2014 with positive results. With new ephemerides from seven years of back-orbit telemetry, future image acquisitions will benefit from EDOT's enhanced accuracy—and previous products can be reprocessed with higher precision.