



## **Potential applications of state of the art synthetic aperture radar in planetary exploration**

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Synthetic Aperture Radar (SAR) is in Earth remote sensing a well established tool to gather information through tight clouds and even at night. The NASA-JPL Magellan mission conducted from 1990 until 1992 demonstrated this technique in planetary exploration. Since that time SAR instrument technology as well as data processing methods, especially SAR interferometry has developed much further. The paper gives an overview of the state of the art with the example of the German TerraSAR-X satellite which shall be launched in summer of 2006. This instrument will deliver imagery with a spatial resolution of up to 1m which is 100 times better than the images from the Magellan SAR. Studies have shown that complete image coverage as well as a digital elevation model of the planet Earth can be obtained within a time frame of two years. The lateral resolution of the elevation model would be 10m and the vertical resolution 1m. Other applications are the detection of land slides as well as volume change and velocity measurements of glaciers. With differential interferometry it is possible to image small displacements of the planet's surface in the centimeter range which appear after earth quakes or at active volcanoes. The relevant applications are summarized and an outlook is given where these techniques may have a potential in planetary exploration. We suggest to conduct further studies to explore the possibilities of a SAR mission to the planets Mars, Venus, or beyond.