Exploitation of the Radar Images Geometric Deformations to the Quantification of Dips and 3D Modeling

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Geometric deformations generated during the acquisition by spaceborne RADAR (Radio Ranging And Detection) sensor are directly linked to the properties of acquisition: elevation of the sensor, direction of the pulse, angle of incidence and topography. Those geometric deformations emphasize the variations of the topographic surface, indicating discontinuities being able to be of geological origin: lithological and, or, structural. However, these deformations are barrier to the localization and the quantification of these objects.

We modeled the geometric deformations of the SAR sensor and we propose a graphic method allowing to quantify the dip of the geological object. Knowing parameters of acquisition, this model can be inverted in order to compute the dip and strike of the slope that has generated the geometric deformation between a scene in radar geometry and a scene in orthorectified geometry. This graphic method is not affected by artifacts of the Digital Elevation Models and its derived calculations. The ground validation of this method has been achieved in the southern Tunisian Atlas and attests of a standard deviation lower than 7°. In the absence of ground data, this method can thus be used to increase dips points necessary to the realization of a 3D geological model. Key Words: RADAR, dip, modeling