Application of ERS-1/2 SAR and SIR-C/X-SAR Data in Geologic Studies at Bir Safsaf, Egypt

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Bir Safsaf, in southern Egypt (lat 22=B036'N, long 29=B030'E), is a small an=
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inconspicuous oasis of grasses and a few palm tress that lies within the hyperarid "core" of the eastern Sahara. Bir Safsaf and vicinity has earlier been shown from analyses of SAR images acquired during the Shuttle Imaging Radar (SIR) missions A-C to possess optimal geologic conditions for demonstrating the use of spaceborne SAR in sand penetration and mapping features of geologic, economic, and paleoclimatic importance in the northeastern Sahara. Recently acquired SAR images of Bir Safsaf and vicinity from ERS-1/2 have been mosaicked together and are being used as C-band basemaps in the field. They are being interpreted in conjunction with the multifrequency (X-, C-, and L-band) and polarimetric SIR-C/X-SAR images to document, for example, the roles of SAR wavelength, incidence angle, and polarization in portraying geologic contacts and associated fracture zones in weathered granite and migmatite crystalline rocks exposed below a thin cover of blow sand at Bir Safsaf. These contacts and fracture zones are mostly obscured on conventional imagery such as Landsat TM. Other examples of SAR frequency-dependent enhancement of geologic features at Bir Safsaf and recently described by the authors included (1) a north-trending bedrock lineament system of eolian origin discriminated specifically at X-band, (2) portrayal of local late Quaternary channels on images acquired at all three radar bands (X-, C-, and L), and (3) remote detection of shallow (1-2 m deep) ground water at Bir Safsaf itself.

NOTE: The above abstract must stand by itself and will not be immediately followed by a formal paper for the symposium volume. A formal paper describing our interpretation of SIR-C/X-SAR images acquired for us (as SIR-C/X-SAR Investigators) at Bir Safsaf is currently in press for the Special SIR-C/X-SAR Issue of Remote Sensing of Environment (December, 1996). The ERS-1/2 SAR data that covers Bir Safsaf (Egypt) (acquired during the tandom operation using the portable receiving deployed in Israel--late 1995 and 1996) was only brought to our attention and acquired by the authors in recent months. Prior to the tandom mission, ERS SAR data covering latitudes as far south as Bir Safsaf (22 degrees N.) in Egypt were notavailable from the Frascati receiving station. We are planning however to check out the new ERS SAR images of Bir Safsaf in the field (at Bir Safsaf) during the two weeks just prior to the Florence meeting. Therefore, G.G. Schaber hopes (pending availability of travel funds) to present the results of these field studies (using both ERS-1/2 and SIR-C/X-SAR) at the meeting.