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<http://earthquake.usgs.gov/research/geology/turkey/usgsteam2/pages/f3-34.html>

Information Dossier

Damage assessment after earthquake in the Van province in eastern Turkey

Safer Activation Number: GERS110

October 2011



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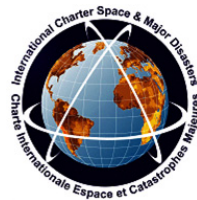


TABLE OF CONTENTS

1. Introduction
2. Area of interest
3. Satellite Image Interpretation
4. Results

1. INTRODUCTION

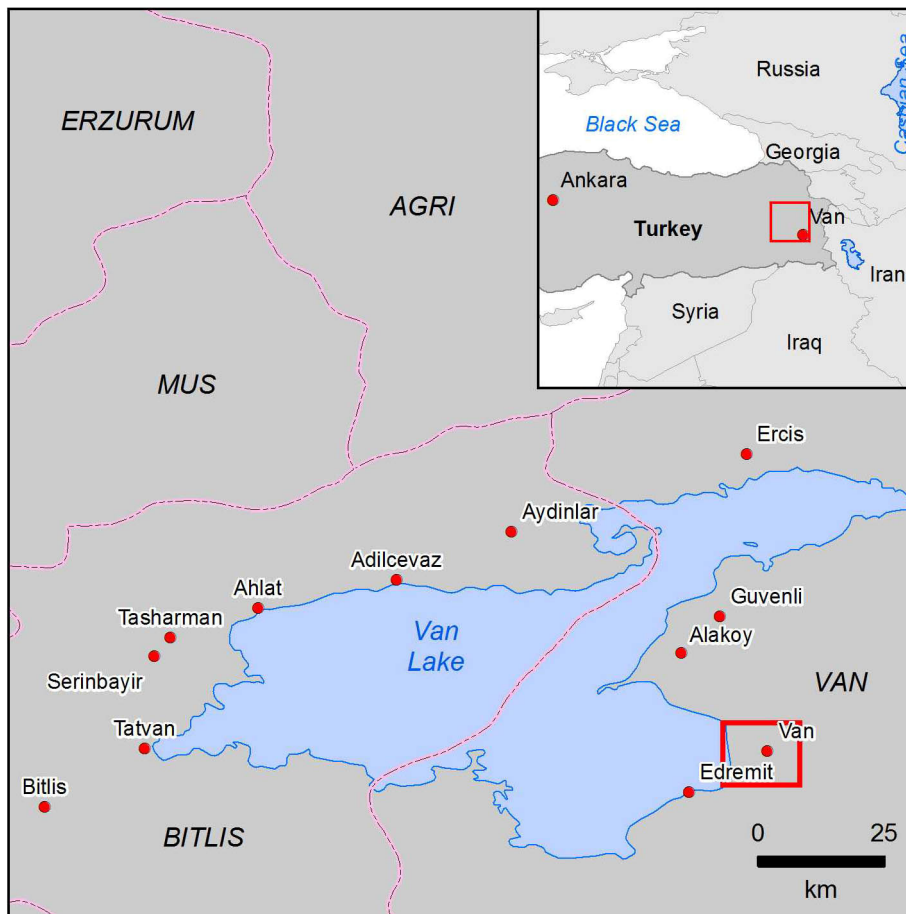
On Sunday October 23, 2011 an earthquake with a magnitude of 7.3 at 5 km depth hit the provinces of Van and Bitlis in eastern Turkey, followed by a series of powerful aftershocks of magnitudes up to 5.6. The epicenter was located at 38° 37' 40.80"N, 43° 29' 9.60"E, at the village of Tabanlı 19 km northeast of the city of Van between the Van Lake and the Iranian border. Several municipalities around the Van Lake were affected. Especially the settlement of Bitlis on the west side and Ercis on the north side of the lake were hit severely. According to Turkish media phone lines and electricity had been cut off. Thus initial reports of damage and casualties have been hard to come by. Current estimates speak of 471 deaths and about 1,650 injuries. This number is expected to rise.

Within the framework of GERS 110 and Charter Call 379, damage assessment maps have been produced for the areas of Bitlis and Ercis. No map has been produced for the settlement of Van because only parts of the image could be analysed due to inappropriate acquisition conditions. Examples of damages of the settlement of Van are presented in this information dossier.

The images presented in this information dossier show potential damages caused by the quake derived from QuickBird-2 imagery (spatial resolution 0.6 m) acquired on October 26, 2011 by comparing with very high resolution optical reference imagery (Worldview-2) acquired prior to the earthquake.

2. AREA OF INTEREST

The map shows the area of interest of the settlement Van in eastern Turkey.



Area of interest of the settlement of Van in eastern Turkey



3. SATELLITE DATA INTERPRETATION

In order to identify potential damages in the settlement of Van, very high resolution optical satellite images (spatial resolution 0.5 - 0.6 m) were analysed (see table 1).

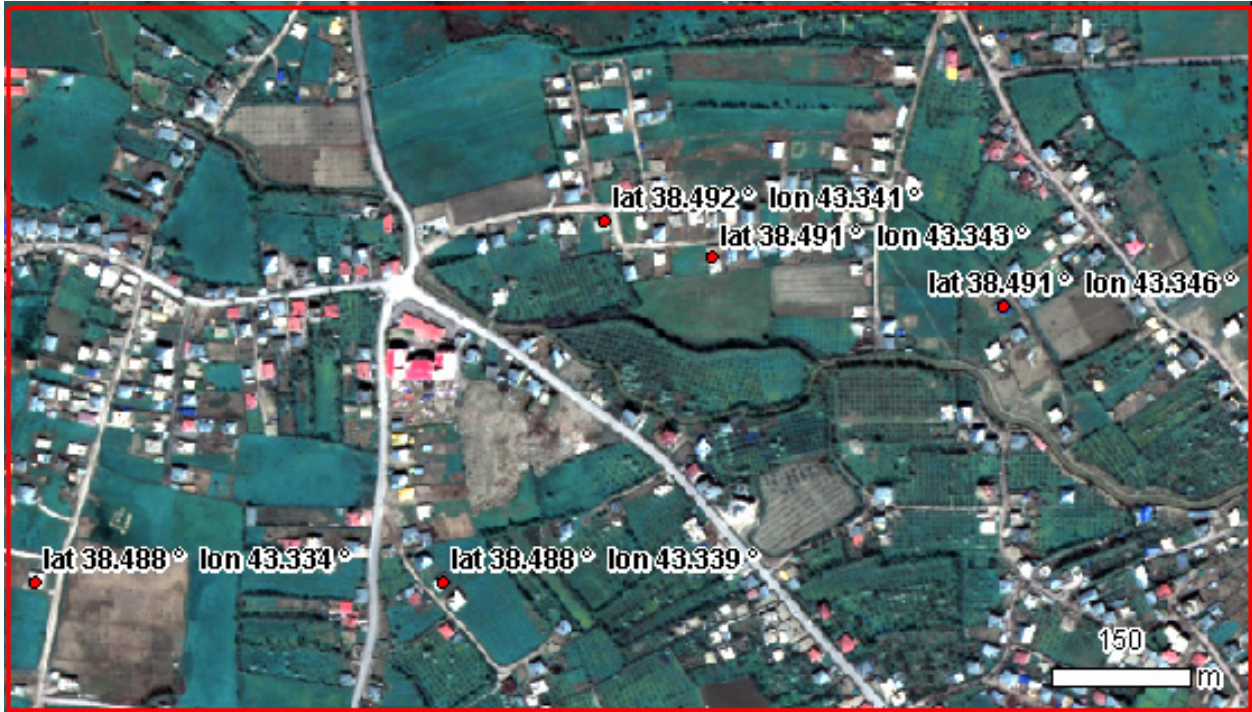
Damaged structures were derived by visually comparing high resolution post-disaster QuickBird-2 satellite imagery, acquired on October 26, 2011, with pre-disaster WorldView-2 imagery, acquired on May 6, 2011. Due to differing acquisition angles, clouds and haze effects, the analysis provides only a coarse estimation of potentially damaged buildings.

Table 1:

Satellite Data – AOI Van			
Category	Satellite / Sensor	Acquisition date / Period	Spatial resolution
VHR1	WorldView-2	06/05/2011	0.50 m
VHR1	QuickBird-2	26/10/2011	0.60 m

4. RESULTS

The following images illustrate examples of buildings where changes between May 06, 2011 and October 26, 2011 could be detected, and could potentially be related to damages caused by the earthquake.



Before: WorldView-2 from 06/05/2011



After: QuickBird-2 from 26/10/2011



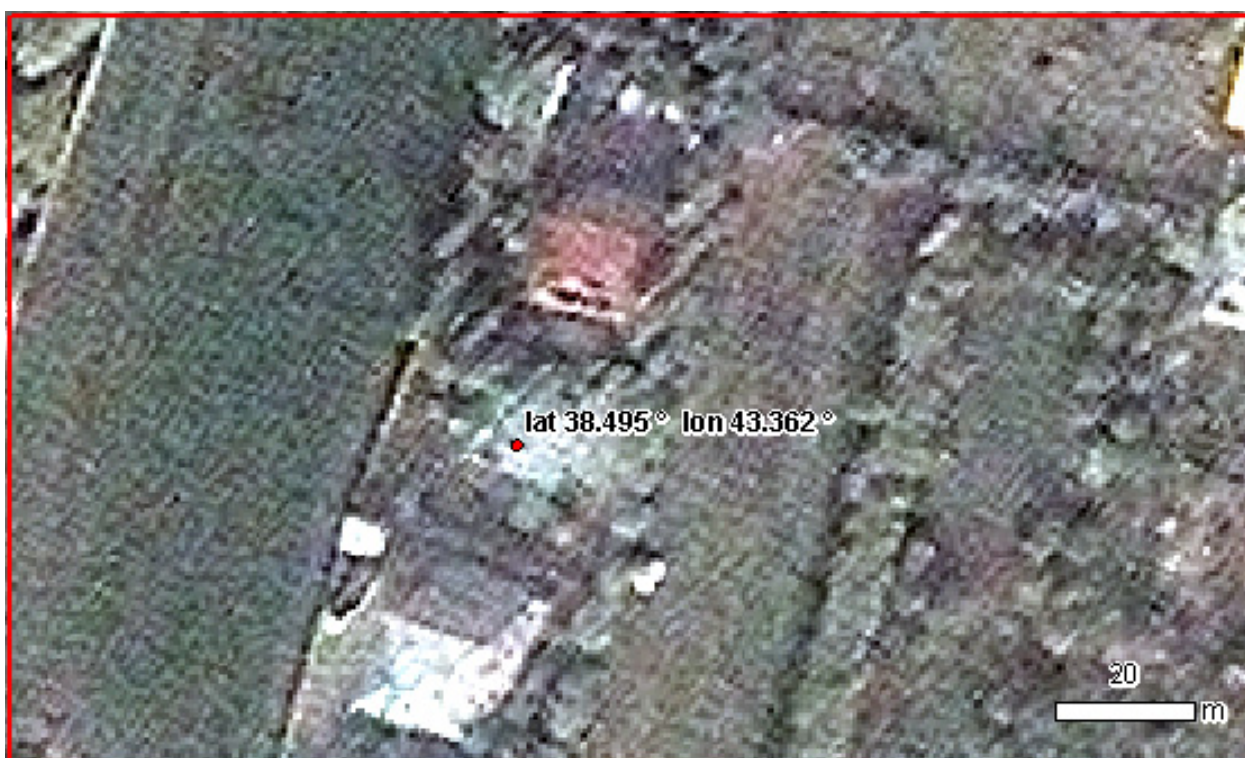
Before: WorldView-2 from 06/05/2011



After: QuickBird-2 from 26/10/2011



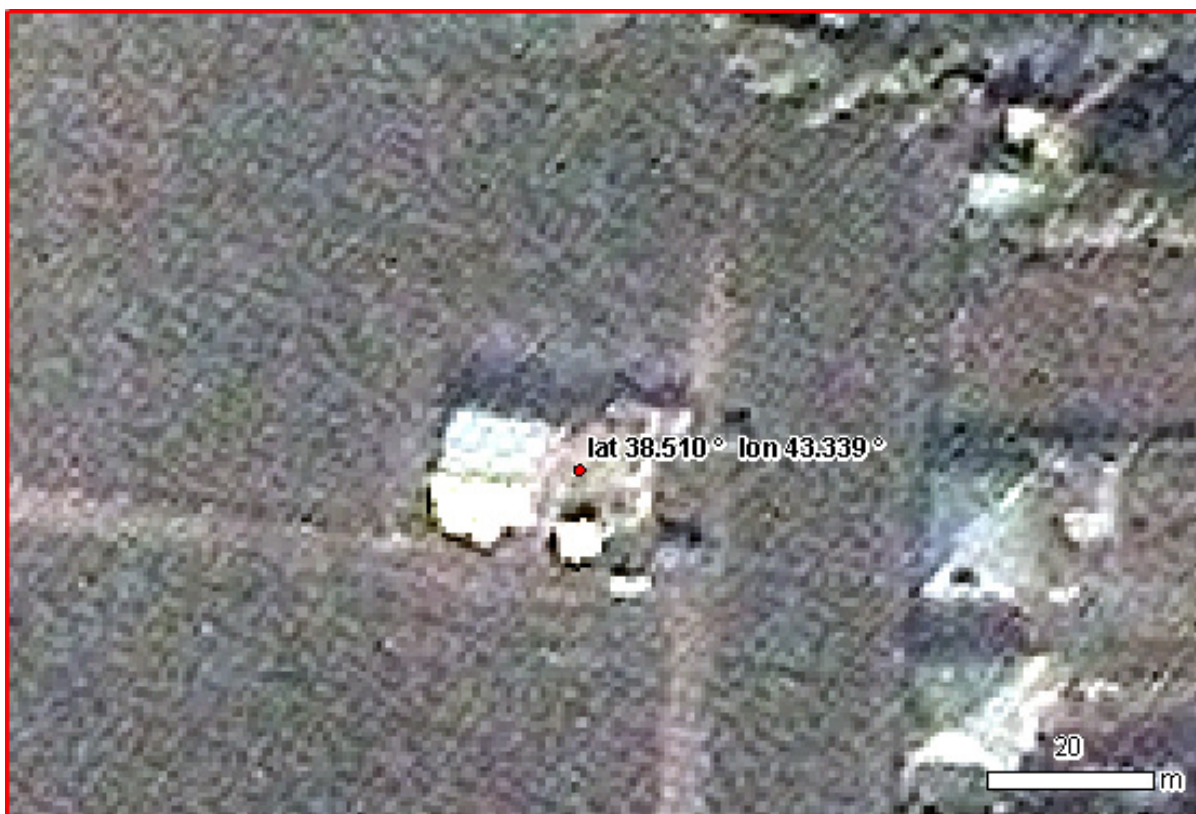
Before: WorldView-2 from 06/05/2011



After: QuickBird-2 from 26/10/2011



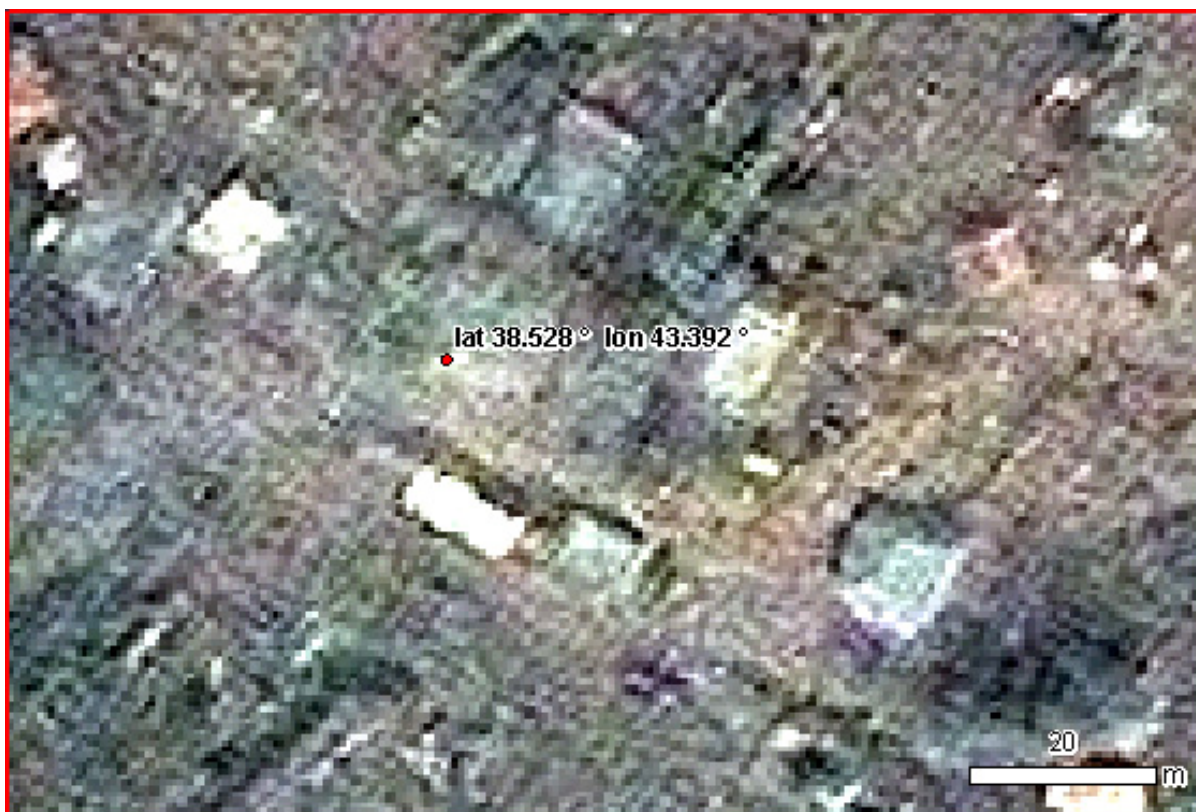
Before: WorldView-2 from 06/05/2011



After: QuickBird-2 from 26/10/2011



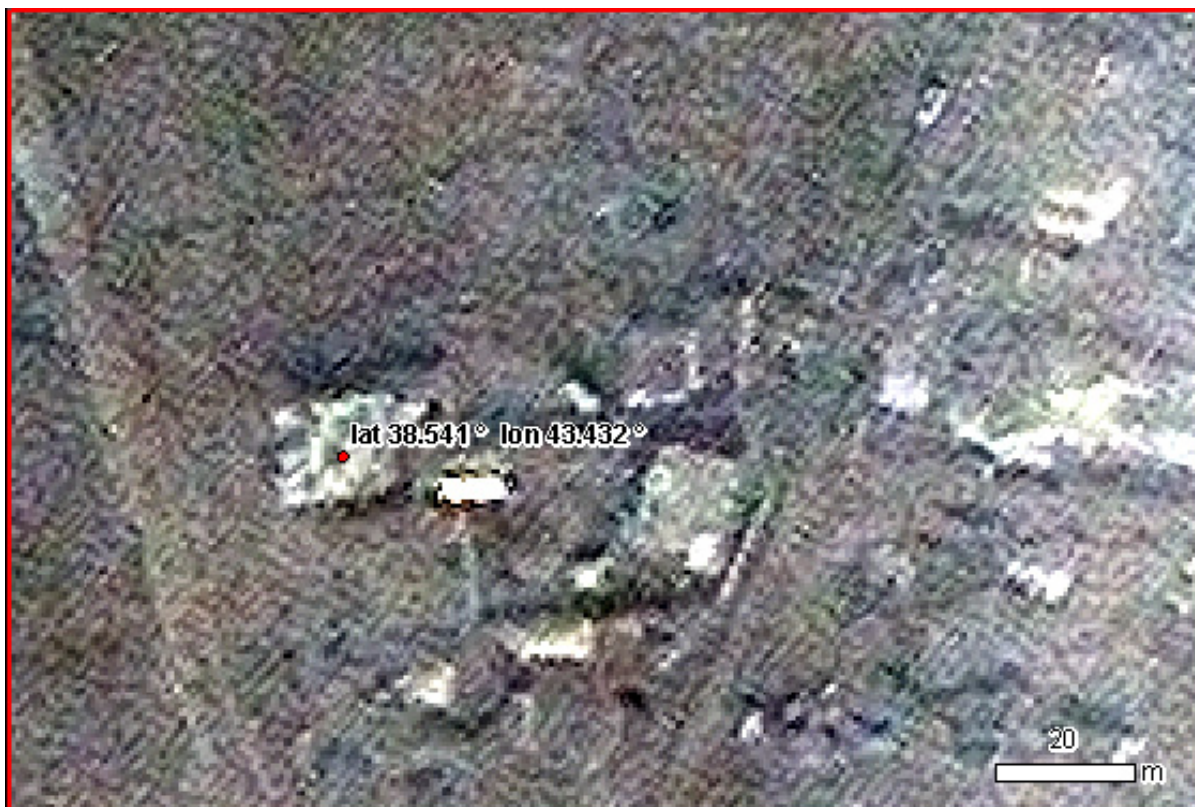
Before: WorldView-2 from 06/05/2011



After: QuickBird-2 from 26/10/2011



Before: WorldView-2 from 06/05/2011



After: QuickBird-2 from 26/10/2011