



Remote Sensing and GIS Studies of the Hegau Volcanic Area in SW Germany

BARBARA THEILEN-WILLIGE, Berlin

Keywords: Remote sensing, GIS, Morphometric maps, Hegau-ring structure

Summary: GIS integrated geomorphologic and structural-geologic evaluations of satellite imageries and SRTM- and ASTER-DEM-data from the Hegau-area in SW-Germany provide information of the structural pattern of the sub-surface. The area is characterized by Tertiary volcanic domes, Tertiary molasse sediments forming ridges and scarps and flat to undulated, Quaternary glacial-related morphologic sequences. Traces of circular features can be identified on morphometric maps derived from DEM data and on LANDSAT- and satellite radar imageries providing information of the volcanic structures. Linear features visible on the different satellite imageries are mapped and correlated with known tectonic data. It becomes evident how far the landscape development of the Hegau-area has been influenced by sub-surface, magmatic structures.

Zusammenfassung: Fernerkundung und GIS Studien im Vulkangebiet des Hegau im Südwesten Deutschlands. Satellitenaufnahmen und digitale Höhendaten auf der Basis der Shuttle Radar Topography Mission (SRTM) sowie ASTER DEM Daten des Hegau-Gebietes westlich des Bodensees wurden mit Methoden der digitalen Bildverarbeitung aufbereitet und zusammen mit anderen Geodaten in ein Geo-Informationssystem (GIS) integriert und ausgewertet. Die Auswertungen der verschiedenen Bild- und Kartenprodukte liefern Hinweise auf Untergrundstrukturen in der Vulkanlandschaft des Hegau-Gebietes. Es zeigt sich, dass der Einfluss der während des Tertiärs aufgestiegenen Magmen auf die regionale, geomorphologische Entwicklung und strukturelle Situation im Hegau weit ausgedehnter ist als bisher bekannt. Es zeichnet sich eine deutlich sichtbare Ringstruktur von ca. 5–6 km Durchmesser ab.

1 Introduction

The Hegau-area is situated at the northern border of the Molasse Basin in the Alpine foreland at the German / Swiss border near the Lake Constance. The area is characterized by Tertiary volcanic domes, Tertiary molasse sediments forming ridges and scarps and flat to undulated, Quaternary glacial-related morphologic sequences such as morainic walls, dead ice lakes and terraces built at a base level of 400–500 m.

Miocene tuff, basalt and phonolite as a result of volcanic activities within the Hegau Volcanic province (SCHREINER 1992) are in their present shape almost erosional features formed by glacial, periglacial, fluvial and landslide activities mainly during the Pleistocene and Holocene. The volcanic pipes have

been considered so far to be single pipes without close structural relationships.

Remote sensing techniques offer useful tools that can aid in evaluating the geomorphologic and geologic setting of the eroded volcanic landforms.

2 Objectives and Approach

This study is dealing with multi-technique approaches, such as combinations of remote sensing, geomorphological, geophysical, and geological data in order to get a more detailed knowledge of the structural pattern in the Hegau volcanic area and the landscape development. It considers the support provided by a Geographic Information System (GIS) integrated with a spatial database. For the objec-