



GEOS 692 F01 REMOTE SENSING OF VOLCANIC ERUPTIONS

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Time: Wednesday 1:00 - 2:30 class, Friday 1:00 - 2:30

Place: WRRB 004 Teaching Lab

3 Credits: 1.5 hours lecture and laboratory, grading on class participation, presentation and discussion of assigned reading, and a student project.

Prerequisites: Introductory remote sensing course or permission of the instructors.

Volcanoes are a fascinating subject to scientists as well as the general public. This course focuses on the use of satellite images of volcanic eruptions to monitor and mitigate volcanic hazards, and to understand eruption processes. Volcano monitoring and analysis in North Pacific Ocean region has been the focus of GI researchers for years, and has resulted in one of the most detailed collections of satellite images in the world. Real examples from this collection will be used to illustrate different types of activity, such as Hawaiian lava flows, Strombolian eruptions, and Plinian ash clouds. Methods for determining parameters on the ground such as temperature, grain size, and composition will be given. The data used will include that from the GI's own receiving stations (Advanced Very High Resolution Radiometer, AVHRR, Moderate Resolution Imaging Spectrometer, MODIS, Synthetic Aperture RADAR, SAR) as well as other available data such as, Geostationary Earth Observing Satellite, GOES, Advanced Spaceborne Thermal Emission and Reflection Radiometer, ASTER, Landsat Enhanced Thematic Mapper, ETM & ETM+, Ikonos, and spaceborne photography from the shuttle and international space station.

The course is made up of alternating lecture and seminar classes, with laboratory examples. The lectures will give the students background on the current topic, and papers for the students to read. During the seminar classes, the students will lead discussion based on these papers. The labs will focus on examples of the satellite data, ranging from well practiced techniques to new methods of image analysis.

Text: Reference articles and book chapters.

Day	Date	Lecturer	Subject	Lab Exercise	Homework/Assigned Reading
Fri	20-Jan	Dehn, Valcic, Skoog	Overview: Course	Set-up, Intro to Linux	
Wed	25-Jan	Bailey	Overview: Remote Sensing and Satellite Systems & Sensors	Tables of Satellite Sensors (in lab)	Searching for information on volcanic eruptions (e.g. Bezy, 1994)
Fri	27-Jan	Dehn	Overview: Volcanic Features & Processes observed from space	Viewing of satellite information websites	Prep: PPT on volcanic eruption with satellite images as illustrations
Wed	1-Feb	Dehn	Student presentations 1 (PPT) - Volcanic Eruptions		Background papers on atmospheric influences
Fri	3-Feb	Webley	Overview: Atmospheric Influences		Papers on atmospheric Influences
Wed	8-Feb	Dean	Student presentations 2 (PPT) - Atmospheric Influences		Background papers on thermal anomalies
Fri	10-Feb	Dehn	Thermal Anomalies		Papers on thermal anomalies
Wed	15-Feb	Dean	Student presentations 3 (PPT) - Thermal Anomalies		Background papers on plumes
Fri	17-Feb	Schieder	Plumes		Papers on plumes
Wed	22-Feb	Dean	Student presentations 4 (PPT) - Plumes		
Fri	24-Feb	Dean, Dehn	Thermal Anomaly/Plumes (dual-lab)	LAB 1: Mid-term lab	
Wed	1-Mar	Dean	Student presentations 5 (PPT) - Thermal Anomalies/Plumes		Background papers on dispersion modeling
Fri	3-Mar	Peterson, Webley, Dean	Dispersion Modeling/PUFF		Papers on dispersion modeling
Wed	8-Mar	Dean	Student presentations 6 (PPT) - PUFF		
Fri	10-Mar	Peterson, Webley, Dean	PUFF	LAB 2: Use of PUFF	
Wed	15-Mar	<i>SPRING BREAK</i>			
Fri	17-Mar	<i>SPRING BREAK</i>			
Wed	22-Mar	Dean, Dehn	Monitoring	Report on previous eruption images (c.f actual monitoring report)	
Fri	24-Mar	Bailey	ENVI 1	ENVI Basics	
Wed	29-Mar	Webley	ENVI 2	Use of ENVI to look at features in datasets	Background papers on high resolution data
Fri	31-Mar	Wessels	High Resolution data		Papers on high resolution data
Wed	5-Apr	Dean	Student presentations 7 (PPT) - High Res		Background papers on SAR
Fri	7-Apr	Dean, Webley	Overview SAR with examples of SAR data		Papers on SAR
Wed	12-Apr	Wessels	DEM & data fusion lab	LAB 3: Creation of DEM	
Fri	14-Apr	Z. Lu	InSAR		
Wed	19-Apr	Dean	Student presentations 8 (PPT) - SAR		Background papers on SO2 and Aerosols
Fri	21-Apr	Webley, Cahill	SO2 and Aerosols		Papers on SO2 and Aerosols
Wed	26-Apr	Webley, Dehn	World-wide systems		
Fri	28-Apr	<i>NO CLASSES</i>			
Wed	3-May	Dehn, Dean, Webley	Work on Projects		
Fri	5-May	Dehn, Dean, Webley	Project Presentations		

Class Participation	10%
paper write-ups	
merits (e.g. Volc lecture attendance)	
demerits (e.g. tardiness)	
Paper Presentations (x8)	30%
Lab Exercises (x3)	30%
Final Project	30%
	100%

Books on reserve in the Library

Sabins, Floyd F. 1978. Remote Sensing Principles and Interpretation

Massom, Robert. 1991. Satellite Remote Sensing of Polar Regions: Applications, Limitations, and Data Availability

Sparks, R.S.J. 1997. Volcanic Plumes

Lillesand, Thomas M. 1994. Remote Sensing and Image Interpretation

Sigurdsson, Haraldur. 2000. Encyclopedia of Volcanoes