GEOS 676: Remote Sensing of Volcanic Eruptions

Instructors

Peter Webley (PW)	Assistant Research Professor, GI, UAF
Ken Dean (KD)	Research Professor, GI, UAF
Jon Dehn (JD)	Associate Research Professor, GI, UAF

10:00 – 11:00 Globe Room M and W
10:00 – 13:00 Gina Lab F

Guest Lecturers

CC – Cathy Cahill	Associate Research Professor, GI, UAF
FM – Franz Meyer	Assistant Research Professor, GI, UAF

3 Credits: 2 x 1 hours lecture and 3 hr laboratory

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.

Coursework

Class Project
6 Homeworks
6 Lab reports
2 Presentations

Week	Day	Date	What we are doing	Lecturer
0	Fri	21 Jan	Course Intro, setting up accounts	PW
1	Mon	24 Jan	Introduction to physics behind RS	PW
	Wed	25 Jan	Introduction to the satellite sensors	PW
	Fri	28 Jan	**Lab 1**:Introduction to data formats, geocoding, georeferencing etc	PW
2	Mon	31 Jan	Atmospheric influences on satellite data	PW
	Wed	2 Feb	Software : ENVI, TVIS, IDL	PW
	Fri	4 Feb	**Lab 2:** Online data: GINA, SAA, Rapidfire	PW
3	Mon	7 Feb	Lecture on Thermal Anomalies I	JD
	Wed	9 Feb	Lecture on Thermal Anomalies II	JD
	Fri	11 Feb	**Lab 3** Thermal Anomalies	PW
4	Mon	14 Feb	Lecture on Plumes I	KD
	Wed	16 Feb	Lecture on Plumes II	PW
	Fri	18 Feb	**Lab 4** Volcanic Ash Clouds and Plumes	PW
5	Mon	21 Feb	Instruments : FLIR, Radiometers, etc	JD
	Wed	23 Feb	Instruments : FLIR, Radiometers, etc	JD
	Fri	25 Feb	**Student Presentations on 1st topic so far**	JD/KD
6	Mon	28 Feb	Lecture on High Resolution data	JD
	Wed	2 Mar	Lecture on DEM's etc	JD
	Fri	4 Mar	**Lab 5** on High resolution data and DEM's	JD
7	Mon	7 Mar	Lecture : Dispersion Modeling, Physics	PW
	Wed	9 Mar	Lecture on running the models	PW
	Fri	11 Mar	**Lab 6** on Modeling : Puff and HYSPLIT	PW
8	Mon	14 Mar	SPRING BREAK	----------
	Wed	16 Mar	SPRING BREAK	----------
	Fri	18 Mar	SPRING BREAK	----------
9	Mon	21 Mar	Lecture on Radar	FM
	Wed	23 Mar	Lecture on SAR, InSAR	FM
	Fri	25 Mar	**Student Presentations on second topic so far**	PW
10	Mon	28 Mar	Lecture on Volcanic Gases	PW
	Wed	30 Mar	Lecture on Volcanic Aerosols	CC
	Fri	1 Apr	**Lab 7** on volcanic gases	PW
11	Mon	4 Apr	Operation monitoring using satellite data	PW
	Wed	6 Apr	GOES and MODVOLC systems	PW
	Fri	8 Apr	**Lab 8:** Operational data GOES, MODVOLC, AVO, Central America	PW
12	Mon	11 Apr	Instruments: FLYSPEC, CC Impactor	JD
	Wed	13 Apr	Redoubt Eruption 2009	PW
	Fri	15 Apr	**Student Presentations on third topic so far**	KD/PW
13	Mon	18 Apr	Photos from space station etc	KD
	Wed	20 Apr	Future for satellites	PW
	Fri	22 Apr	DAY OFF	----------
14	Mon	25 Apr	VAAC's and ICAO	PW
	Wed	27 Apr	VONA, VAN	PW
	Fri	29 Apr	Work on Projects	JD/KD/PW
15	Mon	2 May	Work on Projects	JD/KD/PW
	Wed	4 May	Work on Projects	JD/KD/PW
	Fri	6 May	PRESENTATION ON PROJECT	JD/KD/PW