

NWACC 2005 Proof-of-Concept Grant Final Report
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Project Title: Remote Landscape Observatory

Project URL: <http://www.wwu.edu/landscapeobservatory/>

1. Project Identifiers

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2. Brief Statement of Project Goals

In order to better study very slow or infrequent geologic events, we originally proposed to create a two part WWU Remote Landscape Observatory:

1. ***Delta-cam*** - We will upgrade our webcam and time-lapse systems in our Coastal Studies Laboratory in the Environmental Studies Building at WWU.
2. ***Landslide-cam*** – We will purchase and install a wireless camera and server with its own power supply near the over-steepened front of the Swift Creek landslide. This server will communicate via a broadband wireless connection with a base at Nooksack Valley Middle School.

3. Setting of Implementation

The ***Delta-cam*** system consists of a networked camera that resides in the WWU Coastal Studies Lab and the time-lapse movie generator will reside on ATUS servers. It is used every academic quarter when beach and delta models are created as part of upper division geology classes. Students in these classes interact directly with the system via the web interface: they have control of digital pan/tilt/zone on the live view and the ability to generate time-lapse movies on the time-lapse view.

The ***Landslide-cam*** will reside wherever the landscape of interest is located (glacier, landslide, riverbed, etc.) and will have local storage of images (see description below). The processing of images will take place on a dedicated computer in the geology department. Time-lapse movie generator will reside on ATUS server. This system will be used every academic quarter as part of upper division geology classes. Students in these classes will interact directly with the system via the web interface.

4. Discussion of Results

Like many proof-of-concept projects, the reality of developing our two landscape observatories proved more of a challenge than envisioned in the abstract. In this section, we describe the challenges we encountered and the progress we made.

The *Delta-cam* is an IQEye 603 mega-pixel IP camera in a Pelco enclosure mounted in the Geology Department's Coastal Studies Laboratory. This installment was relatively straight-forward because the site has both AC power and network connections. The camera has its own web interface and can be viewed live and controlled remotely using digital pan/tilt/zoom. The camera sends high resolution images to a local computer at approximately 2 GB/hr raw images. These images are then re-sized and stored in a database, from which an ASP.NET page draws images to create user-specified time-lapse movies. The programming was started by WWU computer science student Kelvin Li. He graduated in December, so we paid Kelvin with about \$1500 of NWACC funds to finish the work. Commercial vendors of this kind of service (e.g. EarthCam <http://www.earthcam.net/software/megapixel.php>) charge \$10-15K/mo for similar services.

The *Landslide-cam* is a much bigger technical challenge. The site is remote (no power or network) and has limited line-of-sight to possible receivers. The school district with which we planned to collaborate is willing but their network is at capacity between 7 am and 5 pm. So we are moving forward with a plan to store images locally (using swappable HD). We researched and purchased a 550W solar power system from SunWize. We will use the Delta-cam camera to test this system, including the power consumption and image storage system. We purchased a low-power CPU that is capable of controlling the camera and storage functions. It runs a basic LINUX OS and has the capability of supporting radio connectivity when we are ready to expand.

5. Impact/Future Plans

Several WWU students and staff have been involved with this project.

Andrew McGlone - former WWU ATUS web services director

Marie Raney - current WWU ATUS web services director

Jeff Frost - technician for WWU Scientific and Technical Services

Jim Shephard – information and technical service specialist for the Engineering Technology Department

Joshua Fuller - an undergraduate Earth Science education major, awarded a NASA Space Grant Summer Research Fellowship to work with Linneman for the summer of 2005.

Kelvin Li – a computer science major, now graduated

Brennan Ashton – student from Sehome High School who programs the LINUX for the CPU controller.

We must still assemble the remote system with the new power system, camera and swappable data storage of about 1 TB. We still have approximately \$5K of institutional matching funds remaining. With this we will buy the second camera and storage.

The next phase will involve wireless connectivity to allow us to post live webcam images from the remote site every 10 seconds. Wireless connectivity has been expanding rapidly in this part of Whatcom County. Two different companies tell us that the site will have connectivity within one year. Thus by solving the software, power, camera and local control and storage problems, we are well situated to expand to real-time connection.

7. Publicity

None yet, but the WWU Communications Office is hoping to do a feature story about the remote system once it is up and running.

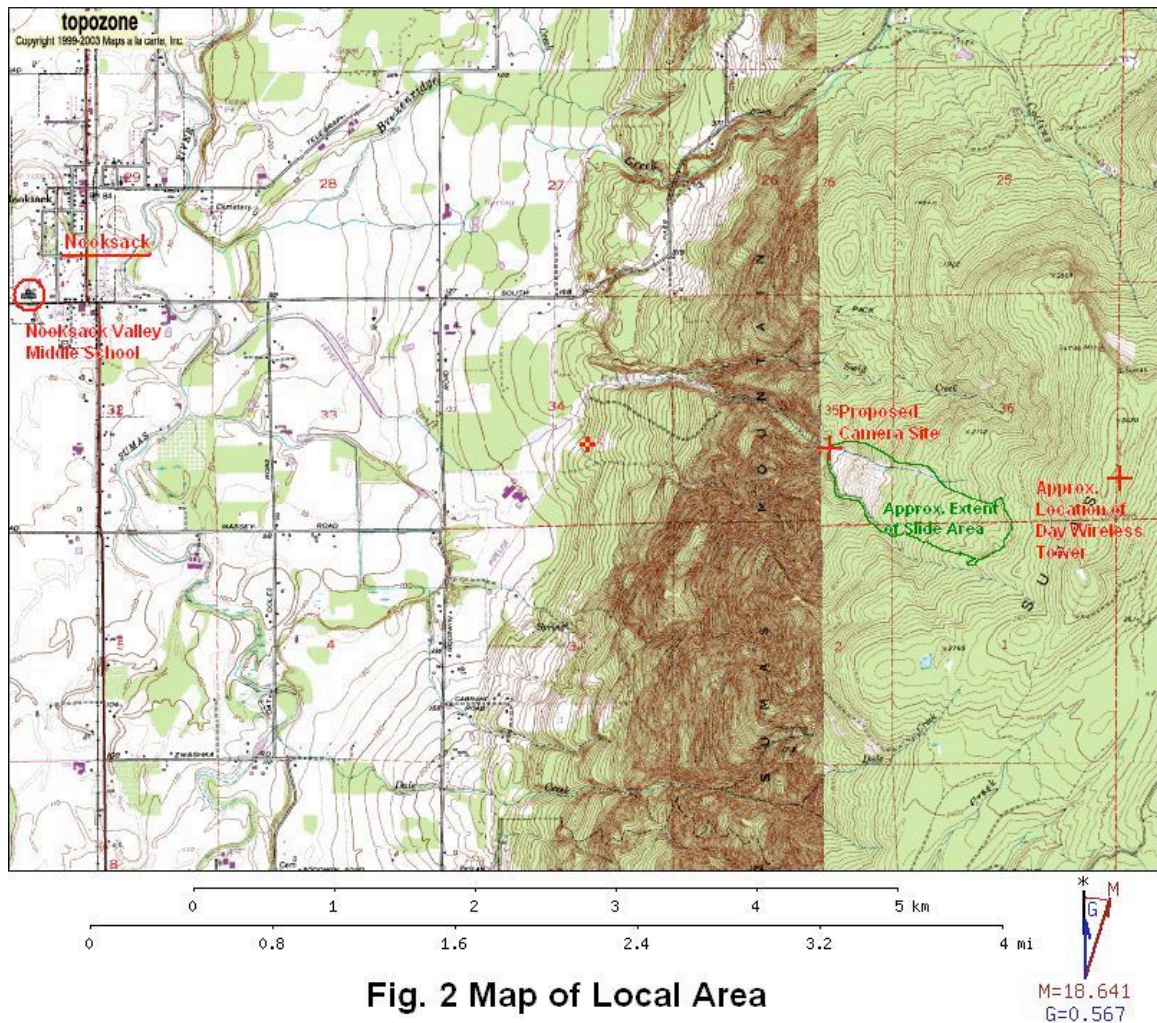


Fig. 2 Map of Local Area

Location map of Swift Creek Landslide.