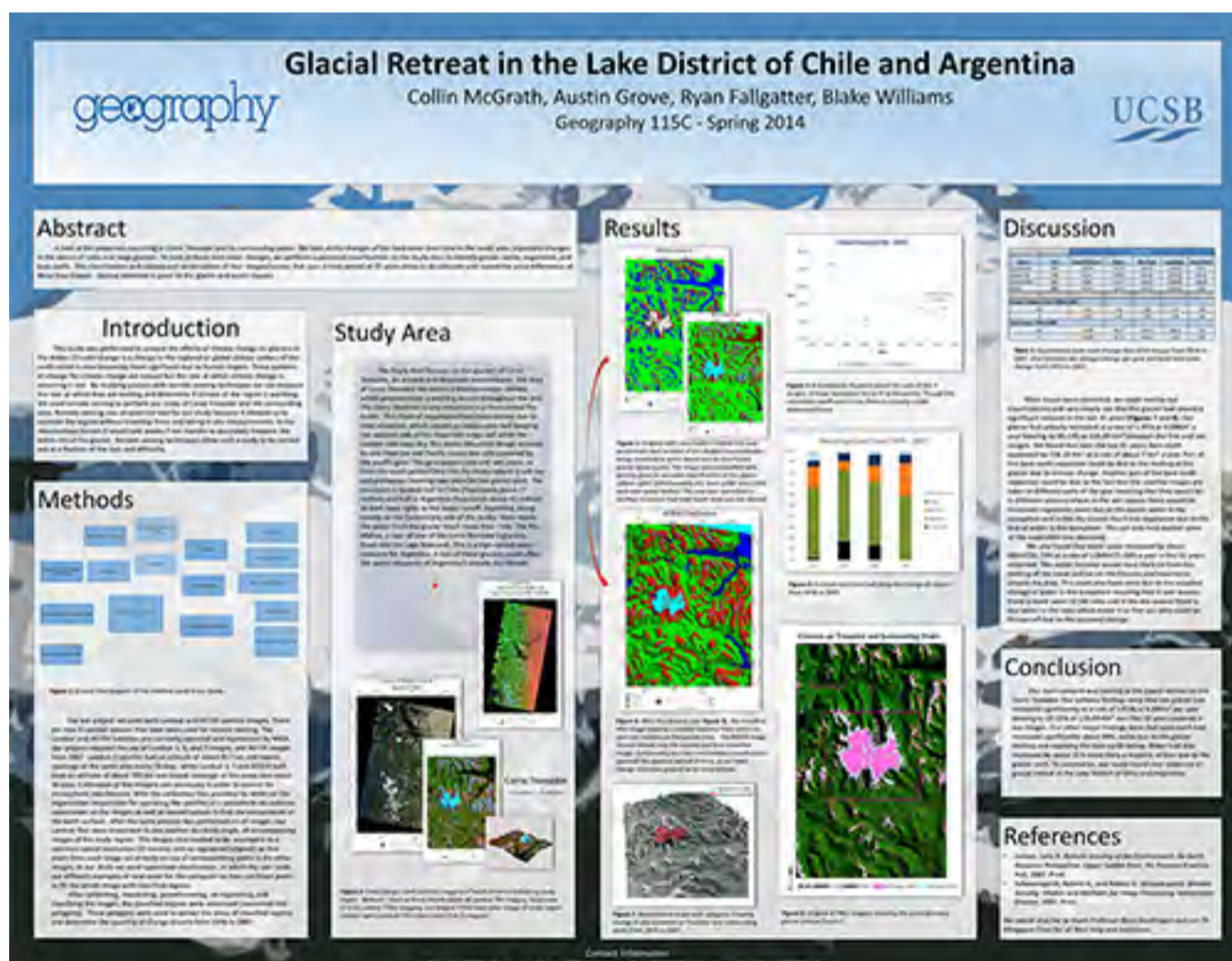


Cordillera Real Glacial Retreat—Bolivia

Annie Ferguson, Kevin Bibby, Nancy Yu, and Warren Kunkler

Department of Geography, University of California, Santa Barbara

The goal of this project was to monitor the glacial retreat in the Cordillera Real region of Bolivia by studying land cover changes in relation to changes in air temperature and precipitation rate over time. Through the use of advanced remote sensing techniques, land cover changes were tracked, showing a significant loss of glacial coverage and an increase of vegetation from 1987 to 2004.

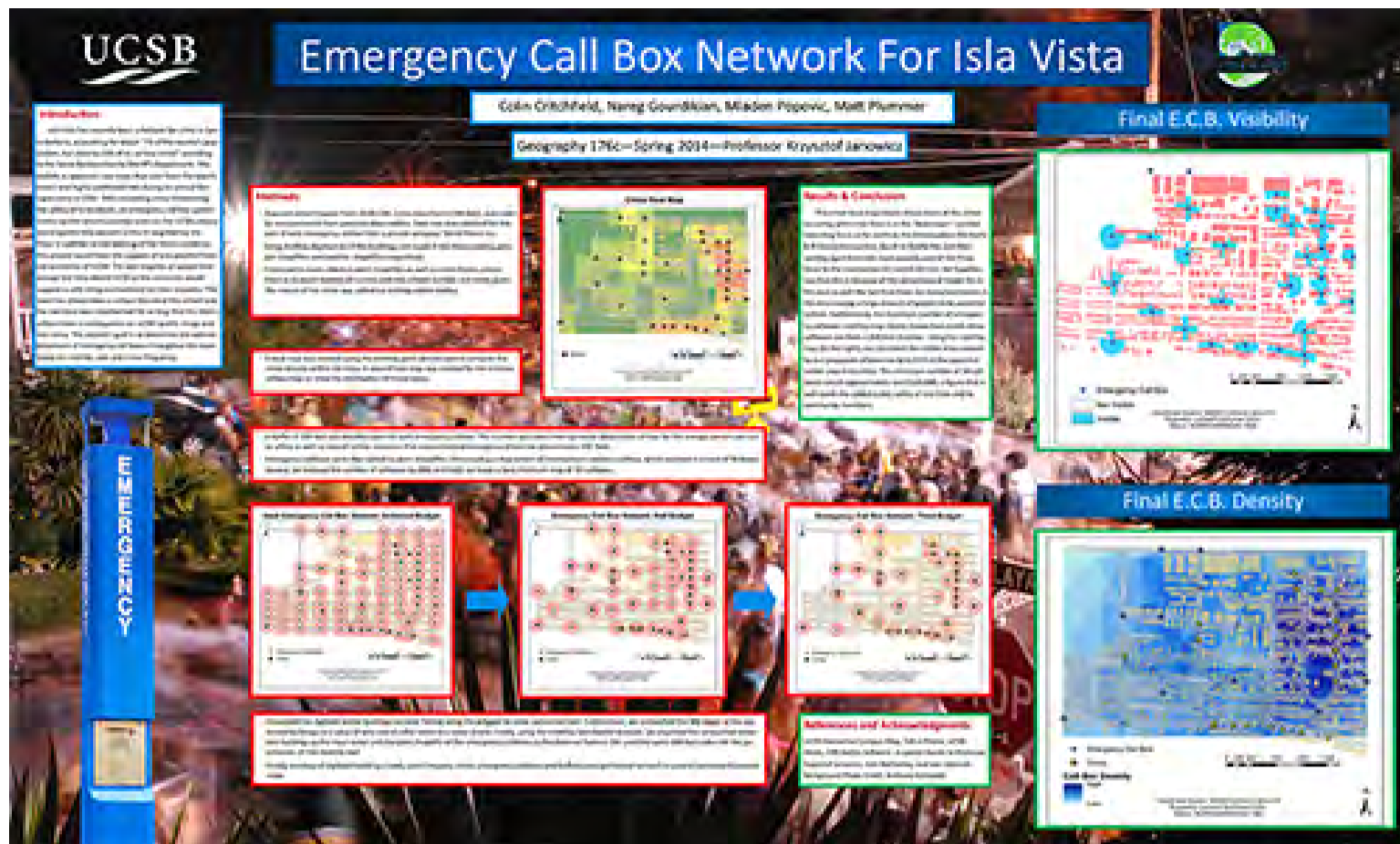


Glacial Retreat in the Lake District of Chile and Argentina

Collin McGrath, Austin Grove, Ryan Fallgatter, and Blake Williams

Department of Geography, University of California, Santa Barbara

The effects of climate change on glaciers in the Andes are examined with remote sensing techniques to measure the rate at which lakes and large glaciers change over time in the Cerro Tronador area. To look at these land cover changes, supervised classifications are performed in the study area to identify glacier, water, vegetation, and bare earth over a time span of 31 years.

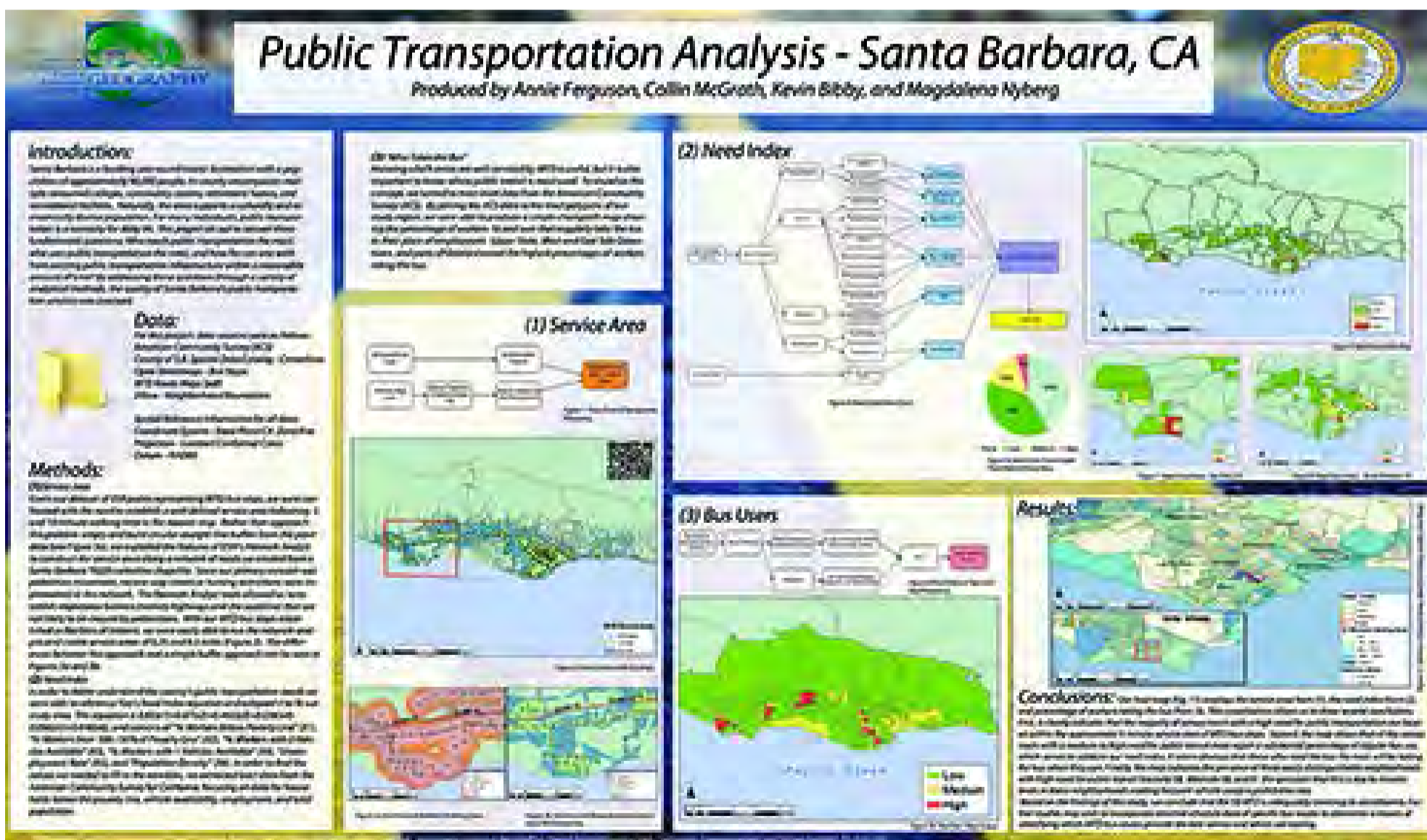


Emergency Call Box Network for Isla Vista

Colin Critchfield, Nareg Gourdikian, Mladen Popovic, and Matt Plummer

Department of Geography, University of California, Santa Barbara

With increasing crime threatening the safety of Isla Vista residents, an emergency call box system similar to the one that exists on the UCSB campus would greatly help prevent crime in the community. Creating a heat map showing the greatest occurrence of crime in Isla Vista, the project goal was to determine the optimal placement of emergency call boxes throughout the town based on visibility, cost, and crime frequency.



Public Transportation Analysis, Santa Barbara, CA

Annie Ferguson, Collin McGrath, Kevin Bibby, and Magdalena Nyberg

Department of Geography, University of California, Santa Barbara

The adequacy of the public transportation system in Santa Barbara is evaluated using an overlay of MTD service areas with a transportation-need index, and data about people in the work force using public transportation.

Astronomy Learning in Digital Virtual Environments – Preliminary Study

Jatila van der Veen, UCSB Physics Department and U.S. Planck Team
Jessica Cornick & Jim Blascovich, UCSB Department of Psychological and Brain Sciences
Luke Spooner, UCSB Physics Department, Undergraduate Research Assistant

Our objective is to develop and test the didactic effectiveness of an interactive virtual solar system using digital immersive virtual environment technology (IVE) for undergraduate introductory astronomy (Astro 1). We conducted a pilot study with 50 UCSB students during the spring quarter, 2014, using the desktop Planck Mission in Virtual Reality simulation. The specific learning objective was understanding of the phases of the Moon and the necessary conditions for a solar eclipse. Students were initially instructed to fly outside, inside, and above the Earth's orbit while observing Earth-Moon-Sun interactions from these perspectives. Students were subsequently instructed to fly through the Earth and track the Moon as it orbited the Earth, noting Moon light changes as the Earth-Moon-Sun angle changes. Finally, students were instructed to focus on the Sun as the Moon passed and to stop the simulation when they thought they had 'created' a solar eclipse.

• 50 students over the course of 3 weeks

• 22 male, 18 female

- 24 European
- 12 Asian
- 10 Latino/a
- 2 Middle Eastern
- 2 African American

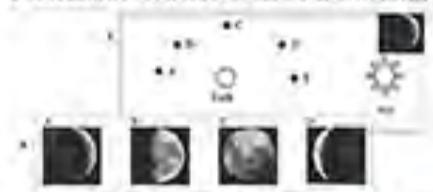
participants by gender and STEM vs. non-STEM majors



Participants were undergraduate volunteers who were solicited from STEM and non-STEM departments at UCSB. Only 2 had taken any previous astronomy.

Participants were given a pre- and post-test with questions from the National Astronomy Diagnostic Test (www.compsun.org/astronomy/teachdetail.cfm?ID=1432):

- 1) What phase must the Moon be in for a total solar eclipse? (new)
- 2) Where is the Moon, relative to the Sun and the Earth, when it looks like this? (C)
- 3) If the Moon is full when it rises, what will it look like after 8 hours? (C)



After learning to navigate in the virtual solar system, participants were guided through the following exploration:

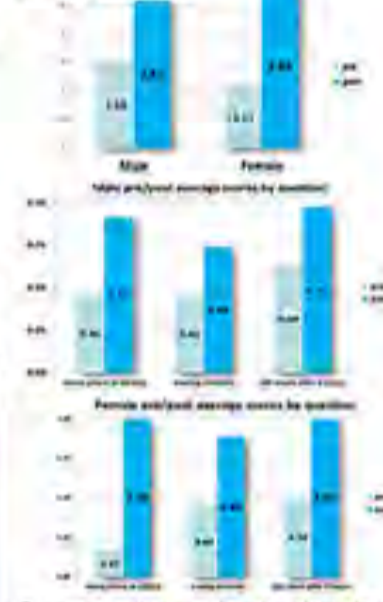
- 1) Observing the Moon from outside the Earth's orbit, looking towards the Sun – Moon is in shadow
- 2) Observing the Moon from inside the Earth's orbit, looking away from the Sun – Moon is lit
- 3) Tracking the Moon from inside the Moon's orbit, observing the way the light changes on the Moon as the Earth-Moon-Sun angle changes – Phases of the Moon
- 4) Observing the rotation of the Moon – synchronous
- 5) Finally, finding the conditions for a solar eclipse (Moon must be in NW phase and the Moon, Sun, and Earth must align when/where the orbits of the Moon and Earth intersect)



After completing the post-test, students were asked to draw the alignment of the Earth, Moon, and Sun during a solar eclipse, from any perspective. All drew the correct alignment of the Earth, Moon, and Sun, with the correct phase of the Moon (new), although some students had difficulty drawing the intersecting orbits.



All participants showed substantial pre-post test gains. However, men and women had significantly different scores on the post-test ($t(47)=2.22$, $p=0.03$), with men scoring lower ($M=2.59$, $SD=0.81$) than women ($M=2.89$, $SD=0.32$).



Our results suggest that having students conduct guided explorations in a virtual solar system promotes their comprehension of spatial thinking in astronomy. Further, our results suggest that navigating in a virtual solar system may have the potential to close and even reverse the gender gap in astronomy learning for females.

Astronomy Learning in Digital Virtual Environments—Preliminary Study

Jatila van der Veen

Physics Department and U.S. Planck Team
University of California, Santa Barbara

Jessica Cornick and Jim Blascovich

Department of Psychological and Brain Sciences
University of California, Santa Barbara

Luke Spooner

Physics Department, Undergraduate
Research Assistant
University of California, Santa Barbara

The objective of this project was to develop and test the didactic effectiveness of an interactive virtual solar system using digital immersive virtual environment technology (IVE) for undergraduate introductory astronomy (Astro 1). A pilot study was conducted with 50 UCSB students, using the desktop Planck Mission in Virtual Reality simulation.

Predictive G.I.S. Modeling of Chumash Settlement Sites on Santa Cruz Island

Kyle Brook - Justin Luong - Marina Bozinovic - Kyle Wong

INTRODUCTION

Located off the Santa Barbara Coast, Santa Cruz Island is the largest of the Channel Islands of California and is a popular destination for tourists and researchers alike. The island's rich history and natural resources have made it a focal point for archaeological research. This project aims to use GIS modeling to predict the locations of undiscovered Chumash settlement sites on the island.

STUDY AREA

Santa Cruz Island is situated off the southern coast of the Santa Barbara Channel, approximately 100 miles south of the Santa Barbara coastline. The island's diverse topography, including coastal plains, hills, and mountains, provides a complex environment for settlement. This study focuses on the central and eastern portions of the island, where archaeological evidence suggests Chumash habitation.

REFERENCES

Brook, Kyle. "Predictive GIS Modeling of Chumash Settlement Sites on Santa Cruz Island." Department of Geography, University of California, Santa Barbara, 2014.

ABSTRACT

The spatial distribution of prehistoric Chumash Indian sites on Santa Cruz Island was influenced by the accessibility of resources such as food, water, and shelter. Determining the common characteristics of sites already documented by archaeologists and applying these criteria to un-surveyed regions, GIS modeling of known patterns was used to create a predictive model of undiscovered settlement sites on the island.

RESULTS

DISCUSSION

The predictive GIS model of Chumash settlement sites on Santa Cruz Island provides a valuable tool for archaeologists and researchers. By identifying areas with high potential for undiscovered sites, the model can guide future fieldwork and excavation efforts. The model's accuracy is supported by the discovery of several new sites in un-surveyed areas, demonstrating the effectiveness of GIS modeling in archaeological research.

ACKNOWLEDGMENTS

This project was supported by the Department of Geography, University of California, Santa Barbara. We thank the staff of the Santa Cruz Island Field Station for their assistance and the Chumash community for their support.

FIG. 1 Map of Santa Cruz Island showing the study area and the location of the island relative to the Santa Barbara Channel.

FIG. 2 Map of Santa Cruz Island showing the predicted locations of Chumash settlement sites based on GIS modeling.

FIG. 3 Map of Santa Cruz Island showing the predicted locations of Chumash settlement sites based on GIS modeling, with a legend for site types.

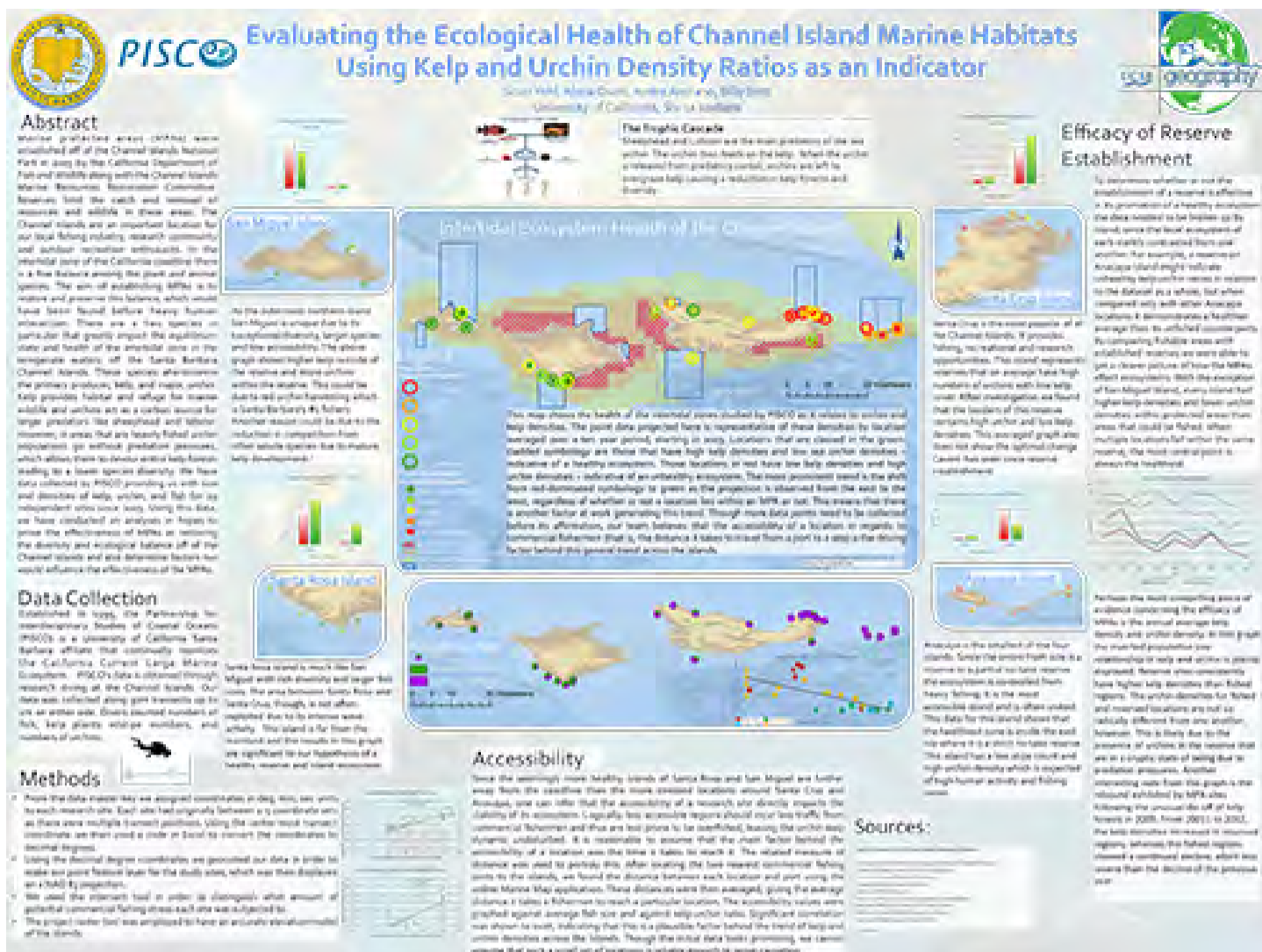
FIG. 4 Map of Santa Cruz Island showing the predicted locations of Chumash settlement sites based on GIS modeling, with a legend for site types.

Predictive GIS. Modeling of Chumash Settlement Sites on Santa Cruz Island

Kyle Brook, Justin Luong, Marina Bozinovic, and Kyle Wong

Department of Geography, University of California, Santa Barbara

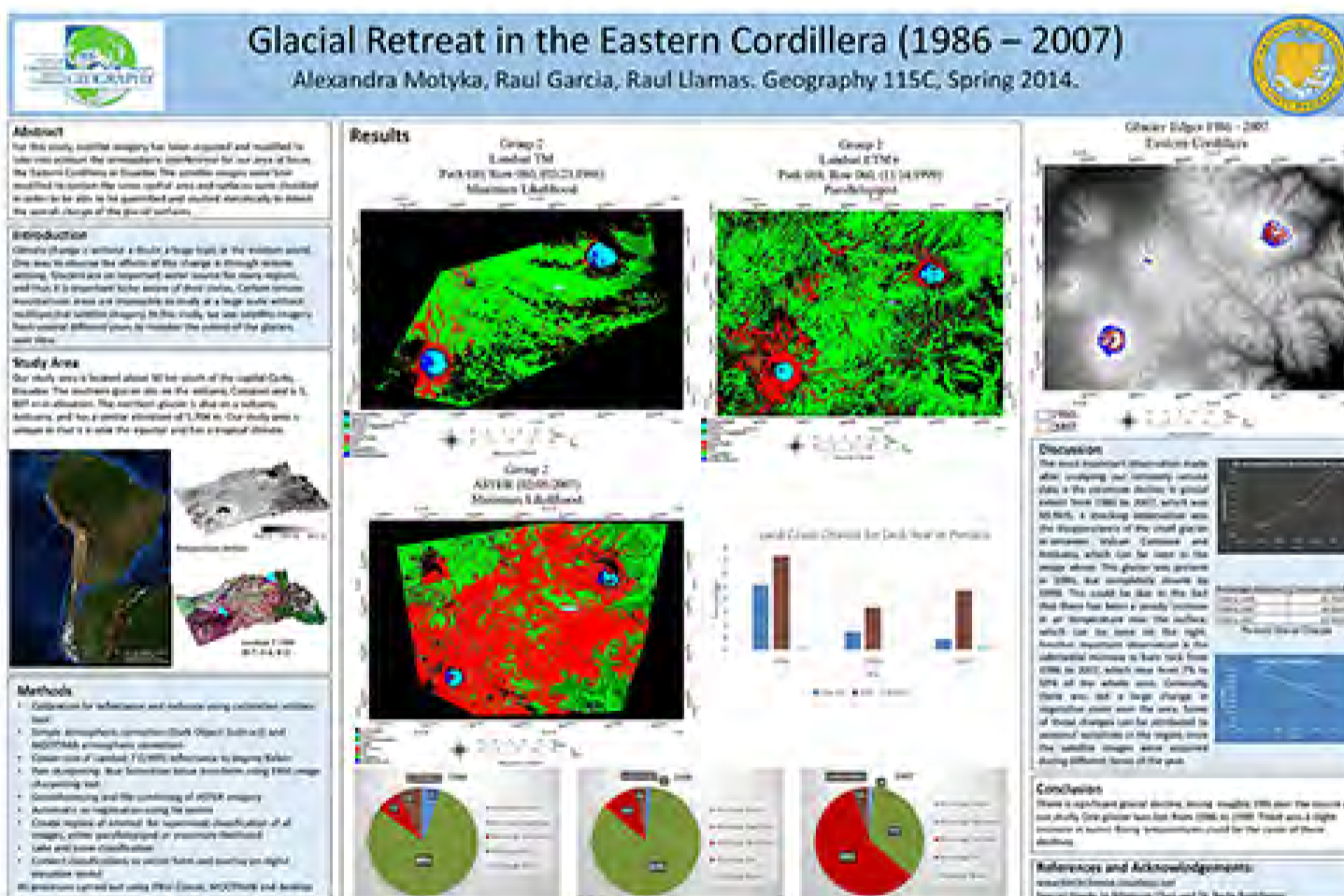
The spatial distribution of prehistoric Chumash Indian sites on Santa Cruz Island was influenced by the accessibility of resources such as food, water, and shelter. Determining the common characteristics of sites already documented by archaeologists and applying these criteria to un-surveyed regions, GIS modeling of known patterns was used to create a predictive model of undiscovered settlement sites on the island.



Evaluating the Ecological Health of Channel Island Marine Habitats Using Kelp and Urchin Density Ratios as an Indicator

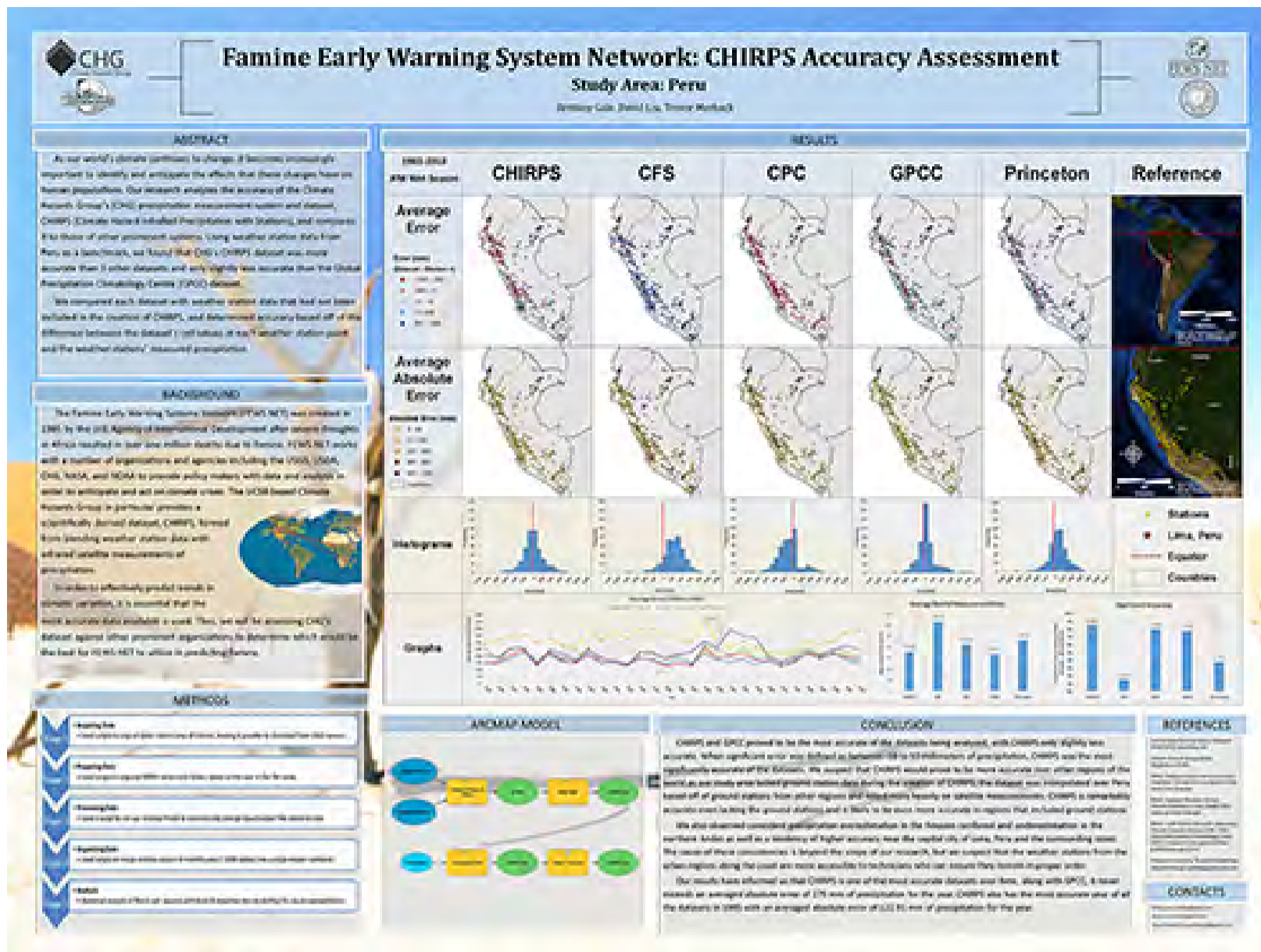
Scott Yehl, Alana Osaki, Andre Arellano, and Billy Britt
 Department of Geography, University of California, Santa Barbara

In the intertidal zone of the California coastline there is a fine balance among the plant and animal species. To restore and preserve this balance, Marine protected areas (MPAs) were established in 2003 to limit the catch and removal of resources and wildlife in these areas. Two species in particular greatly impact the equilibrium state and health of the intertidal zone in the temperate waters off the Santa Barbara Channel Islands—kelp and urchins. Kelp provides habitat and refuge for marine wildlife and urchins act as a carbon source for larger predators. However, in areas that are heavily fished urchin populations go without predation pressures, which allows them to devour entire kelp forests leading to a lower diversity of species. Data collected by PISCO provides information on size and densities of kelp, urchin, and fish for 29 independent sites since 2003. This data is used to analyze the effectiveness of MPAs at restoring the diversity and ecological balance off the Channel Islands.



Glacial Retreat in the Eastern Cordillera (1986–2007)
Alexandra Motyka, Raul Garcia, and Raul Llamas
 Department of Geography, University of California, Santa Barbara

Satellite imagery was acquired and modified to take into account the atmospheric interference for the Eastern Cordillera in Ecuador in order to quantify the amount of glacial decline from 1986 to 2007.

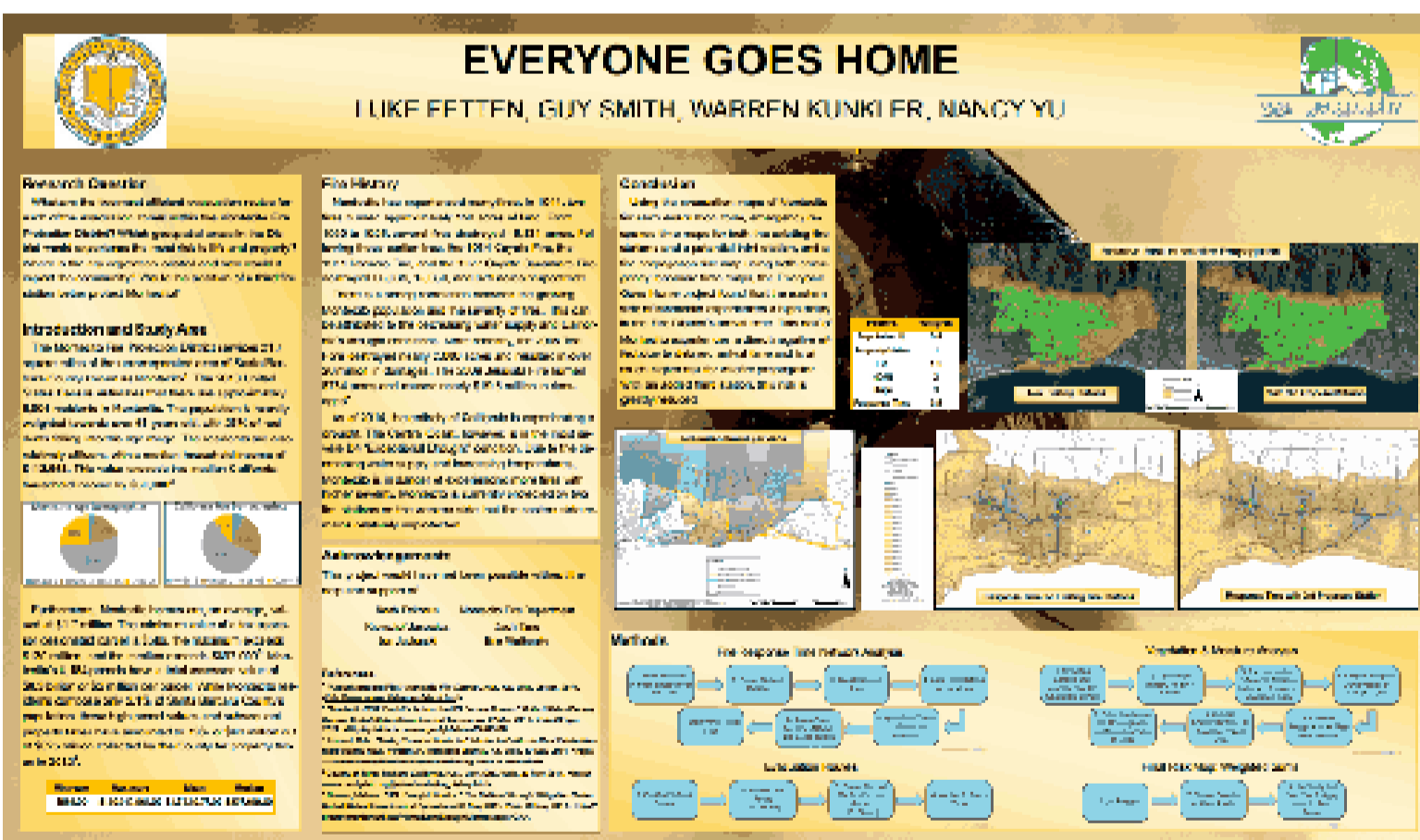


Famine Early Warning System Network: CHIRPS Accuracy Assessment

Brittany Gale, David Liu, and Trevor Merback

Department of Geography, University of California, Santa Barbara

As our world's climate continues to change, it becomes increasingly important to identify and anticipate the effects that these changes have on human populations. This research analyzes the accuracy of the Climate Hazards Group's (CHG) precipitation measurement system and dataset, CHIRPS (Climate Hazard InfraRed Precipitation with Stations), and compares it to those of other prominent systems. Using weather station data from Peru as a benchmark, CHG's CHIRPS dataset was found to be more accurate than three other datasets and only slightly less accurate than the Global Precipitation Climatology Centre (GPCC) dataset.

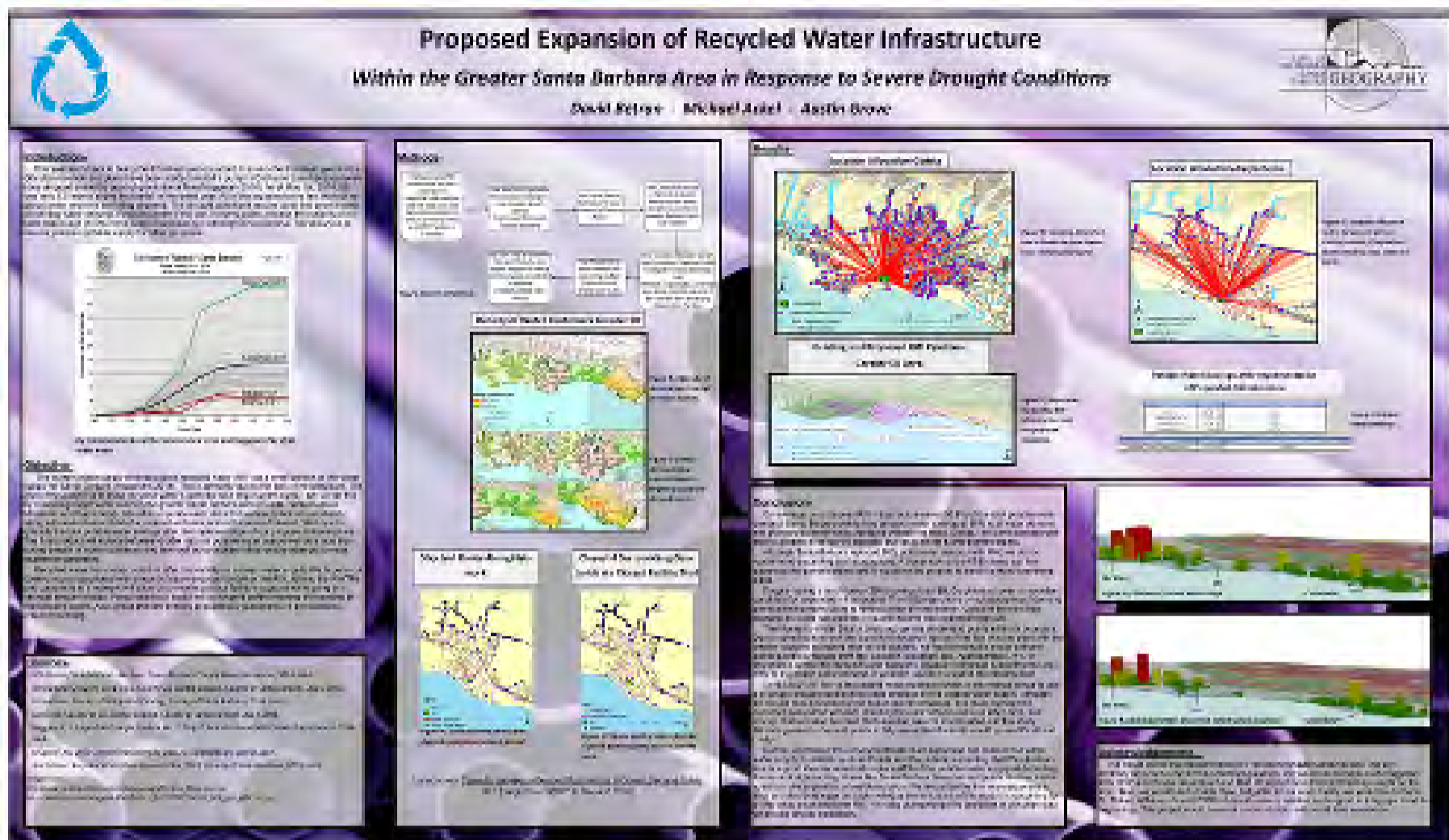


Everyone Goes Home

Luke Fetten, Guy Smith, Warren Kunkler, and Nancy Yu

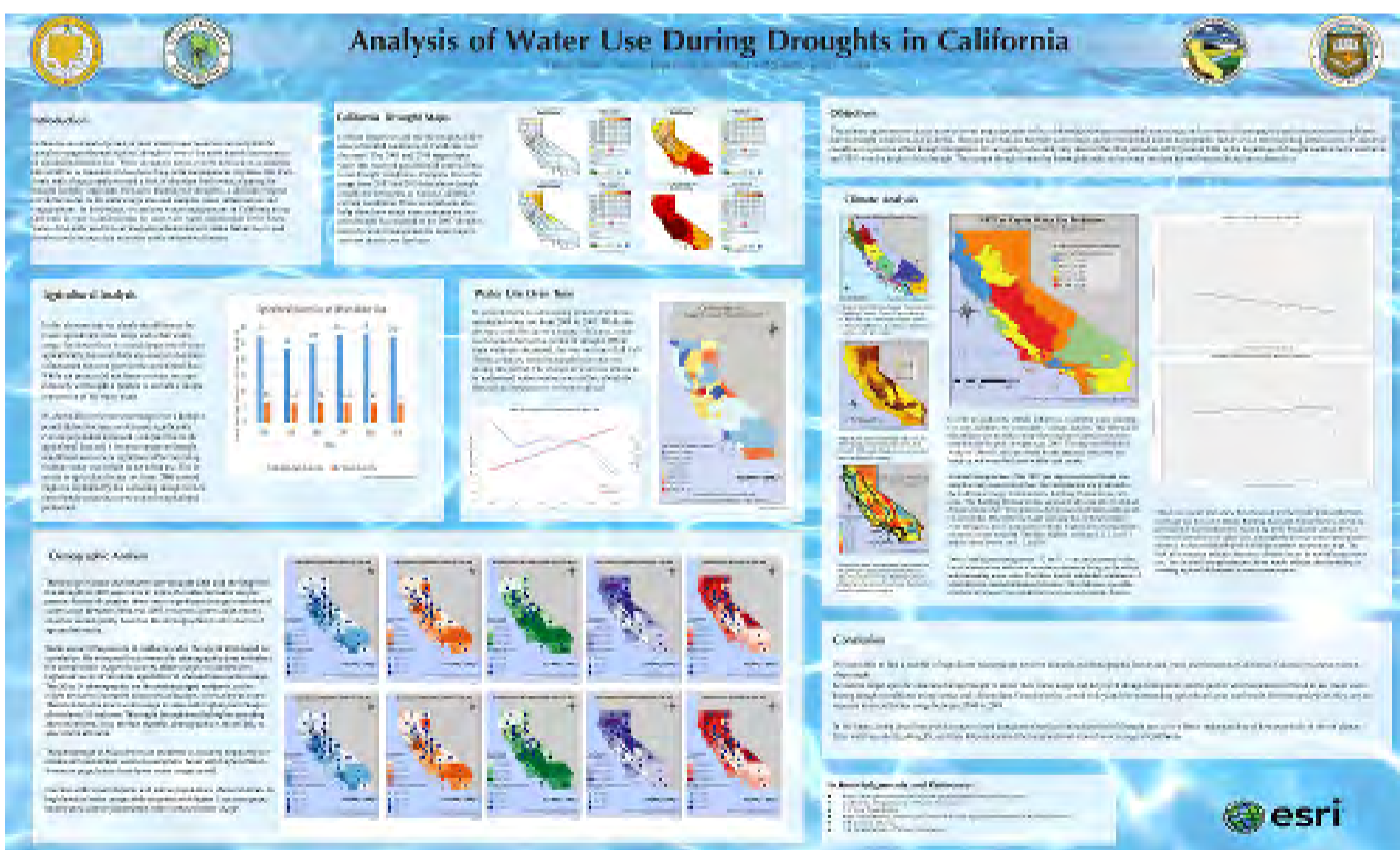
Department of Geography, University of California, Santa Barbara

This project identifies the areas with the most dense vegetation that are at greatest risk for fire in the Montecito Fire Protection District, as well as the most efficient evacuation routes. The study suggests that the addition of a third Fire Station would greatly reduce the risk.



Proposed Expansion of Recycled Water Infrastructure within the Greater Santa Barbara Area in Response to Severe Drought Conditions
David Betran, Michael Ackel, and Austin Grove
 Department of Geography, University of California, Santa Barbara

As drought conditions intensify, water districts must diversify the water supply. This project attempts to increase the role of recycled water as a water source, by proposing an expansion to the existing recycled water infrastructure for Goleta, Santa Barbara, Montecito, and Carpinteria, focusing on major water uses such as agriculture and landscaping. Network analyst tools allow for the allocation of each treatment plant's capacity while accounting for distance. An impedance equation causes the allocation tool to focus on points that are clustered and near treatment plants before allocating water to more distant demand points. This study quantifies potable water savings as a result of the proposed infrastructure.



Analysis of Water Use during Droughts in California
Thira Khor, Travel Martinus, Elizabeth McBride, and Emily Owen
 Department of Geography, University of California, Santa Barbara

Defined as an extended period of time where water resources are not plentiful enough to support human activity, drought is one of the most harmful environmental conditions, having long-term consequences. In places like California with a large population and a lack of abundant fresh water, planning for drought is highly important. However, planning for drought in California is a difficult prospect due to the state's large area and complex water infrastructure and usage patterns. Using GIS tools, this project analyzes water usage patterns in California so as to inform plans for state-wide water conservation in the future.

SPATIAL TRANSFORMATIONS AS A FUNCTION OF SPATIAL ABILITY & EXPERTISE

SAGE Center for the Study of the Mind

Margaret R. Tarampi¹ & Sarah H. Creem-Regehr²
 SAGE Center for the Study of the Mind, University of California, Santa Barbara; Department of Psychology, University of Utah



BACKGROUND

ACQUISITION

- Infant spatial skills involved in later language proficiency
- Cognitive processing from reading maps to planning on a map
- Distal domain of transformations (Zadeh & Shiffrin, 2000):
 - Object-based (i.e., object rotation)
 - Perspective-based (i.e., body rotation)
 - Factor-based (i.e., body/object rotation)
- Previous focus on body and object-based transformations (Kilgus & Aylett 2004), and limited work on individual differences in factor-based transformations.
- Offer to better understand the role of spatial in everyday life, which is essential to understanding learning and navigating periods.

AIMS:

- Does spatial transformation performance vary based on spatial ability and/or spatial expertise?
- Spatial ability is the ability to create, maintain, and transform visual imagery (Sternberg, 1987)
- Three spatial ability factors of particular interest are:
 - **Spatial orientation (SO):** the ability to spatially transform one's perspective relative to spatial forms.
 - **Spatial visualization (SV):** the ability to mentally transform objects.
 - **Kinesthetic imagery (KI):** the ability to simulate or mentally rehearse spatial movement.
- Spatial expertise are individuals with superior knowledge, skills, or characteristics related to spatial thinking (e.g., architects, scientists), that lead to desirable abilities or competencies (Ericsson).

METHOD

Participants:

- Controls: n=50 (20M, 30F; M_{age} = 21.43 yr)
- Doctors: n=23 (16M, 15F; M_{age} = 25.22 yr)
- All subjects: measure 10 scales of (mixed domain) working and executive functioning on a computer

Psychometric Tests:

- Spatial Orientation (Spatial)
- Moray's Food Map Test of Direction Sense (MMS)
- Harpaz's Isometric Spatial Orientation Test (ISOT)

Spatial Visualization (Object-Based)

- Object Composition Test (OCT)
- Paper Folding Test (PFT)

Kinesthetic Imagery (Whole or Visual Imagery)

- Movement Imagery Questionnaire Rev. 2 (MIQ-2)
- Measure of Movement Imagery (Cohen & Leung, 2002)

Computer-Based Transformation Tasks:

- Rotation Scale (RS) and rotation visual measured on eight computer-based tasks
- 4 variants of RS (2D) tasks: 4 left/right (LR) tasks

Between-subjects variables:

- SO, SV, KI (factor analysis based on studies 1 & 2)
- Group (controls, doctors) (Study 1)

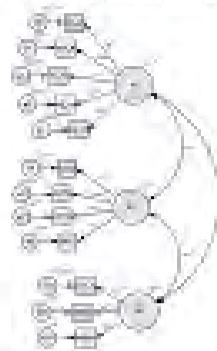


ACKNOWLEDGMENTS & CONTACT

Research of Margaret R. Tarampi and Sarah H. Creem-Regehr is supported by the National Science Foundation (Award Number: 1008200) and the SAGE Center for the Study of the Mind. We thank the participants for their time and effort. Contact: Margaret R. Tarampi, SAGE Center for the Study of the Mind, University of California, Santa Barbara, CA 93106. Email: tarampi@ucsb.edu

STUDY 1

OBJECTIVE 1: To determine the factor structure with a confirmatory factor analysis (CFA)



Results:

- CFA was applied to measure of a latent variable (factor) with an understanding of the nature of each factor (i.e., spatial ability).
- Three-factor model was an excellent fit and is better fit than alternative two-factor models (RMSEA = .040, CFI = .960, SRMR = .020).
- Model fit was excellent with the three-factor model (RMSEA = .040, CFI = .960, SRMR = .020).
- All variables loaded on the three-factor model.

OBJECTIVE 2: Use the existing factor scores to test specific predictions of the processes planned as a function of the different stimuli used.

• CFA was applied to measure of a latent variable (factor) with an understanding of the nature of each factor (i.e., spatial ability).

Model	RMSEA	CFI	SRMR
Model 1 (3-factor)	.040	.960	.020
Model 2 (2-factor)	.045	.950	.025
Model 3 (1-factor)	.080	.800	.050

Results:

- Evidence that all spatial abilities play the interaction between factors in general is additional predicted to spatial expertise (performance on spatial tasks) in general.

OBJECTIVE 3: Compare RTs (latency) for each type of task and test if RTs are affected by kinesthetic (KI) factor.



STUDY 2

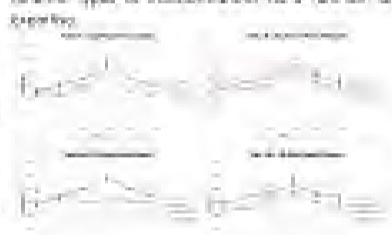
OBJECTIVE 1: To determine if doctors differ in spatial ability compared to controls.

Task	Controls	Doctors
RS	2.5	2.5
MIQ-2	2.5	2.5
ISOT	2.5	2.5
MMS	2.5	2.5
OCT	2.5	2.5
PFT	2.5	2.5

Results:

- Doctors showed no higher scores than controls on any of the spatial ability tasks.
- MIQ-2 scores were higher in doctors than controls.
- MIQ-2 scores were higher in doctors than controls.

OBJECTIVE 2: To test relationships of between the different types of transformations as a function of expertise.



GENERAL DISCUSSION

- Some previous models of spatial ability suggest a general ability or RT for all tasks, rotation and object-based.
- Three spatial ability factors appear to be involved in spatial transformations. Consistent with the idea that spatial transformations of bodies are facilitated by spatial ability factors (i.e., spatial ability factors: SO, SV, KI).
- Doctors are high in rotation imagery and visual imagery, and showed on LR tasks than controls.

Spatial Transformations as a Function of Spatial Ability and Expertise

Margaret R. Tarampi

SAGE Center for the Study of the Mind, University of California, Santa Barbara;

Sarah H. Creem-Regehr

Department of Psychology, University of Utah

Discussing spatial orientation, spatial visualization, and kinesthetic imagery, the project explores whether spatial transformation performance varies according to spatial ability and/or spatial expertise.

Solar By Numbers: Combining Site-Suitability and Cost Analysis for PV Installation at Cal Poly, San Luis Obispo

Eric Ahlgren, Aaron Bucka, and Will Holland

Department of Geography, University of California, Santa Barbara

American Riviera Rapid Transit System

By: Will Turner, Adam Bolenbaugh, Dominick Burnham & Patrick Fitzpatrick

Background

The US-101 corridor between Santa Barbara and Ventura experiences large increases of congestion due to commuters. As shown in Figure 1, a map of average speeds along US-101 during peak hours, highway speeds dip far below the 65 miles per hour speed limit as commuters travel to work (7-9AM), and from work (3-7PM). The Caltrans data that created these maps showed average speeds drop as low as 20 miles per hour at certain points.

This congestion has arisen from the increase in population over the past years in both Santa Barbara and Ventura. The following graphs not only show this population increase, but also an increase in workers, more than 100,000 in Santa Barbara (Graph 1) and 400,000 in Ventura in 2012 (Graph 2). These increases in population and labor force, and projected increases, intensify the level of traffic congestion along the US-101. Providing another commuting option is a viable way to decrease current congestion and handle further population expansion.

Research Question

Where would be the optimal station locations for a high speed commuter rail connecting Santa Barbara and Ventura?

Assumptions

A commuter rail will be most effective if it serves (in order of importance):

- Areas with high commuter-aged population (20-64 years)
- Areas with the highest population density
- Areas in proximity to bus stations

Results

Assessing Potential Map

Once the demographic figures were organized and the corresponding raster generated, we began weighting our data and analyzing the results. We created three individual raster images of population density, commuter density, and bus stop density, and summed them up three separate times to make three composite raster layers. Each of the three maps had different weights assigned to the data, either 1-1-1, 2-1-1 or 3-1-1, respectively. We decided that, of all the weighted summations, the 3-1-1 weighting distribution best represented the commuter population and their needs.

Developing Station Locations

The station location decision process focused on serving the maximum number of commuters, while still keeping the number of stations low to limit total stoppage time. Our final raster combining the demand data helped us visualize areas where the need for a station was greatest. If an Amtrak station was already located in close proximity to these high-demand areas, we decided to simply use that location and declare it a proposed high-speed rail station. In our analysis, we found that four Amtrak stations were located in ideal spots: Galena, Lower State Street, Carpinteria, and Downtown Ventura. We then created buffer zones around each of these existing Amtrak stations at three mile radii to identify which high-demand areas were under-served, and therefore required an additional station. To better serve these commuter-dense areas, we propose three more stations at the following locations: Upper State Street, Southern Ventura, and Grand.

Discussion

Visualizing the Data

Our seven proposed stations all run along existing Amtrak railroads and are located a short distance from bus stops. All of the seven stations have a bus stop within 1,000 feet. Proximity to other transportation networks, i.e. bus stops, was of high importance to our analysis and decision making. The availability of a bus stop only makes it easier for commuters to access the rail, but can also encourage them to leave their car at home and utilize public transportation.

Visual Speed

Optimizing the number of stations has a direct effect on the efficiency of the rail in order to decrease stoppage time. Fewer stations are necessary, yet the rail still needs to serve as many people as possible. We believe we can accomplish this by targeting the population that is most likely to commute (ages 20-64) and the areas of highest population density.

With two minute stops at each station and a top speed of 90 mph, the commuter rail would travel the distance in an estimated travel time of less than 45 minutes between Downtown Ventura and Lower State Street, Santa Barbara. This is in comparison to 45 minutes in rush-hour traffic, and 48 minutes on Amtrak service.

Limitations and Possible Improvements

Access to more precise demographic data pertaining to American working commuters, currently limited by privacy laws, would increase the accuracy of our methods. Access to land-use data could also help to make the model more production ready, and less idealistic. Finally, real-time US-101 traffic data would help to better understand the peak hour congestion throughout the region. The above improvements would create a more accurate model and a more applicable rail proposal.

Methods

Data Collection and Creation

2010 US Census Data
Amtrak Rail and Station Data
2014 US-101 Average Speed Data
Digitized Bus Stops from Google Maps

Bus Point Density

Create a Bus Point Density Raster from the digitized bus stops

Weighted Sum

Combining the three raster files into a final Demand Raster with the following weights:
40% Population Density
40% Population aged 20-64
20% Bus Point Density

Buffer

Create three-mile buffer around stations to evaluate extent of station accessibility

Rasters

Convert Census polygons files into two raster files representing:
1) Population Density
2) Population Aged 20-64

Raster Reclassification

Reclassify the three raster data files using Jenks's optimization method

Overlay

Overlay the Demand Raster with the Amtrak rail and stations

Analyze and Display

Display proposed stations along the existing rail that meet demand and increase accessibility

American Riviera Rapid Transit System
Will Turner, Adam Bolenbaugh, Dominick Burnham, and Patrick Fitzpatrick
 Department of Geography,
 University of California, Santa Barbara

Glacial retreat in the Cordillera Blanca from 1987 to 2001

Eric Ahlgren, Hugh McAvoy, Clark Shao, MingChen Shen
 Geog 115C, Spring 2014

1. Introduction

2. Methods

1. Satellite Imagery: Landsat TM/ETM+ images from 1987 to 2001 were used to monitor glacial retreat. The Normalized Difference Snow Index (NDSI) was calculated to identify snow and ice cover.

2. Glacier Delineation: The NDSI images were thresholded to create binary maps of snow/ice cover. The watershed segmentation algorithm was used to delineate individual glaciers.

3. Area Calculation: The area of each glacier was calculated for each year. The change in area over time was used to determine the rate of glacial retreat.

3. Study Area

4. Results

The Cordillera Blanca region in the Andes has experienced significant glacial retreat over the past few decades. This study focuses on the retreat of glaciers in the Cordillera Blanca region from 1987 to 2001. The results show that the area of snow and ice cover has decreased significantly over this period, with a total loss of approximately 100 km². The rate of retreat is highest in the central and southern parts of the region.

5. Discussion

The results of this study indicate that the Cordillera Blanca region is experiencing a rapid and significant loss of glacial ice. This is a major concern because the glaciers in this region are a vital source of water for the surrounding population. The retreat of the glaciers is likely due to a combination of factors, including global warming and local climate change. Further research is needed to understand the causes of this retreat and to develop strategies to mitigate its effects.

6. Conclusions

The study area has experienced a significant loss of glacial ice over the past few decades. This is a major concern because the glaciers in this region are a vital source of water for the surrounding population. The retreat of the glaciers is likely due to a combination of factors, including global warming and local climate change. Further research is needed to understand the causes of this retreat and to develop strategies to mitigate its effects.

References & Acknowledgements

References:
 Ahlgren, E., McAvoy, H., Shao, C., & Shen, M. (2014). Glacial retreat in the Cordillera Blanca from 1987 to 2001. *Geography*, 78(1), 1-12.

Acknowledgements:
 We thank the following individuals for their assistance in this project: [Names]

Glacial Retreat in the Cordillera Blanca from 1987 to 2001
Eric Ahlgren, Hugh McAvoy, Clark Shao, and MingChen Shen
 Department of Geography, University of California, Santa Barbara



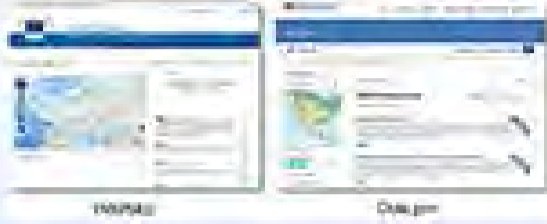
Improving Content Organization and Resource Discovery in Geoportals Using Linked Data

— a case study based on ArcGIS Online



What are geoportals?

- Geoportals are Web gateways that provide integrated access to geospatial resources, such as maps, applications, services, and reports.
- Geoportals are key components of Spatial Data Infrastructure (SDI), which are distributed systems that support the acquisition, processing, distribution, maintenance, and preservation of geospatial data.
- Examples of geoportals: Europe's INSPIRE and U.S. Data.gov.

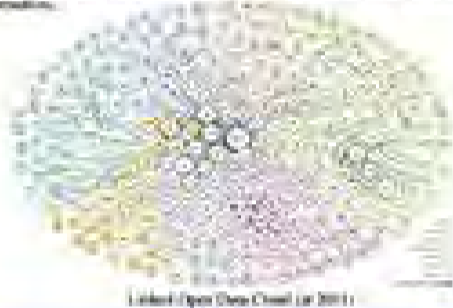


What is Linked Open?

The term **Linked Open Data** (LOD) means:

- It refers to a set of standards for public datasets (interoperable data on the Web).
- It can also be used to indicate the data that have been published following standards and can be automatically processed by machines.

The **Linked Open Data Cloud** (LODC) shows various information about almost everything in our world, and has a significant volume of geographic information.



Challenges raised in this research:

- How to integrate geospatial resources from different providers into one geoportals?
- How to organize metadata of geospatial resources to accommodate the needs of different domains?
- How to enable semantic search for geospatial resources in a geoportals?
- How to enable hyper-relevant-based geospatial resource discovery?

Data used in this research:

- Metadata from ArcGIS Online.
- ArcGIS Online is a geoportals that contains a rich amount of geospatial resources including maps, applications, tools, and geospatial services.
- ArcGIS Online resources data from our study includes (e.g., USGS) for other resources that listed by the LOD community web.

Integrating geospatial resources from different standards:

Problem Definition:

- Geospatial data have to integrate resources from different providers.
- Different providers use metadata from different standards (e.g., INSPIRE and DCAT/DC112).
- There is a need to unify the data from the same standard.

Proposed solution: A semantic-enhanced metadata discovery model.

- Computer resources are identified based on the labels and descriptions provided by the data providers.
- The labels resources model identifies a geospatial resource based on its membership of the resource probability after the observations of some words in both title and description.

Formally indicating words (e.g., "topography") in the category of resources is more likely than other resources' common.



Organizing metadata using Resource Description Framework (RDF):

Problem Definition:

- Traditionally, metadata for geospatial resources are stored in relational databases.
- They are pre-defined and fixed schemas, and unable to allow geospatial resources based on domain needs.

Proposed solution: RDF-based metadata organization.

- RDF as a standard data model for Linked Data.
- It organizes data as subjects, predicates and objects, and data are linked into graphs instead of tables.
- It is schema free and allows customized vocabularies.

Semantic search for geospatial resources:

Problem Definition:

- Traditional hyper-relevant search engines do not search between query and the target resources.
- Unable to capture the semantic meaning of queries, such as "natural resources" is "environment", "waterbody" is "lake" and "river".

Proposed solution: semantic discovery based on semantic mappings.

- Extracting entities and concepts from the Linked Open Data Cloud.
- Expanding the query based on used as resources and related.
- Matching the expanded query with resource entities.



Resource discovery based on logical relations:

Problem Definition:

- Traditional resource search ignores logical relations.

Proposed solution: SPARQL queries for RDF-based data.

- E.g., searching for maps created by the user "John" and contains "Sea" and focus on "California" will have a result in 1.



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Improving Content Organization and Resource Discovery in Geoportals Using Linked Data

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Abstract

This study implements an exploratory analysis of first-grade children's reasoning about plane and solid shapes based on various levels of geometric representations. First-grade children were voluntarily recruited while completing a three-week task developed for this study. This task required children to recognize and distinguish geometric figures (e.g., circle, triangle, square) that they were asked to identify. The study also required children to identify shapes from 2D images of plane and solid shapes. Children were asked to find all instances of the stimulus shapes in parts of the stimulus shape given a choice of the solid shapes. Based on the descriptive qualitative and quantitative data we found the children demonstrated the significance of "angular vertices" ("corners") in their levels of learning tasks. We observed that young children were able to identify shapes in their illustrations, but their children had trouble recognizing lines from 2D diagrams from 3D images. Children, especially when geometric resources were limited, and we would encourage in prior findings that may relate to our finding that children had difficulty recognizing consistently across the writing task. Implications for future research on spatial reasoning communication are also discussed.

Introduction

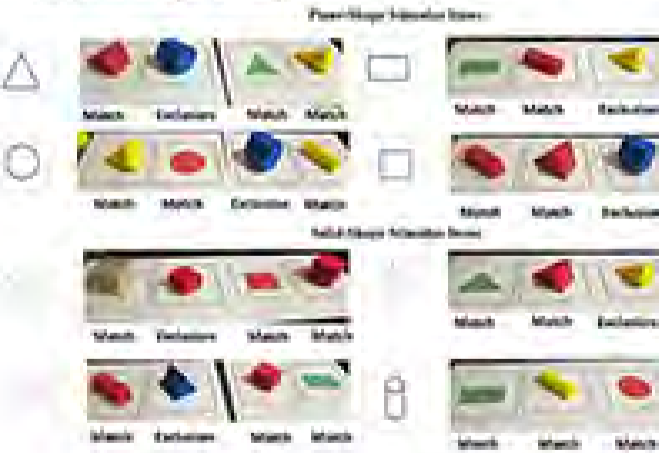
This present study sought to contribute to the understanding about early geometry learning experiences by looking closely at first-graders' geometric-spatial reasoning. We were particularly interested in children's interpretations of 2D diagrams of plane and solid shapes (what they were asked to compare and contrast with 3D plane and solid shapes comparisons). Following these two activities in geometry learning as a single session in the typical classroom, we found our 2D diagrams of shapes on the task commonly listed as geometric shapes (e.g., square, triangle, circle). Additionally, we included solid shapes comparisons widely available for purchase on the internet market, but not available to be used in the classroom. We report here on exploratory findings from a subset of 11 participants.

Methods

- Four first-grade classrooms at a charter school in a coastal community in Southern California.
- Enrollment: 47% White, 40% Hispanic, 2% Asian, 2% Other.
- Enrollment of students eligible for free or reduced price lunch assistance.
- All students who received signed parental consent forms were given the opportunity to participate.
- The collected 30 videotaped interviews (30 min long).
- This exploratory analysis represents a subset of 11 participants.
- $n = 11$: 4 females (36.4%), 7 males (63.6%).
- Total $M_{age} = 4.92$, Age Range: 1.7 (3.48 years).

Measures

- Semi-structured cognitive-structural interviews, video-recorded.
- Shape comparison and discrimination writing task, which took three 20-minute sessions and one 30-minute shape.
- All children were read the same instructions, administered a training story, they viewed four 2D plane shapes, recorded their (lightly modified) constructions, and read the four 2D solid shape stimulus forms.
- Children were directed to find instances of the 2D stimulus shapes among the 2D target and distractor items.
- Children were always asked about at least 1 match and 1 exclusion before possible to view where other task made the distinction required their way into.

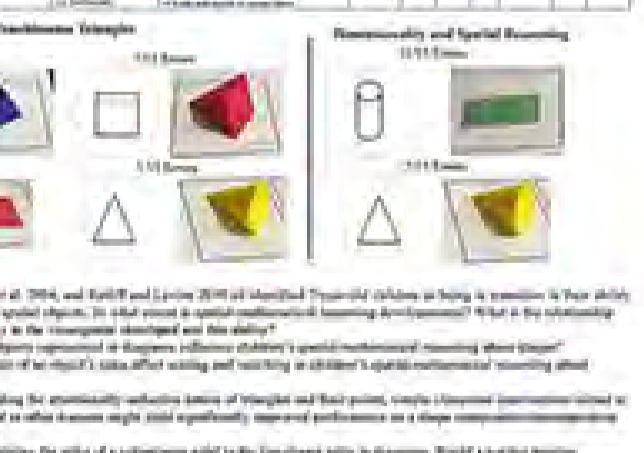


First-Grader's Spatial-mathematical Reasoning about Plane and Solid Shapes and their Representations

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Table 2: Overall Assessment Children Data

Participant	Gender	Age	Match	Exclusion	Match	Exclusion
1	Female	5.0	10	10	10	10
2	Male	5.0	10	10	10	10
3	Female	5.0	10	10	10	10
4	Male	5.0	10	10	10	10
5	Female	5.0	10	10	10	10
6	Male	5.0	10	10	10	10
7	Female	5.0	10	10	10	10
8	Male	5.0	10	10	10	10
9	Female	5.0	10	10	10	10
10	Male	5.0	10	10	10	10
11	Female	5.0	10	10	10	10



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