

Geology Fieldwork

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LA588 Final Project

May 6, 2019

Introduction

I wanted build a website that summarizes my fieldwork experience all in one place as a visual resume of sorts. Until now, I have never created something that addresses it all together, which this website does. Ideally, it can be incorporated into a personal website in the future.

Though much of it is simple, the goal was to make a complete website on a subject that can be presented in map form. Almost every page includes a Leaflet map with some markers. The home page map is most complex, as well as the QGIS map on the [castleguard.html](#) page. I have tried to be intentional about spacing, uniformity, and other formatting to achieve a professional looking webpage with relevant and interesting information.

Structure

- Home page
 - Iowa State
 - Switzerland fieldwork
 - Banff fieldwork
 - Carleton College
 - Keck, Iceland thesis
 - Painted hills mapping project
 - New Zealand mapping projects

All subpages are accessible via the navigation bar and links in the popups on the homepage map.

Home page

I have participated in fieldwork, fieldtrips, and mapping projects, which all have spatial components that can be represented on maps. The homepage features a large Leaflet map with markers that display where I have done such work, as well as some basic info in popups. Some points contain links to additional detail.

The data for each set of points (research, mapping, fieldtrips, and education) are saved in external JSON files:

- fieldtrips.json
- forefields.json
- mapping.json
- school.json



JSON example

Each point group had java script code like this to plot marker points and popups. Complete code is accompanied by css and html. **Purple text** needed to be changed, in addition to adding or removing details.

```
L.geoJSON(mapping, {
  pointToLayer: function(feature, latlng) {
    var act = {
      radius: 5,
      fillColor: "#cc9900",
      color: "#000",
      weight: 1,
      opacity: 1,
      fillOpacity: 0.8
    };
    return L.circleMarker(latlng, act);
  },
  onEachFeature: function(feature, layer) {
    //Box contents
    photoURL = "photos/"+ feature.properties.photo+".jpg";
    linkURL = feature.properties.url;
    htmlText1 = "<strong>" + feature.properties.title + "</strong><br>" +
    feature.properties.caption + "<img src='" + photoURL + "' width='270'><br>" +
    feature.properties.description
    htmlText2 = htmlText1+"<br>"+<a href="+linkURL+">details</a>";
    if(feature.properties.link=="no") htmlText =htmlText1;
    if(feature.properties.link=="yes") htmlText =htmlText2;
    layer.bindPopup(htmlText);
    //hover
    layer.bindTooltip(feature.properties.title);
  }
}).addTo(map);
```

Format marker

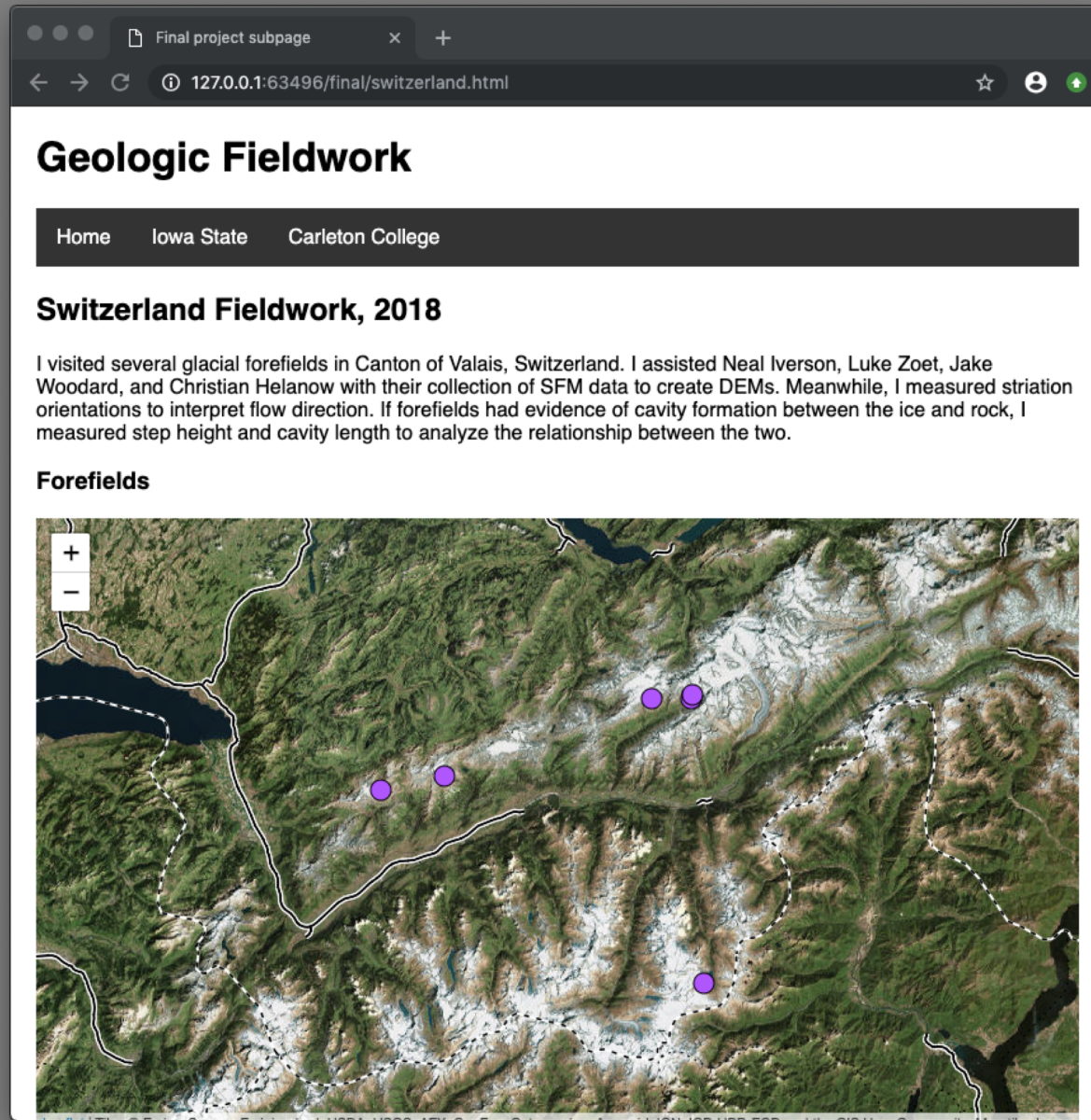
Define popup contents with or without link to details

Determine which popup text to use (link or no link)

Add popups on hover and click

Switzerland fieldwork

- Leaflet map
 - forefields.json
- Link to external site
- Photos



The screenshot shows a web browser window with the following content:

- Browser tab: Final project subpage
- Address bar: 127.0.0.1:63496/final/switzerland.html
- Page title: **Geologic Fieldwork**
- Navigation menu: Home, Iowa State, Carleton College
- Section title: **Switzerland Fieldwork, 2018**
- Text: I visited several glacial forefields in Canton of Valais, Switzerland. I assisted Neal Iverson, Luke Zoet, Jake Woodard, and Christian Helanow with their collection of SFM data to create DEMs. Meanwhile, I measured striation orientations to interpret flow direction. If forefields had evidence of cavity formation between the ice and rock, I measured step height and cavity length to analyze the relationship between the two.
- Section title: **Forefields**
- Image: A satellite-style map of a mountainous region in Switzerland with five purple circular markers indicating fieldwork locations. A dashed white line outlines a specific area on the map.

Basemaps example from switzerland.html

```
var Esri_WorldImagery =  
L.tileLayer('https://server.arcgisonline.com/ArcGIS/rest/services/World_Imagery/Map  
Server/tile/{z}/{y}/{x}', {  
    attribution: 'Tiles &copy; Esri &mdash; Source: Esri, i-cubed, USDA, USGS,  
AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, UPR-EGP, and the GIS User Community'  
});
```

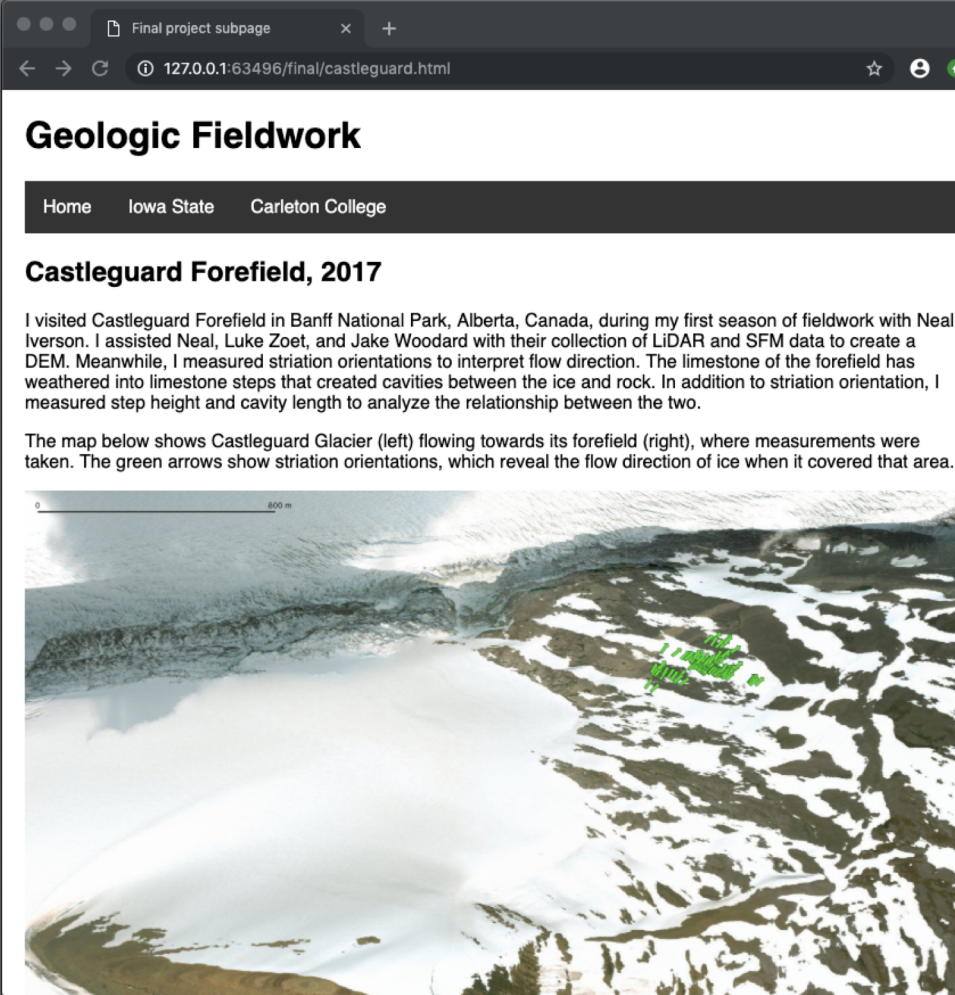
Satellite imagery used in most maps for
environmental context

```
var Stamen_TonerLines = L.tileLayer('http://{s}.tile.stamen.com/toner-  
lines/{z}/{x}/{y}.png', {  
    attribution: 'Map tiles by <a href="http://stamen.com">Stamen Design</a>, <a  
href="http://creativecommons.org/licenses/by/3.0">CC BY 3.0</a> &mdash; Map  
data &copy; <a href="http://openstreetmap.org">OpenStreetMap</a> contributors,  
<a href="http://creativecommons.org/licenses/by-sa/2.0/">CC-BY-SA</a>',  
    subdomains: 'abcd',  
    minZoom: 0,  
    maxZoom: 20  
});
```

Roads and political border imagery used
in the Switzerland map because we were
working near such things

Banff fieldwork

- QGIS map
 - Field data from .csv file
 - This map features rotated symbols by values from the attribute table. Unfortunately, this unique symbology could not be preserved when exported to a Leaflet map, so instead it is displayed here as a still.
- Link to a pdf of a poster
- Poster contents laid out and formatted for easy viewing within the site



The screenshot shows a web browser window with the address bar displaying "127.0.0.1:63496/final/castleguard.html". The page title is "Geologic Fieldwork". A navigation bar contains links for "Home", "Iowa State", and "Carleton College". The main content area features a section titled "Castleguard Forefield, 2017". The text describes a fieldwork experience in Banff National Park, Alberta, Canada, involving the collection of LiDAR and SFM data to create a DEM, and the measurement of striation orientations on limestone steps. It also mentions the measurement of step height and cavity length. Below the text is a photograph of a glacier flowing towards a rocky forefield, with green arrows overlaid on the image indicating striation orientations. A scale bar at the top of the photo shows 0 to 200 meters.

QGIS symbology

Single symbol

Marker

- Simple marker

Unit: Millimeter

Opacity: 100.0 %

Color: [Green]

Size: 7.00000

Rotation: 0.00 °

Topology

- topo airport
- topo camp
- topo hospital
- topo pop capital
- topo pop village

Field type menu:

- E (double)
- N (double)
- W (double)
- name (string)
- flow (integer)
- S (double)
- h (double)
- field_8 (string)

Field type context menu:

- Deactivate
- Description...
- Store Data in the Project
- Attribute Field
- Field type: int, double, string
- Expression
- Variable
- Edit...
- Paste
- Assistant...

Scale bar: 0 to 0.8 mm

Coordinate: -117.212287,52.128214

Scale: 1:336

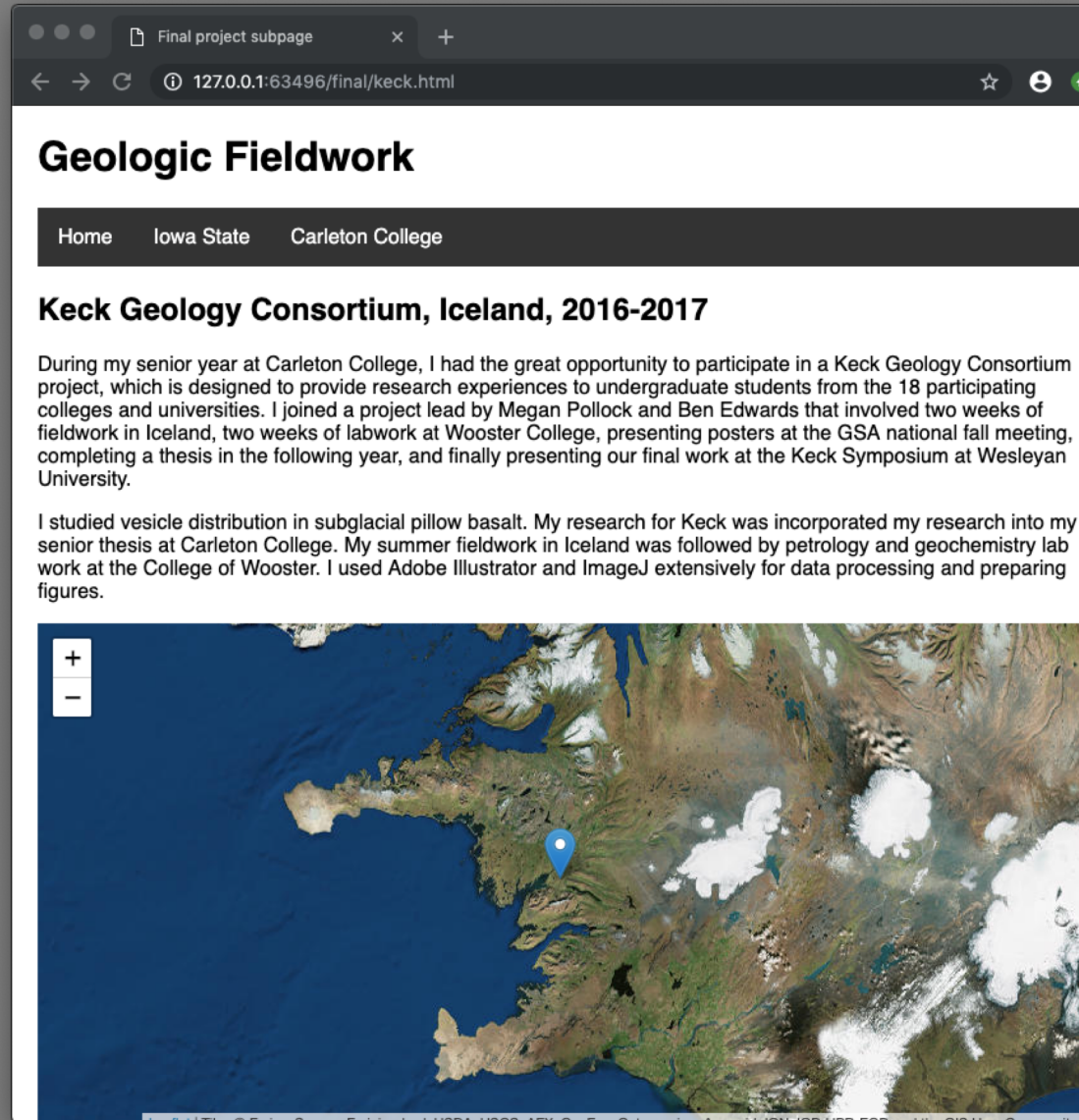
Magnifier: 100%

Rotation: 0.0 °

Render: [checked]

Keck, Iceland thesis

- Leaflet map to indicate quarry location
- Embedded pdf
`<embed src="keckdoc.pdf" width="100%" height="600px" />`
- Link to pdf
`Open pdf`
- Photos



The screenshot shows a web browser window with the following content:

- Browser tab: Final project subpage
- Address bar: 127.0.0.1:63496/final/keck.html
- Page title: **Geologic Fieldwork**
- Navigation bar: Home | Iowa State | Carleton College
- Section title: **Keck Geology Consortium, Iceland, 2016-2017**
- Text: "During my senior year at Carleton College, I had the great opportunity to participate in a Keck Geology Consortium project, which is designed to provide research experiences to undergraduate students from the 18 participating colleges and universities. I joined a project lead by Megan Pollock and Ben Edwards that involved two weeks of fieldwork in Iceland, two weeks of labwork at Wooster College, presenting posters at the GSA national fall meeting, completing a thesis in the following year, and finally presenting our final work at the Keck Symposium at Wesleyan University."
- Text: "I studied vesicle distribution in subglacial pillow basalt. My research for Keck was incorporated my research into my senior thesis at Carleton College. My summer fieldwork in Iceland was followed by petrology and geochemistry lab work at the College of Wooster. I used Adobe Illustrator and ImageJ extensively for data processing and preparing figures."
- Image: A satellite map of Iceland with a blue location pin on the western coast. The map includes a zoom control with '+' and '-' buttons.

Painted Canyon Mapping Project

- Photos
- Leaflet map with a rectangle outlining our mapping area
- I really wanted to include it, but unfortunately I couldn't find the actual map we made!



Final project subpage

127.0.0.1:63496/final/ca.html

Geologic Fieldwork

Home Iowa State Carleton College

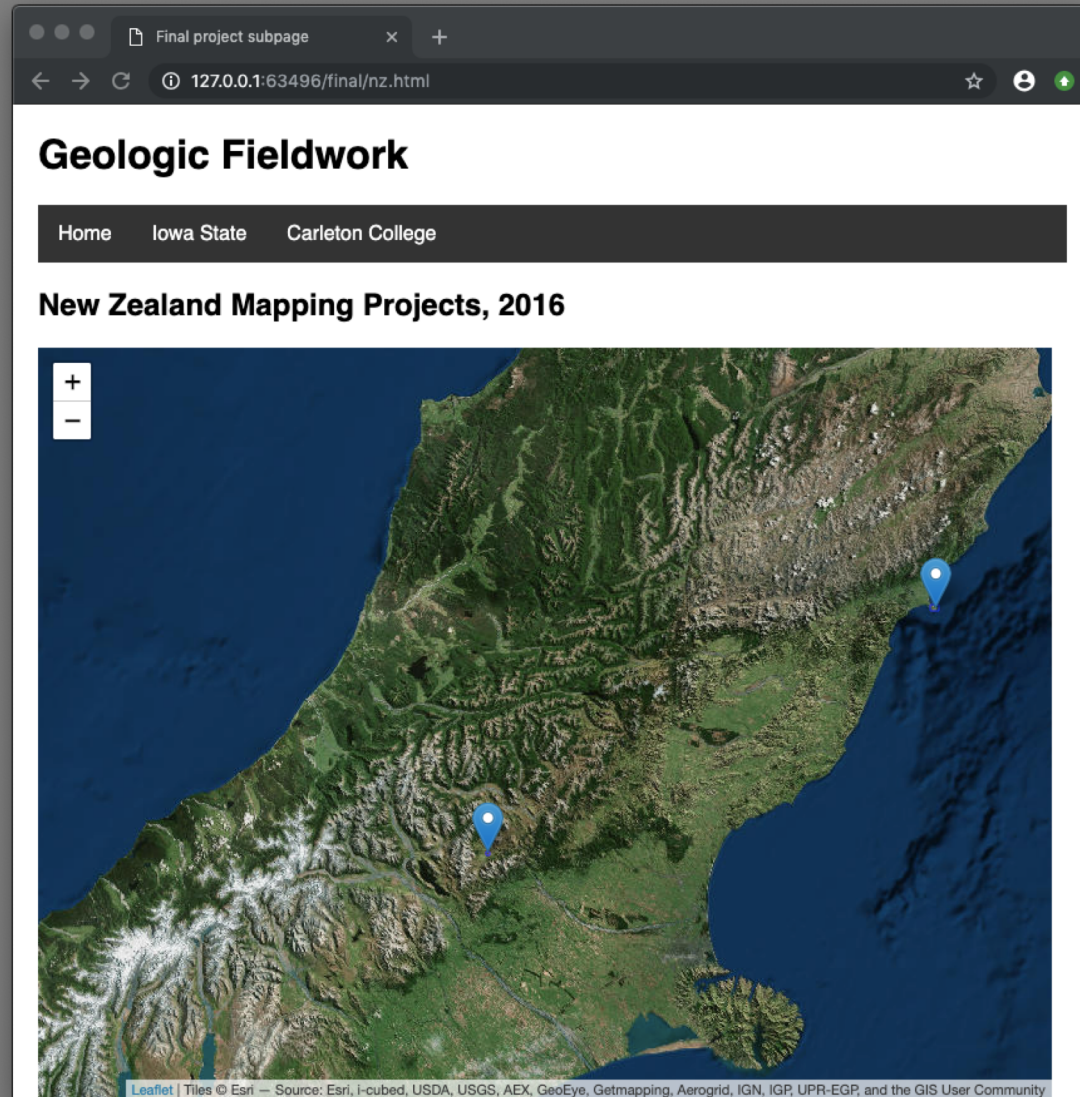
Painted Canyon Mapping Project, 2017

As an exercise in Carleton College's structural geology class taught by Sarah Titus, we spent a weekend mapping a portion of the San Andreas Fault in Painted Canyon in Southern California. The class worked in small groups of three, each of which was responsible for identifying contacts, faults, and folds in our assigned mapping area.



New Zealand Mapping Projects

- Leaflet map
- Photos
- Again, I was hoping to include these maps but I can't find them!
- Because I couldn't track down much info, this page shows two projects and is directed to by two points on the home map



Reflection

The final product includes some things I hadn't originally thought of, as well as leaving out some original ideas because I couldn't track down the data/maps I had in mind or otherwise decided that this new version was preferable. By the end of this project, I feel like I have tremendously improved on creating and managing a large number of detailed external json files, and finally understand the javascript code used to reference them and several different ways. It was nice to brush up on, and to finally try my hand at making a relatively large scale site with many subpages and internal links.

I am happy with the clean looking final product, and am open to suggested improvements, because I hope to continue to develop this site in the future.