1. Abstract
High Standing Islands (HSIs) experience extremely rapid physical and chemical weathering, resulting in large inputs of both sediments and solutes into the ocean. This can impact the global carbon cycle by the rapid burial of organic C and precipitation of calcium carbonate in the oceans. This poster will provide a progress report on a study of the role of uplift and erosion rates of various regions in Taiwan and its effect on the CO$_2$ and C consumption.

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2. Background
Previous studies on weathering rates of high standing islands (HSIs) have shown rates of chemical weathering (Koons et al., 2000; Carey et al., 2000). However, attempts to correlate these rates to sources have often suffered due to a lack of accurate tectonic data. Furthermore, few studies have attempted to determine a relationship between soil organic carbon content, storage, and sequestration with uplift and erosion rates.

The purpose of my research is to determine organic and inorganic carbon content in soils from regions with different uplift and erosion rates. This study may help combine existing data on erosion and soil processes to determine total carbon stores on the island and flux to the ocean as a result of physical and chemical weathering.

3. Geologic Setting and Sample Location
- The central range formed by oblique collision of the Eurasian plate beneath the Philippine Sea plate
- Uplift rates >10mm yr$^{-1}$ have been recorded (Shin and Teng, 2001)
- Rapid uplift of the region leads to high rates of physical erosion by mass-wasting, which allows fresh rock to be exposed for subsequent chemical weathering
- Three out of nine rivers in the world, which have annual sediment concentrations >10pg (Milliman and Syvitski, 1991)
- Samples were collected from three locations in Taiwan with varying degrees of uplift and erosion rates (See Figure 1 & Table 1)

4. Sampling Methodology and Analysis
- Samples were initially dried for 96 hrs at 110ºC
- Organic and inorganic carbon were determined by loss on ignition method. Samples were heated at 550ºC for 4 hrs to determine the amount of organic carbon and at 950ºC for 1 hr to determine the amount of carbonate (Heiri et al., 2001)
- Samples were also sieved to determine variation in particle size
- Changes of organic and inorganic carbon were plotted within each soil profile

5. Results
Initial results show soil samples to be dominated by sand and gravel particle sizes. Clay-sized particles comprise only a few percent of the total soil in these sites. Inorganic carbon (CO$_2$) concentrations decreased from ~ 0.1 to 0.2%.

Concentrations did not vary systematically with depth or with particle size for any of the soils analyzed.

The organic carbon content was highest in the surface samples from the Fushan Experimental Forest. Organic carbon concentrations in the gravel size fraction for all the sites measured were low and relatively constant with depth, ranging from ~ 0.15 to 0.25%.

6. Discussion
The soils are predominately composed of the larger size fractions, with small clay and very low concentrations of carbonate and organic carbon, indicating that they haven’t experienced extensive chemical weathering. However, as evident from the previous studies in the area (Lyons et al., 2005; Carey et al., 2005), the rapid uplift and erosion rates will remove the more weathered material, fresh rock that is rapidly chemically weathered.

Total inorganic carbon sequestered in soils in the study areas is equivalent to ~ 1 kg/m$^2$ soil. This is the same amount of CO$_2$ that would be emitted from driving my car to school.

Total organic carbon sequestered in the soils is equivalent to ~ 1 kg/m$^2$ soil. This would allow me to drive to work and back at week.

However, erosion rates coupled with total carbon content of the soils, yields carbon flux rates of 30kg/m$^2$ soil/century. This would be equivalent to a billion metric tons of CO$_2$ sequestered from the island in the last century.

7. Future Research
Bulk Chemistry analysis:
- Age of soil
- Composition
- Extent of chemical alteration

Experimentally determine weathering rates of materials to determine reactivity of different size fractions

Role of biosphere on weathering rates by analysis of carbon isotopes

Determine variability in organic and inorganic C stores as a function of elevation, slope, and lithology

Investigate episodic extreme weathering events associated with typhoons

References

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