The final program of the second MORE Sciences Students Colloquium

Dear mentors and students,

Thank you for taking time from your busy schedule to contribute to the success of the MORE Science Program. The second MORE Sciences Students Colloquium contains six research papers and oral presentations, showcasing undergraduate (4) and graduate (2) research being conducted within our department. The content covers a diverse spectrum of contemporary topics from Mars, to Terrain Snow Cover, Antarctic Sea Ice, Ground Water, and to Carbon Isotopic within the Department of Geologic Science. Each speaker has 15 minutes for his/her oral presentation and 5 minutes for questions. Ph.D. students within the ESE Ph.D. program are going to serve as judges, and each presenter will be given one award based on the judges' opinion on each speaker's paper and oral presentation. Graduate and undergraduate students will be assessed separately. Undergraduate has one 1st award -$300, one 2nd award-$150, and two 3rd award-50; Graduate has one 1st award -$300, and one 2nd award-$150. Colloquium will be held on Friday, Feb 8th 2008. The specific schedule is listed in Table 1. All abstracts are following the Table 1.

All other students and faculties are welcome to attend the colloquium.

Room: SB 2.01.02, the RS lab, UTSA
Time: 1:00-4:00, Friday, Feb 8th 2008

Judge Committees

Burcu Cicek – Laboratory of Remote Sensing and Geoinformatic (LRSG)
Karen Engates – HydroGIS
Marcus King – Biology
Keith Muhlestein – HydroGIS
Pravin Punamiya – Environmental Geochemistry Lab (EGL)
Padmini Das – Environmental Geochemistry Lab (EGL)

For more information about Colloquium, please call Xianwei Wang at 210-458-7815 or e-mail to Xianwei Wang at **Xianwei.wang@utsa.edu**

We are looking forward to meeting you at the Colloquium!

Sincerely yours,

Xianwei Wang
Coordinator, the 2nd MORE Science Colloquium
The Laboratory of Remote Sensing and Geoinformatics
Department of Geological Science
The University of Texas at San Antonio

Table 1. The final program of 2nd MORE Science Students Colloquium				
Date	**February 8, 2008, Friday**			
Room	**SB 2.0102, UTSA**			
1:00-1:30	**Check in and Lunch**			
	Students	**Mentors**	**Categories**	**Title**
1:30-1:50pm	Austin Jordan	Hongjie Xie	Undergraduate	A.M. High Albedo Events in Martian northern polar craters: An Investigation Using THEMIS Infrared Data
1:51-2:10pm	Beverly Saunders	Steven Ackley	Undergraduate	Physical properties of Sea Ice from the Ross Sea, Antarctica
2:11-2:30pm	Kristi Salazar	Debajyoti Paul	Undergraduate	Stable Carbon and Oxygen Isotopic Composition of soil and Snail shells Recovered from Archaeological Site 41KM69, Flatrock Road Site, Texas: Inferences on Ecological Conditions
2:31-2:50pm	Mark Childre	Alan Dutton	Undergraduate	Understanding the History, Features, Modeling, and Concerns Edwards Aquifer: San Antonio Region
2:51-3:00	**Break**			
3:01-3:20pm	Beibei Yu	Hongjie Xie	Graduate	MODIS-based snow cover variability of the Upper River Grande Basin
3:21-3:40pm	Penelope Wagner	Steven Ackley Hongjie Xie	Graduate	High-resolution imagery provides additional evidence for sea ice dynamics on Mars
3:41-3:50pm	**Judge meeting and discussion**			
3:51-4:00pm	**Announce award**			

Abstracts:

1. **Austin Jordan and Hongjie Xie.** A.M. High Albedo Events in Martian northern polar craters: An Investigation Using THEMIS Infrared Data

Following the work done on surveying High Albedo Events (HAE's) in Mars' northern polar craters (Armstrong et al., 2007), we use data from THEMIS (Thermal Emission Imaging System) on board the Mars Odyssey spacecraft to correlate the findings of the TES (Thermal Emission Spectroscopy) survey. In the TES survey, there were 9 craters (65°N to 71°N) with a diameter larger than 10km which displayed HAE's in a.m. hours (0140-0330 local time) during late spring to mid-summer, at temperatures well above the sublimation point of carbon dioxide frost. This implies that water ice forms overnight, sublimates during the day, and re-deposits in the following night (Xie et al., 2007). Using the THEMIS image database at http://themis.asu.edu, we found a total of 40 infrared images and several visible images which fell into our search criteria for the a.m. crater HAE's. These images were captured at a local time ranging from 0419-0511 during Ls 47° to 180°, with solar incidence angles ranging from 95.4° to 72.1°. An investigation of these images showed mixed results. Some craters (65.43°N/128.33°E, 66.35°N/163.44°E, 66.38°N/144.02°E, 70.04°N/352.05°E) exhibit what could be interpreted as signs of interior crater frost but none of them is definitive, while others (64.82°N/209.40°E, 64.90°N/350.77°E, 65.49°N/283.67°E, 69.87°N/285.01°E, 70.88°N/193.55°E) display no sign of interior crater frost at all. Additionally, there are a number of craters (64.90°N/350.77°E, 65.43°N/128.33°E, 66.35°N/163.44°E, 66.38°N/144.02°E, 70.04°N/352.05°E, 70.88°N/193.55°E) which show definite signs of water frost along the crater rim. These observations suggest one of the followings: (1) the interior crater frost sublimates before the THEMIS images were taken; (2) the THEMIS data cannot capture the diffuse, scattered, and thin frost deposits well enough to be used in any conclusive manner; or (3) there was simply no interior crater frost to begin with.

2. **Beverly Saunders and Steven Ackley**. Physical properties of Sea Ice from the Ross Sea, Antarctica

Thirty three ice cores were extracted at different sites along the Ross sea pack ice between the dates of Dec. 27th, 1999 and February 1st, 2000. Snow and slush depths were measured at each site and estimated ice concentrations were recorded throughout the trip. The cores were segmented into different depth intervals. Each segment was processed and observed. Ice textures were identified as granular, columnar, transitional or other, and salinity and $\delta^{18}O$ samples were taken and measured at each interval. This data was then input to a basic excel program and analyzed. The mean snow and slush depths, ice concentrations, and total percent ice type compositions were then calculated; as were the mean salinities and $\delta^{18}O$ values for each ice type for all of the cores. The ice cores were then divided into groups according to the latitude from which they were extracted and the same analyses were performed for each group. Profiles for each of the cores were also constructed. Slush was present in twenty four of the thirty two ice core locations and was common in most areas. Granular ice was the most common ice type being between 56 and 90 percent of the ice composition in each of the divided areas and over 63 percent of all of the ice sampled. The

mean salinity was around 4.14‰ and the $\delta^{18}O$ mean values tended to be dominated by negative values indicating high snow ice concentrations.

3. **Kristi Salazar and Debajyoti Paul**. Stable Carbon and Oxygen Isotopic Composition of soil and Snail shells Recovered from Archaeological Site 41KM69, Flatrock Road Site, Texas: Inferences on Ecological Conditions

This study focuses on utilizing the stable carbon and oxygen isotopic composition of soil inorganic carbonate, soil organic matter (SOM), and shell carbonates recovered from the Archaeological site in Texas, to interpret ecological conditions prevailing during soil formation (2340-2120 B.P). Our results suggest dietary effects (C3 vs. C4) on the carbon isotopic composition of snail shells. Furthermore, carbon isotopic composition of shell carbonate is influenced by the isotopic composition of soil carbonate. Isotopic compositions of archaeological shells are consistent with that observed for the modern shells collected from the study area. Although the interpretation of oxygen isotope composition in land snails is not straightforward, values are probably related to several different climate signals including temperature, rainfall, and relative humidity, and may be used for potential markers of local climate conditions (Balakrishnan, 2004).

4. **Mark Childre and Alan Dutton.** Understanding the History, Features, Modeling, and Concerns Edwards Aquifer: San Antonio Region

Various maps of the Edwards Aquifer conduit segments, sub-regional flow direction, and potentiometric contours were made using finite difference, GIS, and mapping software. The approach took into account the hypothesis of the discontinuities created by barrier faulting and suspected cross-flow conduits. Recent research has provided evidence for the next modeling effort.

The normal faulting occurred during the late Oligocene and early Miocene Epoch which formed the Balcones Fault Zone. The geologic structure compounds the recharge and artesian characteristics of the aquifer extensively. There are problems with the possible hydraulic connection across fault zones. The original hypothesis stated a partial loss of the hydraulic connection in the recharge zone was the effect of confined or ramp faults and en echelon fractures. Edwards Aquifer Authority recently conducted tracer tests which show that the previous hypothesis is inadequate to explain the flow of water. A conduit, or a trough, may be parallel or provide perpendicular flow. These karst features may penetrate the throw of barrier faults and confined bedding that occupies a region between the Trinity and Edwards Aquifer. In the future, research is needed to further define the locations and influence of penetrating conduits and barrier faults.

Generally, the artesian zone flows freely. In the artesian zone, water moves under low hydraulic gradients through fractured karstic strata from the western counties, through the San Antonio area, northeast to Austin.

The responsibility for research of barrier faults and conduits is currently underway. By working in concert, providing definition, testing, and modeling of barrier faults, conduits, and caves of the Edwards Aquifer are being tackled. San Antonio will be ensured of an uninterruptable contamination free water supply. The research will, with continued support, promise San Antonio's rapid growth in the future.

5. **Beibei Yu , Xianwei Wang, Hongjie Xie.** MODIS-based snow cover variability of the Upper River Grande Basin

Snow cover and its spring melting in the Upper Rio Grande Basin provides a major water source for the Upper to Middle Rio Grande valley and Elephant Butte Reservoir. Thus understanding the snowpack and its variability in the context of global climate change is crucial to the sustainable water resources for the region. MODIS instruments (on Terra and Aqua) have provided time series of snow cover products since 2000, but suffering with cloud contaminations. In this study, we evaluated four newly developed cloudless snow cover products (less than 10%) and four standard products: daily (MOD10A1, MYD10A1) and 8-day (MOD10A2, MYD10A2), in comparison with *in situ* Snowpack Telemetry (SNOTEL) measurements for the hydrological year 2003-2004. The four new products are daily composite of Terra and Aqua (MODMYD10DC), multi-day composites of Terra (MOD10MC), Aqua (MYD10MC), and Terra and Aqua (MODMYD10MC). The standard daily and 8-day products can classify land correctly, but daily products had fairly low accuracy in snow classification due to cloud contamination (a average of 39.4% for Terra and 45% for Aqua) and 8-day products tended to overestimate the snow cover and have a much reduced temporal resolution.All the new multi-day composite products tended to have higher accuracy (about 78% for the hydrological year and 83% for winter season) than the daily product, as the cloud cover has been reduced to less than 10% (~5% for the year) under the new algorithm . This result is consistent with a previous study in the Xinjiang area, China (Wang and Xie, 2007). Therefore, MODMYD10MC products are used to get the mean snow cover of the Upper Rio Grande Basin from 2000 to 2007. The change of the mean snow cover showed an unexpected fluctuated trend rather than continuously decrease due to global warming.

6. **Beverly Saunders, Steven Ackley, and Hongjie Xie**. Physical properties of Sea Ice from the Ross Sea, Antarctica

Thirty three ice cores were extracted at different sites along the Ross sea pack ice between the dates of Dec. 27th, 1999 and February 1st, 2000. Snow and slush depths were measured at each site and estimated ice concentrations were recorded throughout the trip. The cores were segmented into different depth intervals. Each segment was processed and observed. Ice textures were identified as granular, columnar, transitional or other, and salinity and $\delta^{18}O$ samples were taken and measured at each interval. This data was then input to a basic excel program and analyzed. The mean snow and slush depths, ice concentrations, and total percent ice type compositions were then calculated; as were the mean salinities and $\delta^{18}O$ values for each ice type for all of the cores. The ice cores were then divided into groups according to the latitude from which they were extracted and the same analyses were performed for each group. Profiles for each of the cores were also constructed. Slush was present in twenty four of the thirty two ice core locations and was common in most areas. Granular ice was the most common ice type being between 56 and 90 percent of the ice composition in each of the divided areas and over 63 percent of all of the ice sampled. The mean salinity was around 4.14‰ and the $\delta^{18}O$ mean values tended to be dominated by negative values indicating high snow ice concentrations.