GEOG 361 – Remote Sensing in the Geosciences **Dr. Andrew Klein**
Inquiry Project 2

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1. Instructions for the Inquiry Project will be provided in class and the PowerPoint slides detailing it will be made available on the class website.
2. Students will work in Groups of Four. To facilitate Group work, each student should list the students working in their group and their contact information in the table provided at the end of the instructions. Each group will provide the instructor with the names of the group members.
3. The project will be graded on the basis of a five-slide PowerPoint presentation. The slides should be constructed as follows:
   a. **Slide 1** – The Group's selected sensor & group member names
   b. **Slide 2** – A summary table detailing the spatial/temporal/spectral needs of the project
   c. **Slide 3** – Description of the selected sensor and details of when acquisition should occur and why this sensor and acquisition time were selected
   d. **Slide 4** – Appropriate supporting information
   e. **Slide 5** – Appropriate references in the *Chicago Manual of Style* author-date format
4. All PowerPoint presentations will be graded using the following Rubric

	1	2	3	4
Correctness of Sensor Choice	Selected Sensor not come close to meeting requirements	Selected Sensor partially meets requirements but other sensors are superior	Selected Sensor mostly meets requirements but other sensors are slightly better	Selected Sensor is best available
Completeness, Quality and Appropriateness of Project needs	Stated spatial, temporal and spectral requirements do not closely match needs	Stated spatial, temporal and spectral requirements do partially match needs	Stated spatial, temporal and spectral requirements meet most of the needs	Stated spatial, temporal and spectral requirements closely match project requirements
Quality and Appropriateness of Supporting Information	Supporting information not relevant to topic and/or incorrect	Supporting information somewhat relevant to topic and/partially correct	Supporting information to topic and mostly correct	Supporting information sound and correctly backs up sensor requirements and choice
Quality of Reference Sources	Reference Sources are of low quality or provide incorrect information or are not relevant to topic	Reference Sources are too general and inadequate to correctly cover topic	Reference sources are acceptable, but could be of better academic quality and/or better cover topic	Reference sources are of high academic quality, appropriate to objectives and sufficiently cover topic

Assignments will be graded as follows:

Letter Grade	Numeric Score from Rubric
A	14-16
B	11-13
C	8-10
D	5-7
F	4

Contact Information for Group Members:

Member Name	Email/Facebook etc.	Phone

If you have any questions, please do not hesitate to contact me.

Some things to consider…

A major part of any remote sensing project is careful consideration of project design. In determining what type of satellite imagery is best suited to the task at hand and what ancillary data may need to be collected several factors need to be considered.

Wavelength The fundamental issue in project design is determining which portion of the electromagnetic spectrum will provide the information you are after. For instance, if I were interested in determining the albedo of snow covered surfaces I would chose an instrument operating in the visible to mid-infrared wavelengths. However, if I were interested in determining the amount of water that a snowpack contains I would chose a sensor operating in the microwave region.

Spectral resolution Is an instrument with a large number of bands required or is it feasible to use either a few broad bands or a small number of narrow bands at carefully selected wavelengths?

Spatial resolution The pixel size of the sensor needs to be small enough to characterize the phenomena of interest. However, too fine a spatial a resolution results in unnecessary detail - and a lot more information must be processed. Remember that image size increases as the square of the resolution. While a 1m orthophoto may be necessary for studies of urban sprawl in Bryan-College Station, it is not necessary for studying weather conditions over the region.

Temporal sampling How often do measurements need to be made to characterize the phenomena of interest? Is uniform temporal sampling adequate or do some periods require a higher sampling frequency while others periods may require less? There often exists a tradeoff between spatial resolution and sampling frequency - higher resolution data is simply not currently acquired with the frequency of lower spatial resolution data. For example, daily image acquisition is not necessary for studying urban sprawl in Bryan-College Station, but given the region's rapid growth a 5 year sampling interval is not ideal either. Despite the fact that urban sprawl will be apparent over a period of five years, little information on the spatial evolution of the city can be gotten by comparing aerial photos taken five years apart.

A major advantage of remote sensing is the ability to acquire information over large areas. However, interpretation of these regional- to continental-scale images often requires additional sampling (both spatially and temporally) at carefully selected smaller areas. These validation or 'field campaign' sites are often used to relate changes observed in coarse resolution satellite imagery with environmental processes observed in the field or to assess the accuracy of bio- or geo- physical quantities derived from satellite images.

In summary you need to consider…What wavelength regions will be used? What will be the primary spatial sampling size (pixel size)? What are the temporal sampling characteristics (which portions of the year are the most important) and what sampling frequency will be used? Will the sampling frequency remain constant throughout the year?