



Data Request Instructions

The following guidelines can be used in answering the questions of the *"Data Request Form."* For any questions extending beyond or about this information, please contact the person whose information is provided at the bottom of this sheet or go to <http://www.umac.org> for more information. Please send us your request by May 15th in order to receive consideration for the upcoming season.

The University of North Dakota's AEROCam (Airborne Environmental Research Observational Camera) is used by UMAC to provide near real-time aerial imagery with a higher resolution than currently offered by satellite imagery sources to end-users within the UMAC region. Our imagery serves as a vital tool in remote sensing and the geospatial analysis of vegetation, soils, and numerous other environmental and agricultural applications. UMAC end-users include farmers, ranchers, foresters, natural resource managers, tribal officials, and university researchers.

AEROCam operations are primarily conducted to support UMAC funded research activities, though related operations can be undertaken on a case-by-case basis of research and farming activities. All imagery will be collected on a "best effort" basis, meaning we cannot guarantee imagery will be acquired as requested. However, we have a good success rate and will attempt to acquire all requested data to the best of our ability given the many uncontrollable factors such as weather and equipment problems.

Multiple small sites that are related in purpose and are for the same requestor can be requested on a single form. However, if each site involves different people, are for different purposes, or needs different acquisition dates, it is best to submit multiple forms.

A. Contacts

At the top of the form indicate who is the primary contact requesting the data. This is the person with whom we will coordinate the specifics of data acquisition.

Please indicate if you are working with someone within the UMAC community in the space provided on the form. Working with someone within UMAC is not required, but we encourage users to get involved with someone from one of the many UMAC universities listed below so that data can be shared and utilized in as many applications as possible. To find contacts within these UMAC organizations go to <http://www.umac.org/content/umac/people.shtml>.

[University of North Dakota](#), Grand Forks, ND
[South Dakota State University](#), Brookings, SD
[South Dakota School of Mines](#), Rapid City, SD
[Sinte Gleska University](#), Mission, SD
[EROS Data Center](#), Sioux Falls, SD

[University of Montana](#), Missoula, MT
[Montana State University](#), Bozeman, MT
[University of Wyoming](#), Laramie, WY
[University of Idaho](#), Moscow, ID

If there is someone else who will be utilizing the data please enter their information in the "Secondary Contact" section. Any additional secondary contacts can be listed at the end of the "Data Purpose" section if necessary. Specify whether or not each person would like an email notifying them of the data being available on our FTP site.

B. Imagery

Acquisition Dates & Number of Flights

It may be possible for AEROCam to collect data for your site(s) on more than one date depending on availability. Minimum data acquisition windows will consist of a two week period extending one week before and after

each date specified. Periods of time larger than two weeks are also acceptable and encouraged. On the form, you can specify up to three collection dates. We will inform any applicant if we are unable to collect your data within the time period you requested, and perhaps find a suitable alternate time.

If you need images to be collected on more than three flights, please provide rationale at the bottom of the "Data Purpose" section. Time and distance will ultimately decide whether we will be able to collect data on those extra dates.

Band Combinations

Images can be collected in two different sets of 3-band combinations either Color Infrared (CIR) or Red, Green, Blue (RGB). CIR images (NIR, red, and green color bands) are useful in viewing subtle variances in vegetation and evaluating features such as crop health, insect damage, weed infestation, and heat stress. RGB (red, green, and blue color bands) images appear normal, as your eye would see things, making them easier to interpret for evaluating spatial characteristics of the site. If you would like both CIR and RGB images of your site collected, select "BOTH". One important item to be aware of if you request "BOTH" is that **we are unable to collect the RGB images with all three bands**, while the CIR images are unaffected. What we've done in the past is artificially add blue color to the RGB images to give them a true color appearance, realizing that the pixel values for the blue band will be inaccurate. Also, keep in mind that by choosing to receive both band combinations your number of images for the site will double since the CIR and RGB images are saved as two separate images.

Resolution

AEROCam images are offered in 1 meter, 1.5 meter, or 2 meter resolutions. It may be possible to collect higher resolution images such as 0.5 meter or 0.25 meter, but these are done on a case by case basis. If, for specific reasons, you would like higher resolution images, please specify why on the form. Site characteristics such as elevation, topography, ground references, etc. will be considered when determining whether or not we will be able to collect the images at the requested resolution.

In selecting the resolution, there are many factors to consider. At 0.5 meter resolution, AEROCam is required to fly over the site at 3,000 ft Above Ground Level (AGL), 6,000 ft AGL for 1 meter and so on. The maximum altitude that AEROCam can fly is 12,500 ft above sea level (MSL). It may be possible to go higher for short periods of time (1/2 hr or less) if the site is small in area (approximately 1 square mile). If the elevation of the site above sea level is very high, we may only be able to collect images at 0.5 or 1 meter resolution. Topography also controls the altitude over which the site can be flown and in mountainous terrain we may only be able to safely fly the site at 1m or lower resolution.

Featureless terrain can cause problems during processing while images are being rectified. A lower resolution may be desired to simplify the rectification process since agricultural fields, or similar areas that change from year to year, make it difficult to locate suitable Ground Control Points (GCP's) on the reference image when rectifying the raw images. By flying at a higher altitude (decreasing the resolution), a larger area on the ground is in the image increasing the number of possible GCP's. Please, also read the section on geo-rectification before specifying spatial resolution.

C. Site Information

Site Boundary Format

The preferred form of site description information is to make a shapefile and send it along with your request. A shapefile is especially desirable when you have more than one site and/or when the site isn't square in shape. ArcMap or similar software such as [MapWindow GIS](#), which is free to download off the internet, can be used to make

a shapefile of your sites (additional information on using MapWindow GIS is available on the AEROCam webpage). If you prefer, you can give us the Legal Description of the site instead, listing sections and quarter sections. If more than one site is requested, there is a supplemental sheet at the end of the form where you can add the additional site information. If for any reason, you need assistance in determining the boundaries of your site(s), contact someone involved with AEROCam and we will be happy to help you.

Try to limit the size of your site(s) to as small of an area as possible. A typical request is 0.5 – 5 square miles, with an upper limit of 20 square miles. Exceptions can be made if determined necessary, although certain resolutions or repeated flights may be restricted if the site is over 20 square miles. Please, also read the section on geo-rectification before submitting site boundaries.

Elevation (optional)

Enter the minimum, maximum, and the average elevation of your site. This will be used to determine what altitude to fly at while collecting the images of the site. Leave blank if the elevations are unknown.

Topography

Check all that apply within your site. Having some indication of topography found within the site helps us to determine if we need to investigate the site location for any conflicts between the required flying altitude for the desired resolution and terrain. For example, if your site has mountainous terrain and you are requesting 0.5 meter resolution, we will want to look at the site more closely to make sure that the altitude at which the aircraft will be flying gives suitable terrain clearance.

Vegetation

Indicate what types of vegetation are predominantly found on your site. Check all that apply to the site.

D. Data Processing

Image Processing

All CIR images will be flat-fielded and corrected for at-sensor radiance. Because of the correction the images may appear darker, but can be easily viewed in ERDAS Viewfinder or other imagery software. RGB images will be flat-fielded only.

Data Delivery

The primary method of data delivery is through the use of our FTP site. We upload your images and related data in a folder to <ftp://ftp.umac.org/AEROCam> from which you will be able to download your folder of images. Once we have processed the images and uploaded your folder the contacts indicated on the form will be sent an email notifying them that the images, in a specified folder, are available to be downloaded. Images will be left online for 30 days from the date of the email notification before being removed.

Data can also be burned to a DVD and sent through the mail to the Primary Contact if you do not have access to the internet or use a dial-up connection. In order to receive a DVD please indicate why using our ftp site will not work in your case.

The typical data you receive for each site and acquisition date will consist of the unrectified raw images, with at-sensor radiance pixel values, a shapefile and PDF file of the image center points, and a "data description list" explaining each file included.

Geo-Rectification

Geo-rectification refers to the process of lining up each individual AEROCam image with a reference image that has known geographical coordinates. This allows your AEROCam imagery to be more easily compared with other imagery or datasets, and produces a "mosaiced" set of imagery for your site. However, we do not have an automated way to geo-rectify your images, so doing this is a very labor intensive process. Therefore, we prefer that you geo-rectify your own images if you have the resources to do so. If you don't have the resources, and your project requires geo-rectification, special arrangements should be made prior to data acquisition.

More specifically, our priorities will be to perform geo-rectification as follows:

- 1) For those that don't have their own resources, and whose projects are 1 square mile or less in area with resolution of 1 meter or lower;
- 2) For those that don't have their own resources, and whose projects are larger in size or have higher spatial resolution than above; and
- 3) We may be able assist geo-rectification of remaining projects, as time allows.

Ultimately, our own available time and resources determines how much rectification we will be able to do. Arrangements for AEROCam to geo-rectify your images should be agreed upon and made prior to the collection of the data.

E. Data Purpose

A peer review committee will evaluate the "Data Purpose" description based on how the data will be utilized. Each request will then be weighed against the others in their degree of perceived benefits and ranked accordingly. If we receive more requests than our available acquisition time and budget can support, lower ranked projects will not be flown. Those not selected will be notified by around May 15th or shortly thereafter. For those projects selected, priority will primarily come into effect in times of weather and scheduling conflicts.

The information included in this section is used also by AEROCam to ensure the data being collected will be as useful as possible for your desired application(s). Knowing how the images will be utilized could affect how the data is collected and may uncover any missed details.

If we have a question about the information you provided or are unable to meet your requests in any way, someone will contact you prior to data collection. Don't hesitate to contact us as well, if you have any questions or concerns about your request. Our goal is to provide you with the most effective, accurate, and useful data as possible.

Contact Information:

Clint Streeter
Center for People & Environment
4149 University Ave. Stop 9011
Grand Forks, ND 58202
streeter@aero.und.edu

Work (701) 777-2503
Fax (701) 777-2940
Cell (701) 740-7602