ARCTIC COMPOSITE SATELLITE PROJRECT

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1. INTRODUCTION

The University of Wisconsin has made Antarctic satellite composite imagery for over 15 years in support of forecasting, research and education. Unfortunately efforts to offer the same product for the Arctic have not been possible until now. The Arctic Natural Science program at the Office of Polar Programs of the National Science Foundation has funded an Arctic composite satellite project. This unique project is timely as it is available during the International Polar Year.

2. COMPOSITE GENERATION

The composite imagery for the Arctic currently follows the same process as the Antarctic (Lazzara, 2003): imagery is made every three hours using all available geostationary and polar-orbiting satellite imagery (see Table 1). Data used in each composite includes data primarily within plus or minus 15 minutes to the top of the synoptic hour, and then failing that uses data plus or minus 50 minutes to the top of the synoptic hour. The resulting image resolution is a nominal 5 kilometers making the final image size over 4 megabytes in raw format. The composite are assembled using the McIDAS interactive processing system (Lazzara et al. 1999).

Table 1. Satellites used in generating the Arctic composite imagery.

Platform	Satellites
Geostationary	GOES-10 GOES-11 GOES-12 KALPANA-1 Meteosat-7 Meteosat-9 FY-2C MTSAT-1R
Polar-orbiting	NOAA-15, -16, -17, -18 Aqua Terra

As a part of the process of making the composite, any bad lines of satellite imagery are cleaned up along with any bad buffer flakes removed to improve the resulting image. To allow for proper merging of the satellites, the space background it removed as well. The final composite, which is made in both the infrared (~11.0 micron) and water vapor (~6.7 micron) bands, do retain some temperature information, in addition to brightness information. However, the accuracy of the information is not as good as the original 2-byte data, as the final product is 1-byte deep.

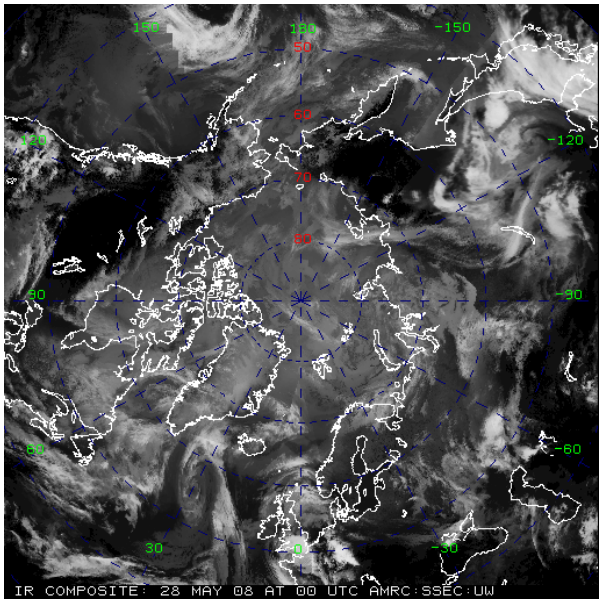

Figure 1. A display of an example Arctic composite infrared image created on 00 UTC on 26 May 2008.

The final composite image is navigated in a polar stereographic projection centered at the North Pole, with standard latitude of 60 degrees South and standard longitude of 0 degrees. This orientation was selected to match the most common view of the Arctic basin. The process for generating the composites is completely automated and experiences only a few failures other than those due to missing satellite imagery, power outages, etc.

3. APPLICATIONS

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One of the first uses of the composite is in support of the Polar study using Aircraft, Remote sensing, surface measurements and modeling of the Climate, chemistry, Aerosols and Transport (POLARCAT) and Arctic Research of the Composition of the Troposphere Aircraft and Satellites (ARCTAS) programs. These IPY efforts are important applications of the composite in both an operational setting with the data used in briefing/determining logistics for the airborne portion of the field campaigns as well as for research as a part of the diagnostics involved in the analysis. More applications and users are expected in the upcoming year as word of the availability of these composites spreads to the community.

4. DISTRIBUTION AND FORMAT

The distribution of the composites takes several available routes, including:

- File Transmission Protocol (FTP)
- World Wide Web (WWW)
- Unidata Internet Data Distribution (IDD)
- Abstract Data Distribution Environment (ADDE)
- Various computer media
- Printed form or hard copy

Currently, real-time composites can be viewed on the web servers as still images and animations.

The archived data format for the composite is McIDAS AREA format. However, it can be made available into netCDF format, "flat" binary or ASCII formats along with imagery formats such as JPG, GIF, etc.

5. FUTURE DIRECTIONS

With regards to the future, Arctic composite project has several unmet goals. First will be to continue to create composites in other commonly available spectral channels found on board both geostationary and polar orbiting satellite platforms. This includes visible channel, shortwave and longwave infrared channels as well. A second activity will be to continue to inform the community of the composites availability. A third activity will be the utilization of the composite in educational settings and public outreach events.

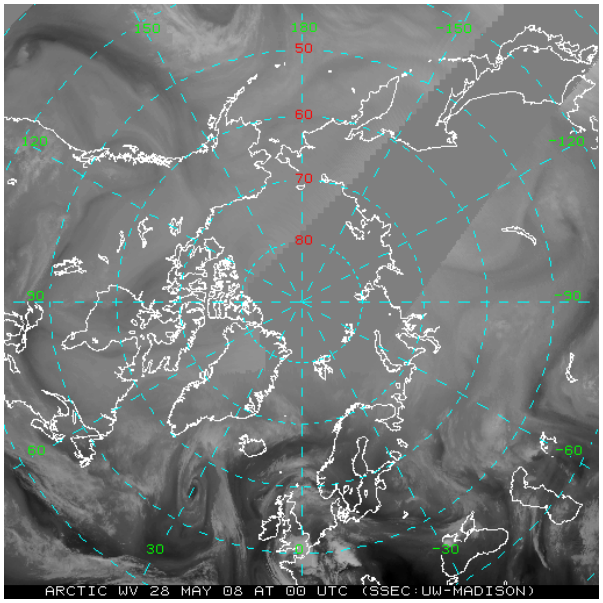

Figure 2. A sample water vapor Arctic composite satellite imagery taken at 00 UTC on 28 May 2008.

6. ACKNOWLEDGEMENTS

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7. REFERENCES

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