

# AUGMENTING MultiSpec<sup>®</sup> SOFTWARE INFRASTRUCTURE

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## INTRODUCTION

- ▶ MultiSpec (© Purdue Research Foundation) is a processing system resulting from multiyear research efforts for interactively analyzing Earth observational multispectral and hyperspectral image data.
- ▶ MultiSpec has found significant use in research as well as in other applications such as multiband medical imagery and in K-12 and university level educational activities. There are currently in excess of several thousand registered users across all the platforms.

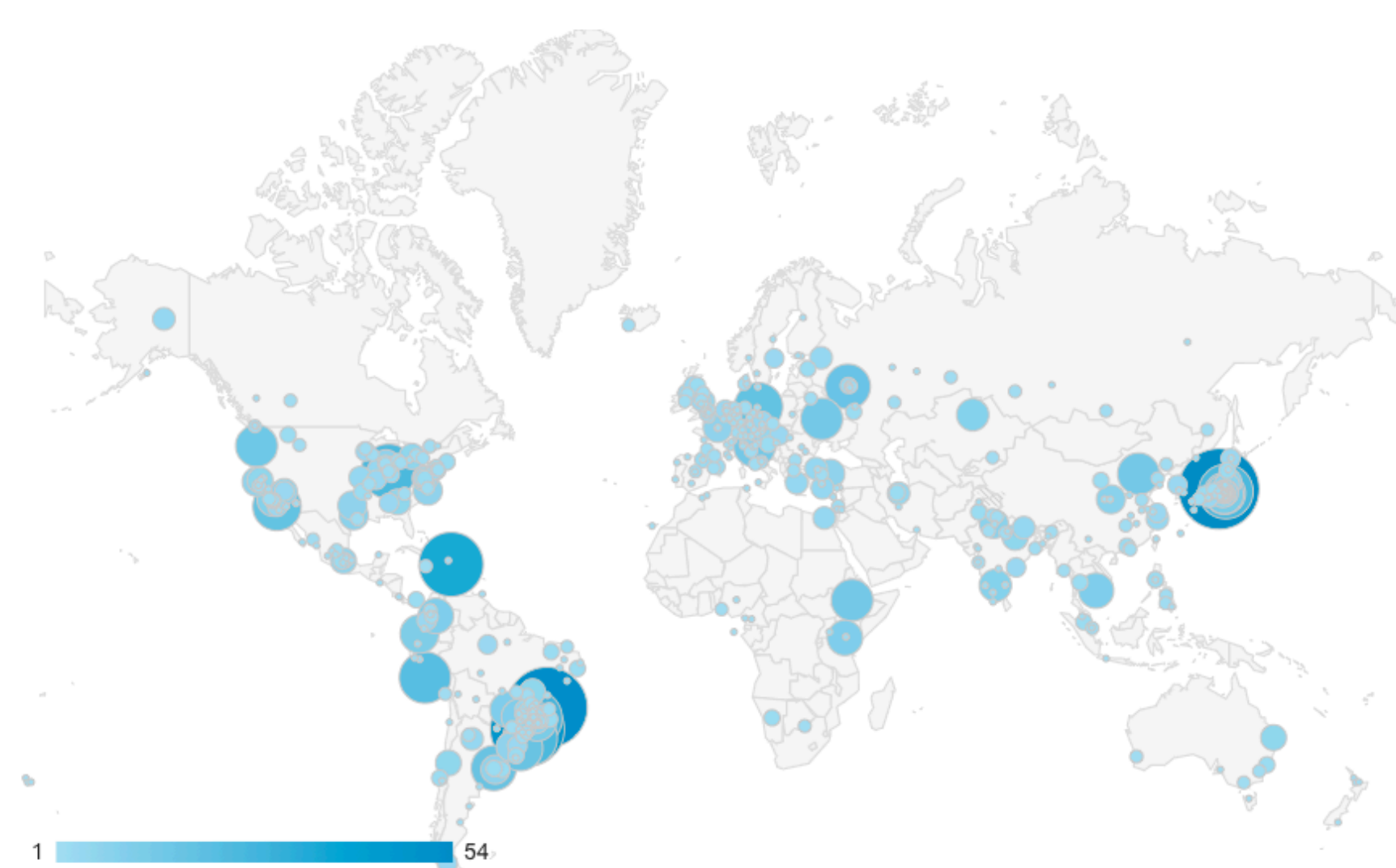


Figure 1. Worldwide Usage of MultiSpec: June 13, 2016 – July 13, 2016

- ▶ Users can access MultiSpec via online and 32-bit Windows and Mac desktop apps. Researchers desire 64-bit desktop versions.
- ▶ The 64-bit versions handle large amounts of random access memory (RAM) more effectively than a 32-bit system. Therefore a 64-bit version of MultiSpec utilizes the most advanced technology.

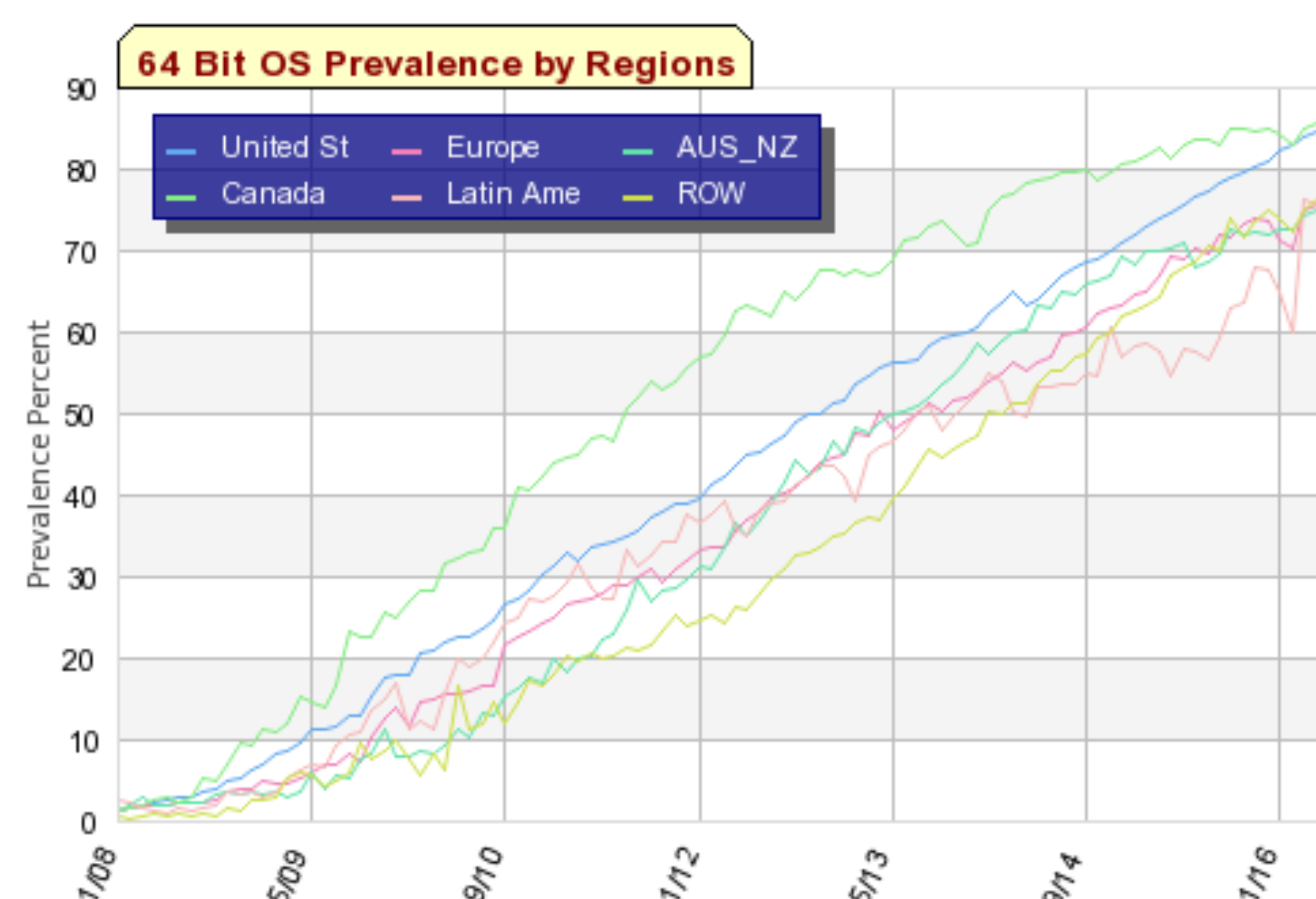


Figure 2. Uprising Usage of 64-bit OS

- ▶ A stand alone Linux version is also desired to run MultiSpec locally on Linux machines. The GDAL library is a necessary part of the Linux implementation as it provides MultiSpec with the functionality to read several image formats desired by researchers.

## METHODS

- ▶ **64-bit Windows Desktop:** Visual C++ files of 32-bit Windows version of MultiSpec were used as the source files for 64-bit MultiSpec in Visual Studio 2008.
- ▶ MultiSpec main project was compiled under 64-bit configuration with appropriate code modification. A skeleton MultiSpec software with limited functionalities was generated and tested by reading, displaying and processing various formats of images.
- ▶ Supporting libraries were modified under 64-bit configuration, re-compiled and included in the MultiSpec 64-bit project. This provides full functionality of MultiSpec to handle HDF4 and HDF5 image files. The final software was tested thoroughly.
- ▶ **64-bit Linux Desktop:** NetBeans project files of Linux version of MultiSpec were used as the skeleton framework. GDAL library was included in Linux version of MultiSpec with only a few formats enabled. The desired formats were gradually enabled and tested.

## RESULTS

Architectural component	64-bit Windows	32-bit Windows
Virtual memory	16 terabytes	4 GB
Paging file size	256 terabytes	16 terabytes
Hyperspace	8 GB	4 MB
Paged pool	128 GB	470 MB
Non-paged pool	128 GB	256 MB
System cache	1 terabyte	1 GB
System PTEs	128 GB	660 MB

Figure 3. Advantage of 64-bit Windows System

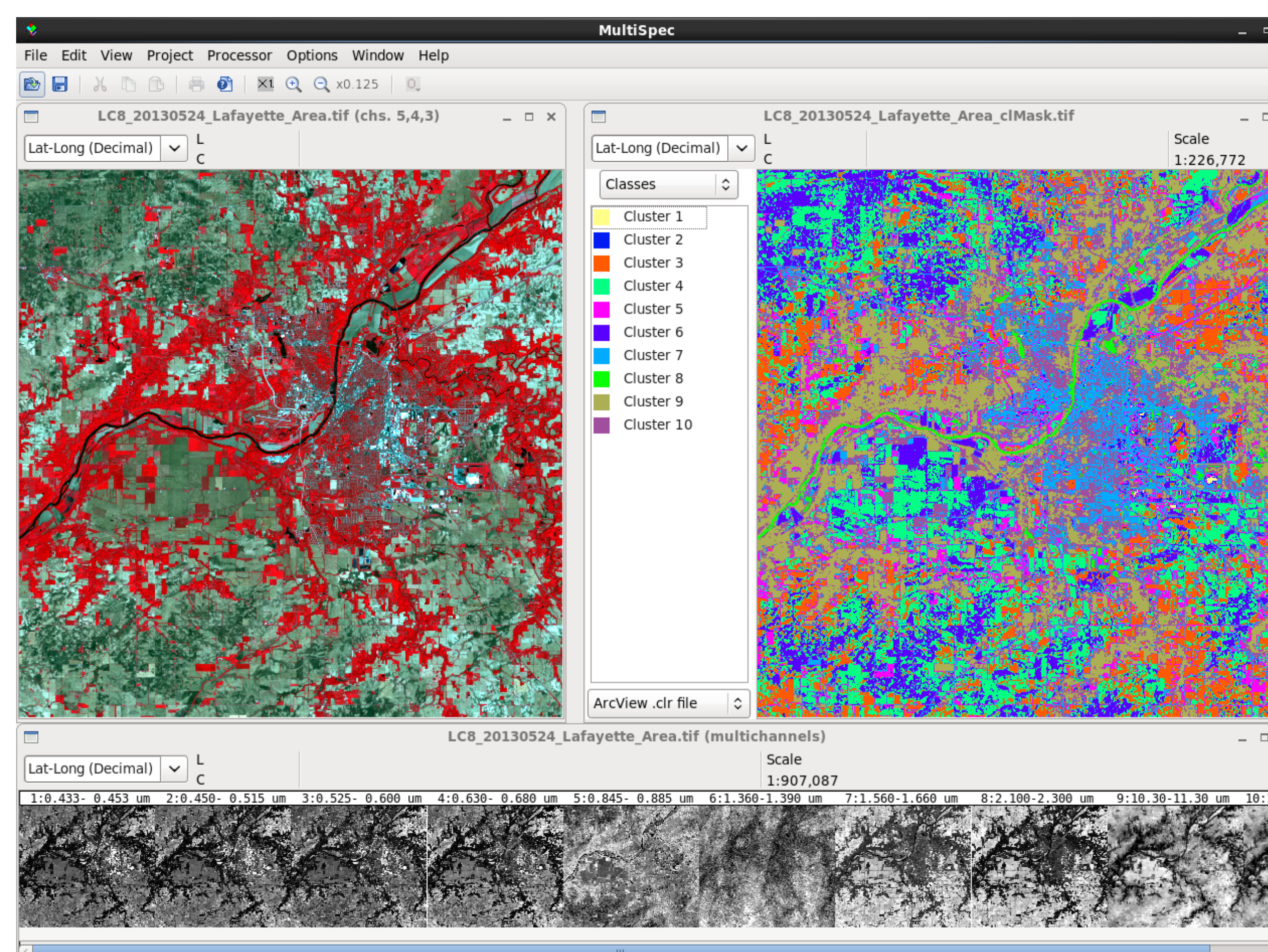


Figure 4. MultiSpec Processing GeoTIFF Images with GDAL Library

## CONCLUSION

- ▶ The 64-bit Windows desktop version of MultiSpec processes multispectral images (JPEG, PNG, GeoTIFF, LAN, NetCDF, GRIB, GIF, HDF4, HDF5, etc.) as expected and outputs the same results as 32-bit version does.
- ▶ GDAL library is included in the new Linux version. With the capability of GDAL library, MultiSpec is able to read and handle various image formats such as JPEG, PNG, GeoTIFF, LAN, NetCDF, GRIB, GIF, etc.
- ▶ Addition of GDAL library is necessary and important for the upcoming step of creating a stand alone Linux desktop version. Two other libraries, HDF4 and HDF5, along with GDAL library are needed to be included to Linux desktop version of MultiSpec.



Figure .5 GDAL Library

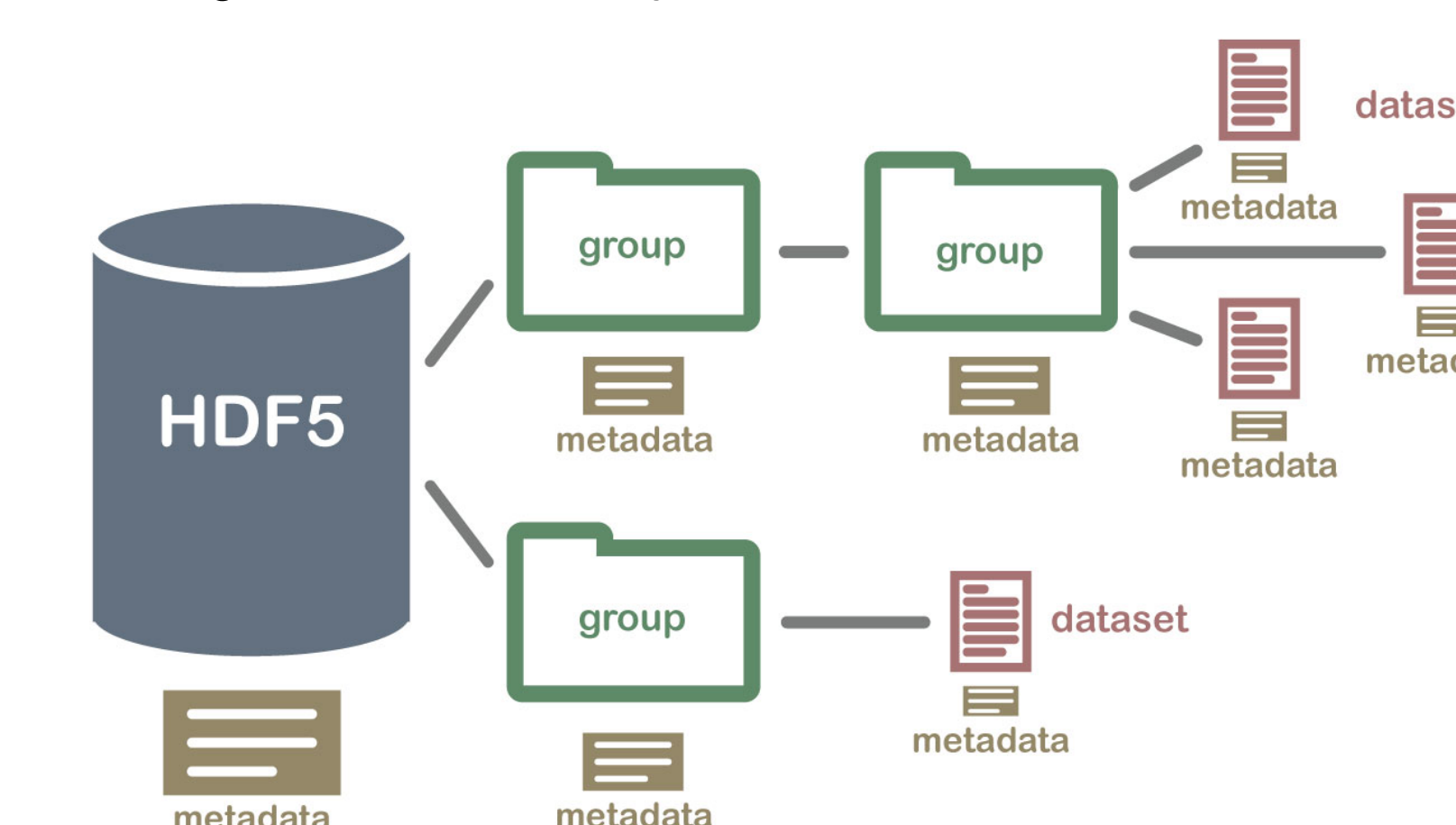


Figure 6. An example HDF file structure which contains groups, datasets and associated metadata.

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