

## **Build YOUR All-Sky View with Aladin**

A. Oberto, P. Fernique, T. Boch, and F. Bonnarel

*Centre de données astronomiques de Strasbourg, CDS, France*

**Abstract.** From the need to extend the display outside the boundaries of a single image, the Aladin team recently developed a new feature to visualize wide areas or even all of the sky. This all-sky view is particularly useful for visualization of very large objects and, with coverage of the whole sky, maps from the Planck satellite. To improve on this capability, some catalogs and maps have been built from many surveys (e.g., DSS, IRIS, GLIMPSE, SDSS, 2MASS) in mixed resolutions, allowing progressive display. The maps are constructed by mosaicing individual images. Now, we provide a new tool to build an all-sky view with your own images. From the images you have selected, it will compose a mosaic with several resolutions (HEALPix tessellation), and organize them to allow their progressive display in Aladin. For convenience, you can export it to a HEALPix map, or share it with the community through Aladin from your web site or eventually from the CDS image collection.

### **1. Introduction**

From a set of private images (obtained for example from observations), Aladin will compose an all-sky mosaic to produce a global view (Fernique et al. 2010). To do this, it will resample all of the pixels from the images onto a HEALPix (Hierarchical Equal Area isoLatitude Pixelization, Górski et al. 2005) tessellation. This result is saved on the user's computer together with necessary metadata for a multi-scale visualization through Aladin. HEALPix is a scheme that divides the celestial sphere into twelve pixels (rhombus shape). It produces a geometrically constructed, self-similar and refinable quadrilateral mesh on the sphere.

### **2. Your Set of Images**

With this new feature, the user can ask Aladin to build an All-Sky view from a local set of images. There are several constraints:

- Those images must be in FITS format and must have an astrometric calibration;
- It is assumed that the bitpix value is the same for the whole set of images;
- In order to obtain a better visualization, we recommend having a photometric image calibration, or at least having homogeneous data.

Aladin will process only parts of the sky where images are present. It is not necessary to have all-sky coverage, or even that the images be contiguous. They can be overlapping.

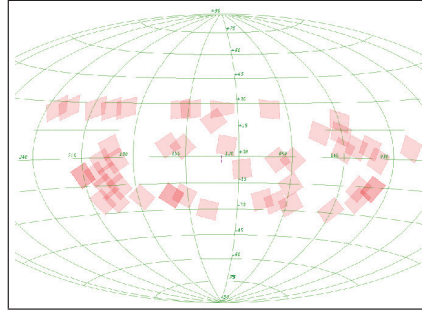


Figure 1. Example of the coverage of YOUR images in order to build an All-Sky view.

### 3. Computation

Once the images are selected, the user may provide output specifications. Aladin suggests a default mosaic building procedure that can be adjusted according to your needs. Depending on the amount of data, the computation may require a very long time and huge disk space. In order to reduce both of these, less consuming parameters can be selected (with consequent loss of data accuracy). First of all, Aladin will browse the data to index the images by the HEALPix diamond number they contribute to in the selected resolution. Then, it will fill each affected diamond with pixel values computed from the images.

All of the computation is done on the user's computer, so the speed will depend on its processor(s). All generated files will be stored on its hard disk.

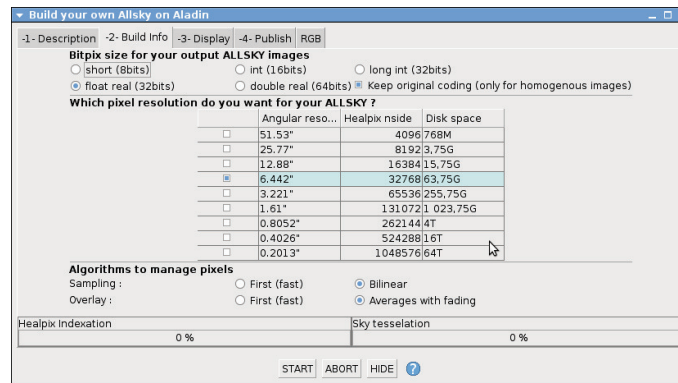


Figure 2. Panel of parameters of the All-Sky building.

#### 3.1. Bitpix and Data Values

Aladin will create new FITS files with resampled pixels. Thus the disk space occupied by the data will be duplicated (except for overlaps) for the level with the same resolution as the data. More files are created for the lower resolution levels until we reach the all-

sky level. If it is not necessary to keep the original data values, a smaller bitpix value for output can be chosen in order to reduce the disk space used. Conversely, Aladin could keep the original coding.

### 3.2. Angular Resolution

The default behavior is to produce maps with approximately the same angular resolution as the original images, and another with lower resolution (for progressive display). The resolution is determined by the HEALPix mesh, which divides each pixel into 4 while downsizing the scaling factor. As above, in order to reduce the disk space, a less accurate angular resolution can be selected (in the table shown in Figure 2 we give an estimation of the total size of the created files, for an all-sky coverage).

### 3.3. Pixel Manipulation

In this version, during the resampling step Aladin suggests two methods: nearest neighbor or bilinear weighting of neighboring pixels. If there is an overlap of several images, it is possible to keep the value of only one of them, or to choose an average. In the future, it will be possible to develop your own Aladin plugin to perform a specific pixel manipulation.

### 3.4. Output

While the all-sky view is building, a visualization of the current state is shown in Aladin. Eventually, it will be possible to use this all-sky view like a real image in Aladin, and adjust the grey levels for the best visualization. This choice can be stored by converting all the FITS files into JPG files.

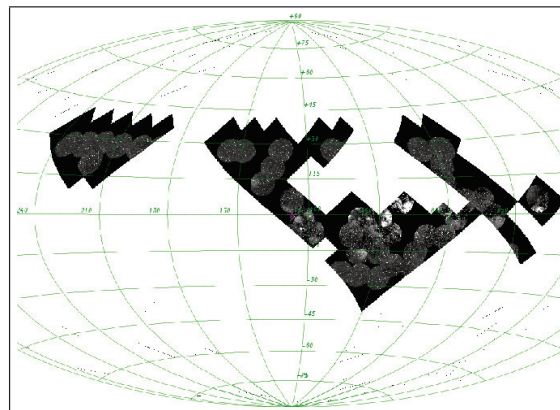


Figure 3. Example of a preview while processing the diamonds.

## 4. Public/Private Distribution

All of the generated files are stored on the user's computer. The newly created directory can be opened in Aladin at any time to visualize the result. According to the user's

