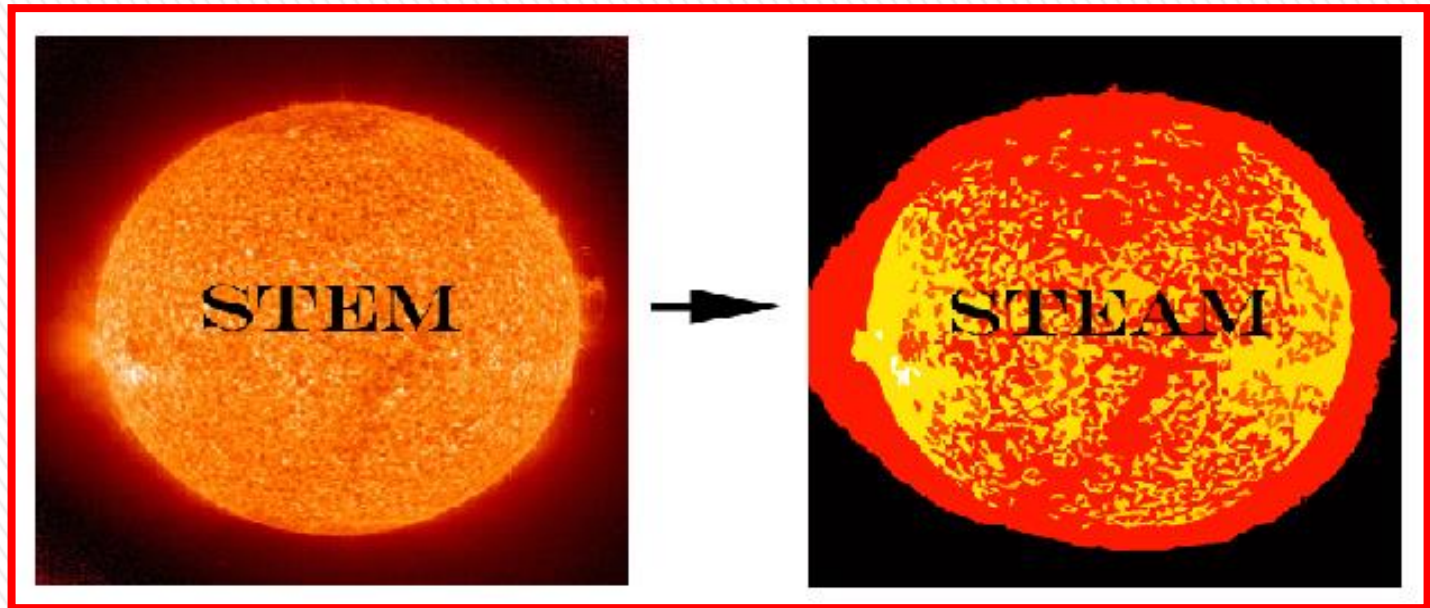


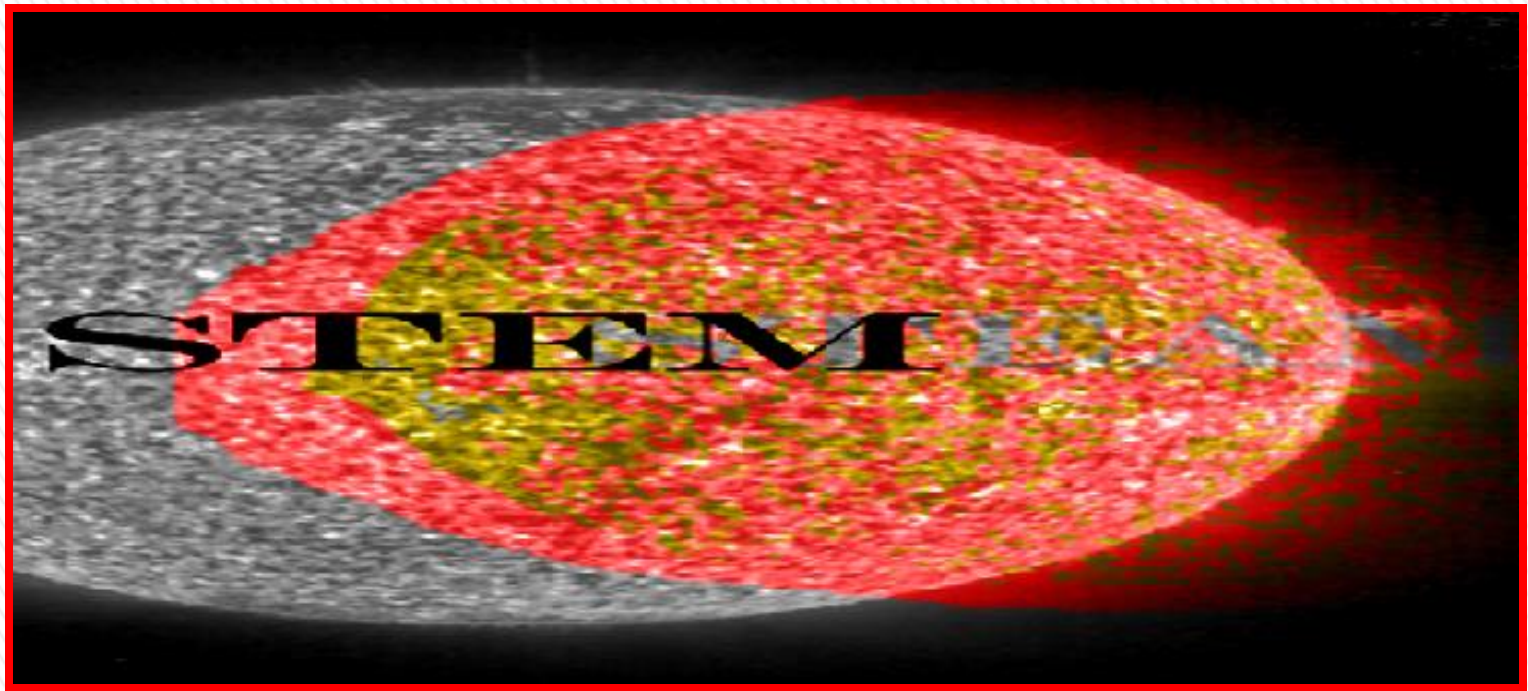


# Moving STEM Towards STEAM

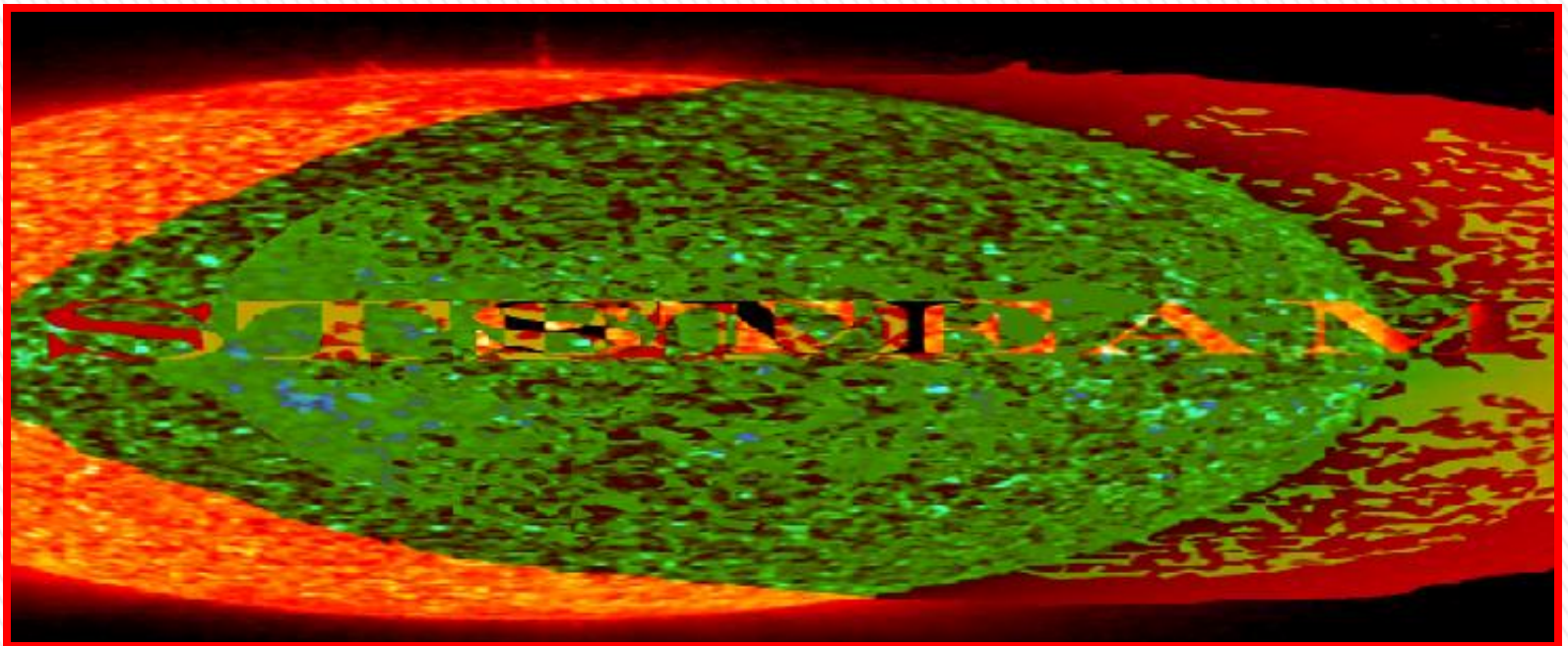


Via the Digital Arts

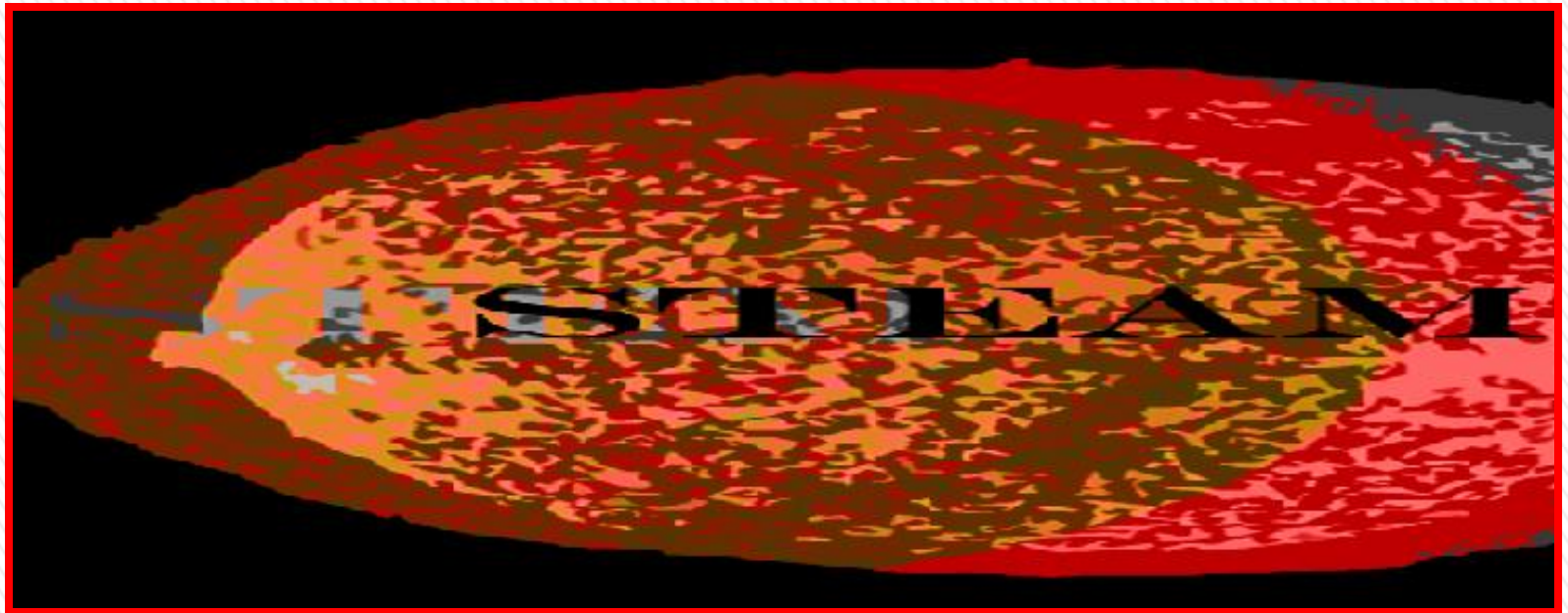
To combine the **Arts** with STEM is to motivate, engage and empower students to pay attention to and understand/retain content in the Sciences, Technology, Engineering and Mathematics.



The creation of **art** ... the making of something that comes from “within” ... has always been a boon for the psyche, a gratifying experience that adds to self-esteem and provides relevance ... meaning.



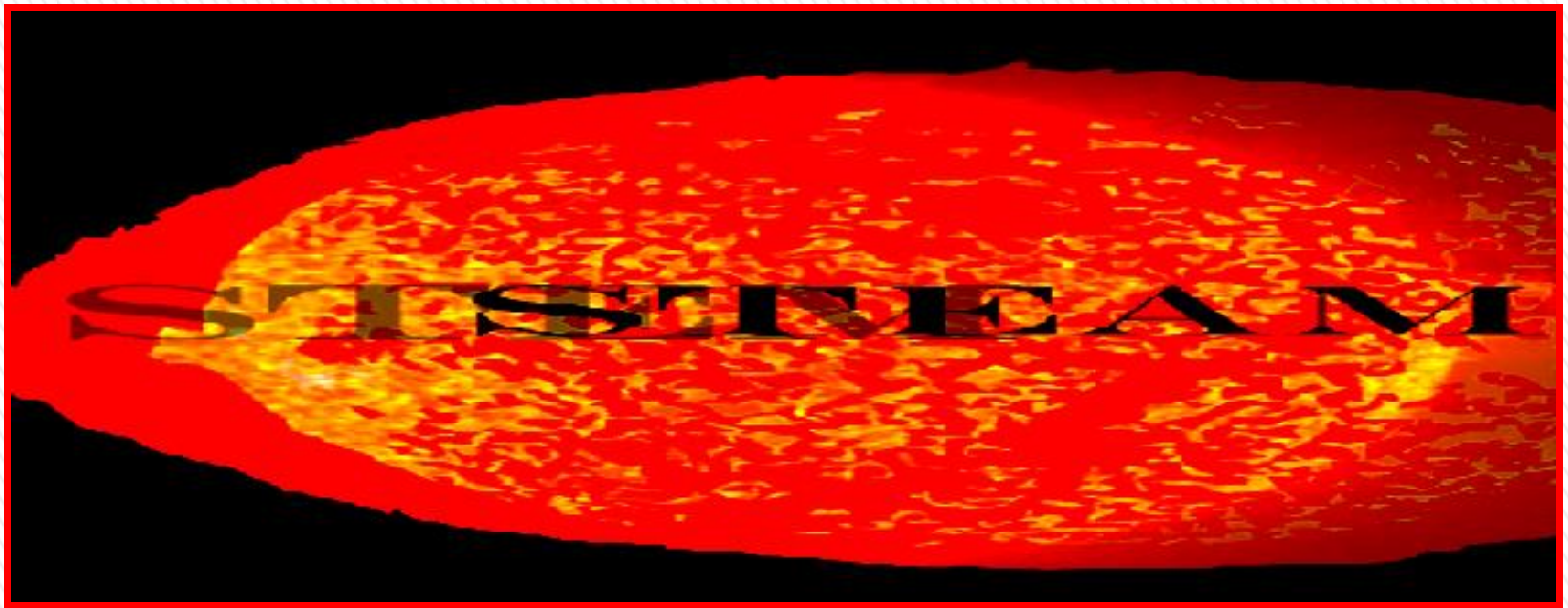
This creative and cognitive experience is surround and exciting, which leads to greater understanding and retention of content and an appreciation for STEM and its motivating component, the **Arts** ... STE**A**M.



The **Arts** I will be discussing as the motivating component will be the Digital **Arts** ... manipulating research images in graphic arts software such as GIMP, a Photoshop freeware equivalent.



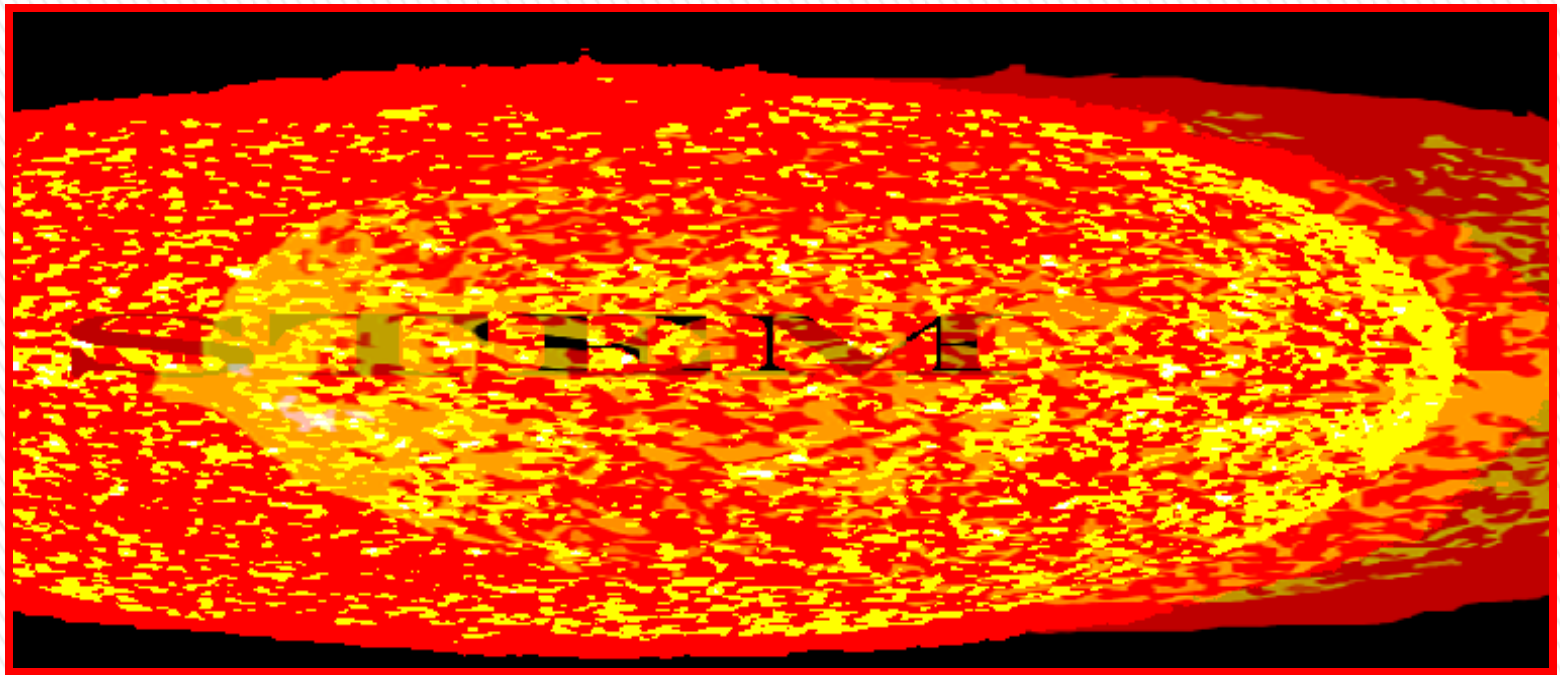
The key factor in all of this is the teacher being willing to learn and teach the software to the students so they are empowered to use their creative skills to visualize STEM content, in this case, Space weather and the upcoming NASA Magnetospheric Multiscale 2014 mission.



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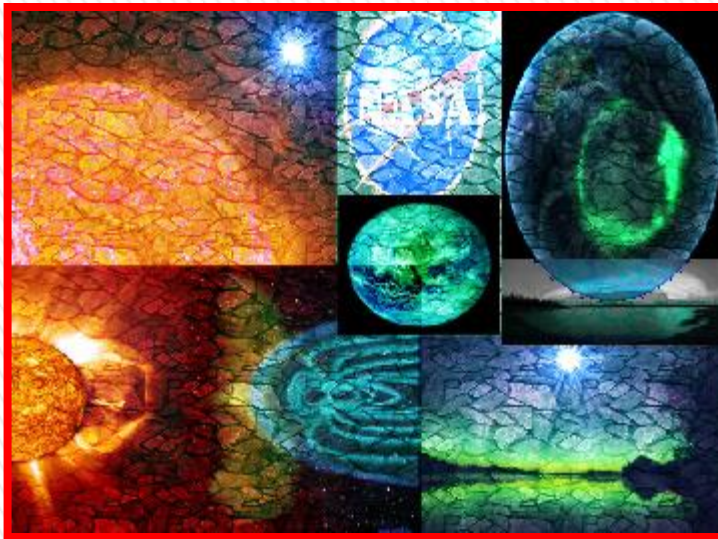


Let's take a look at a few examples of my 8th grade students' work, 2011-2012 school year, which are a result of extensive online research about Space weather/NASA MMS mission and utilization of the tools/filters in GIMP (graphic **arts** software).

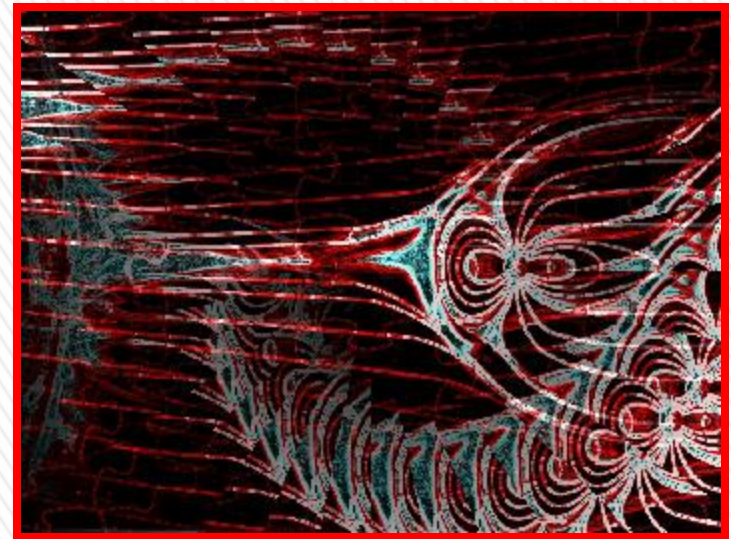


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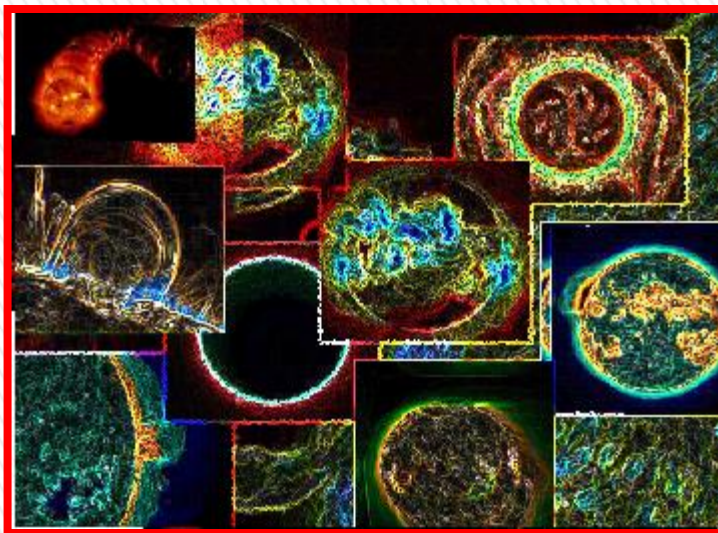




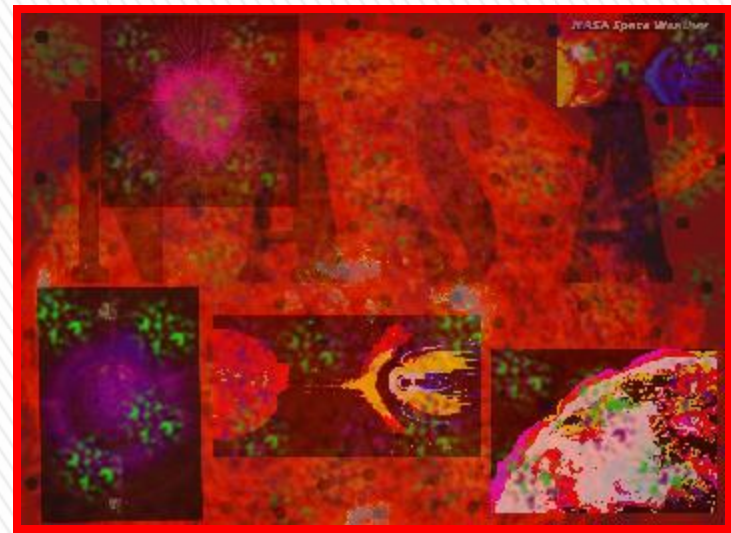
Jesus Gomez



Eduardo Barrera



Maria Guzman

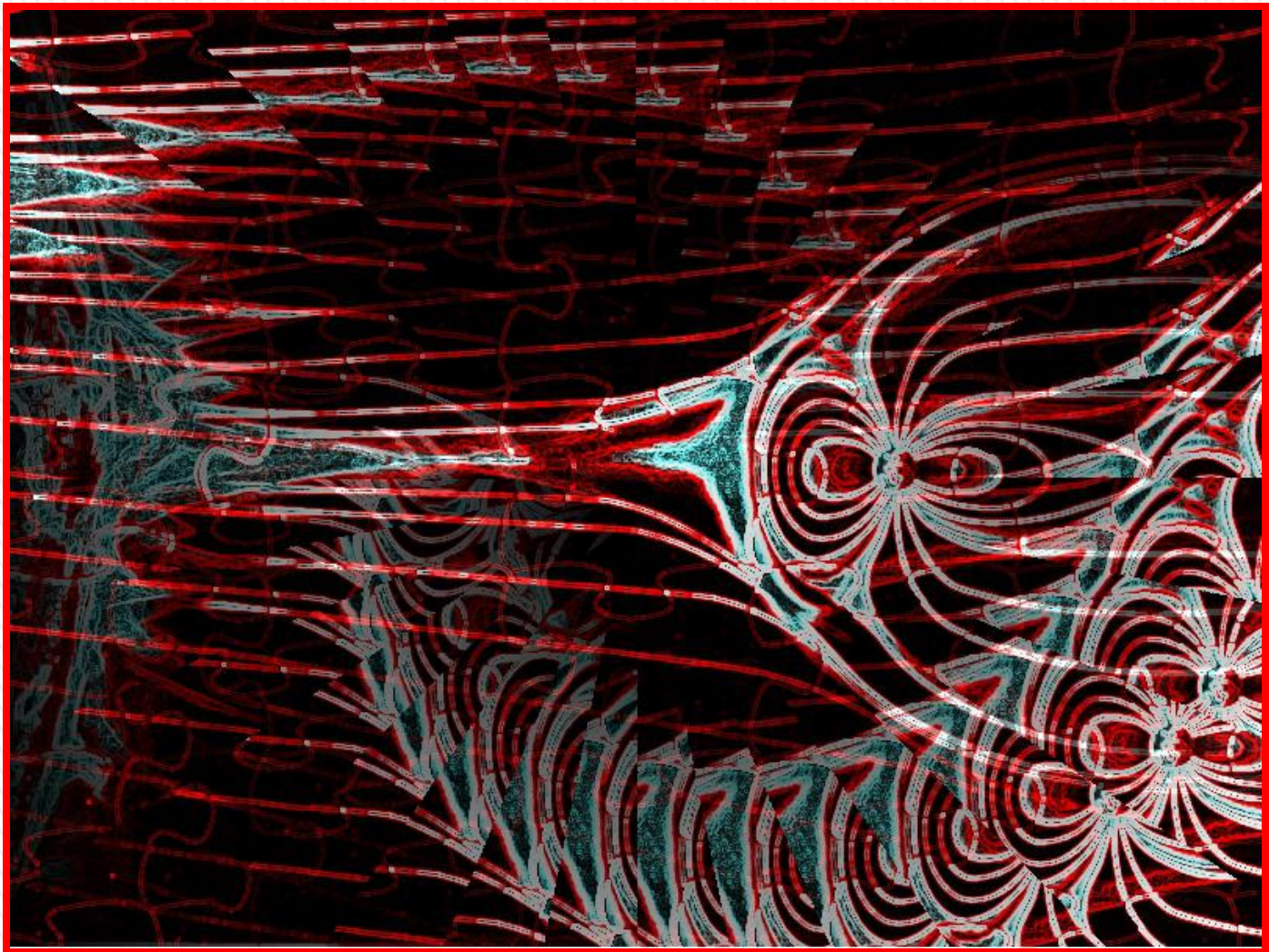


Klarissa Rodriguez



Let's take a look at a few more student, Digital Art examples in larger format.

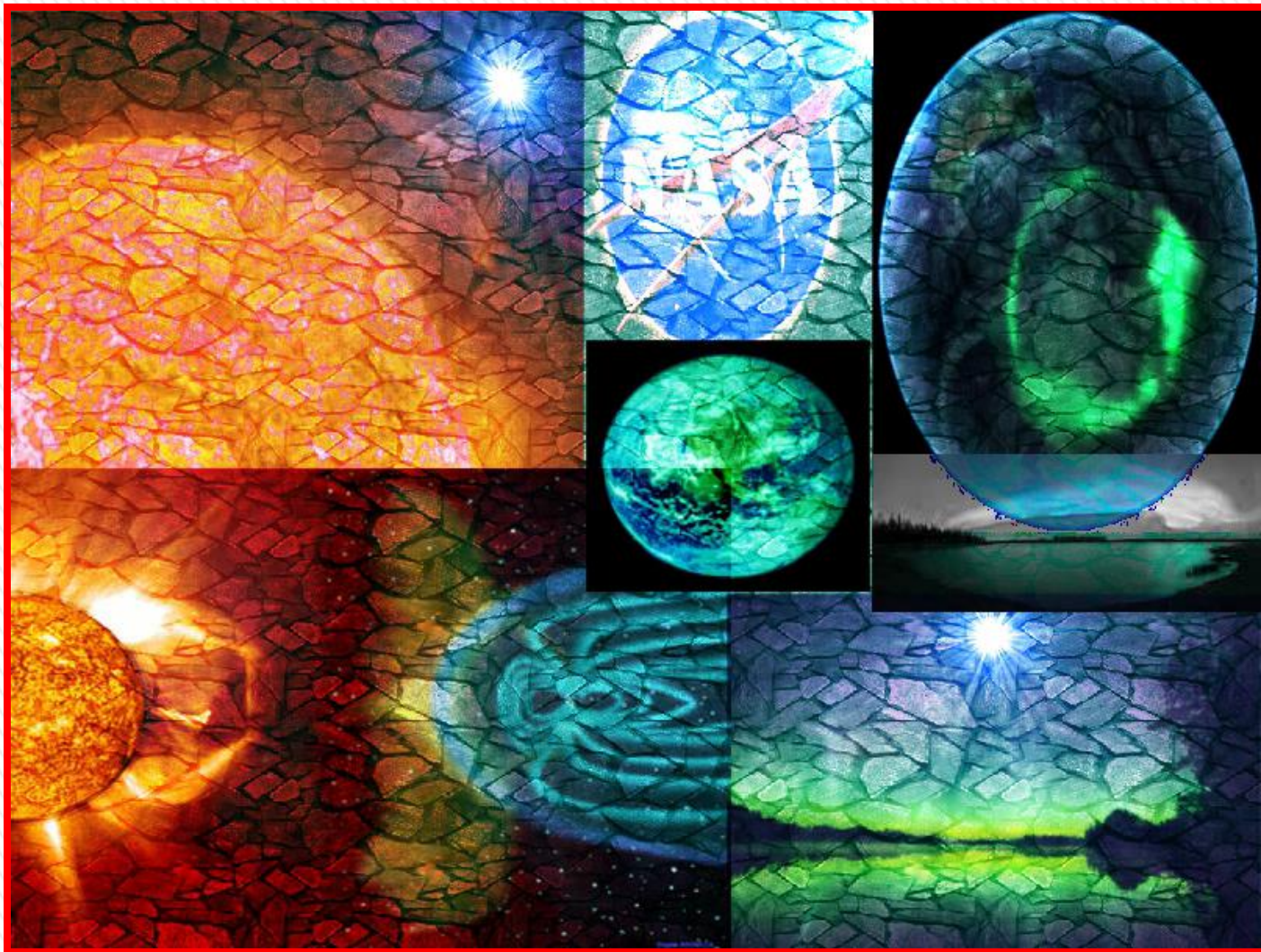




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Eduardo Barrera

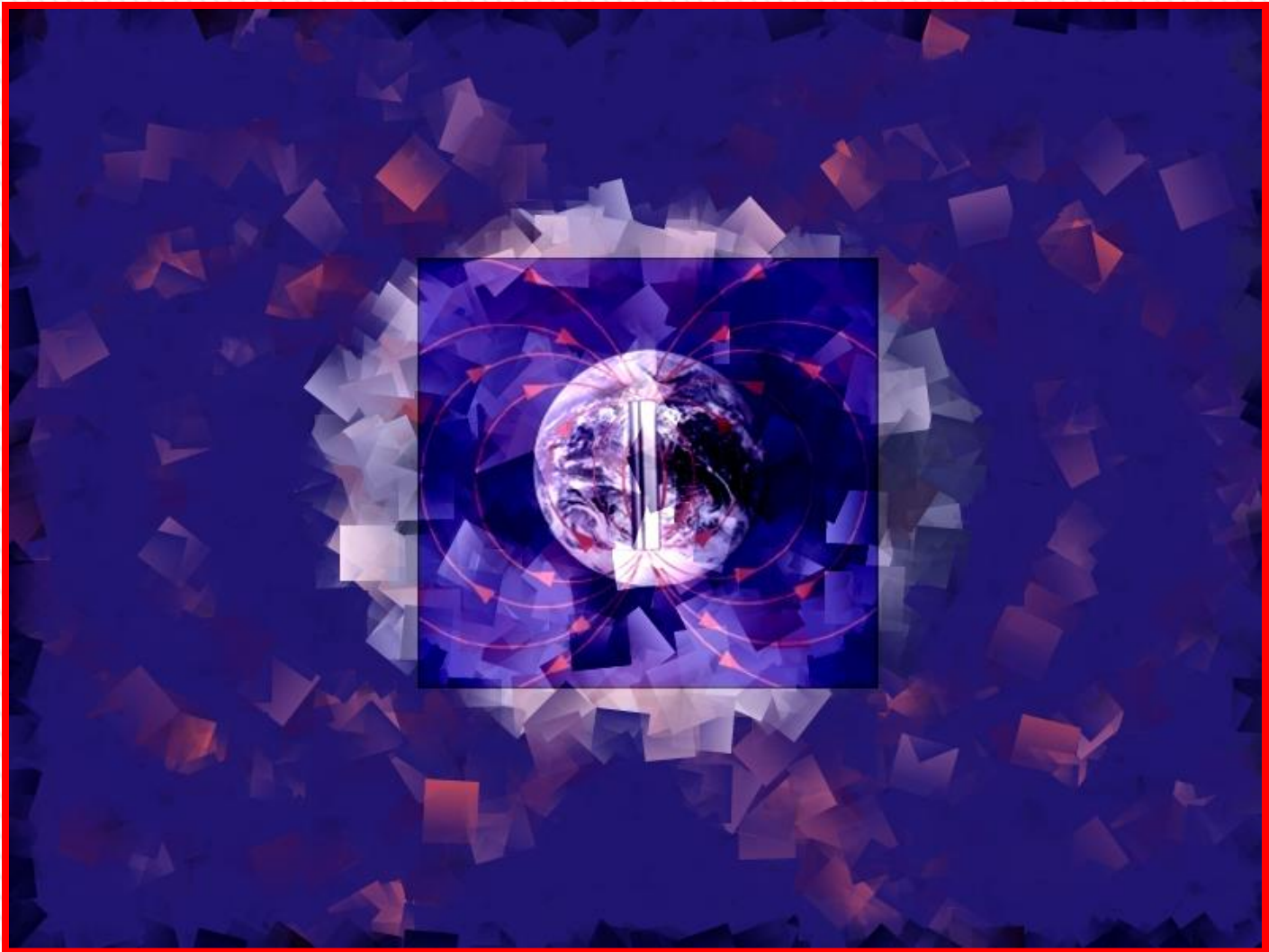




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Jesus Gomez

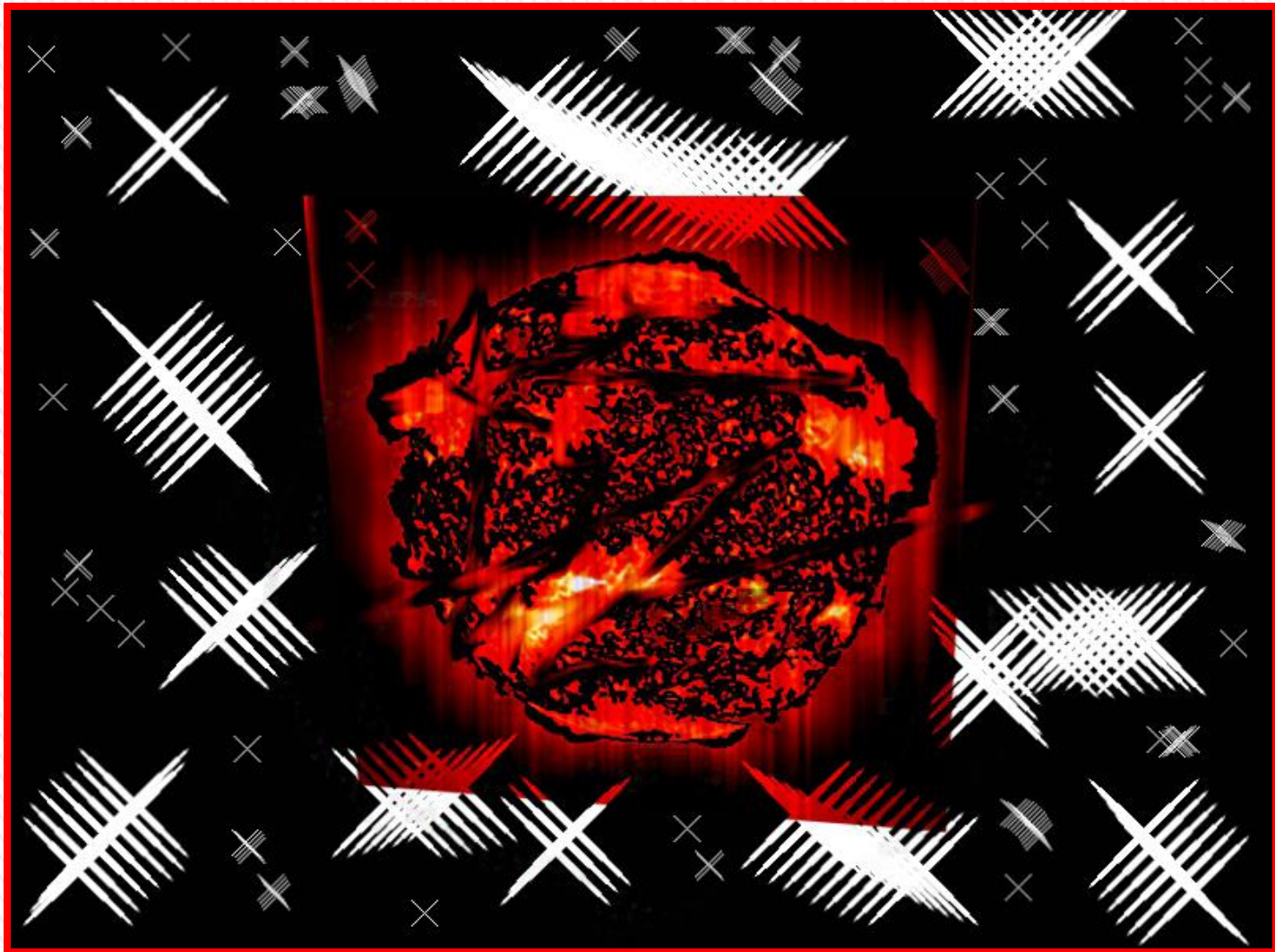




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Raul Martinez



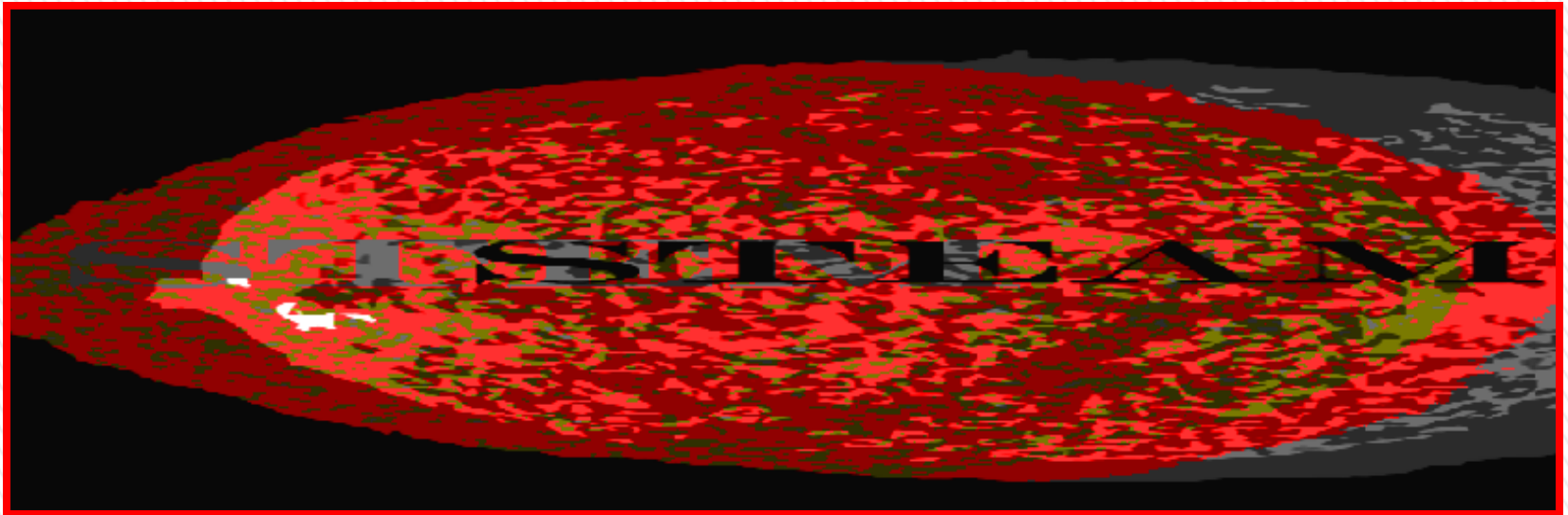


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Jorge Rodriguez



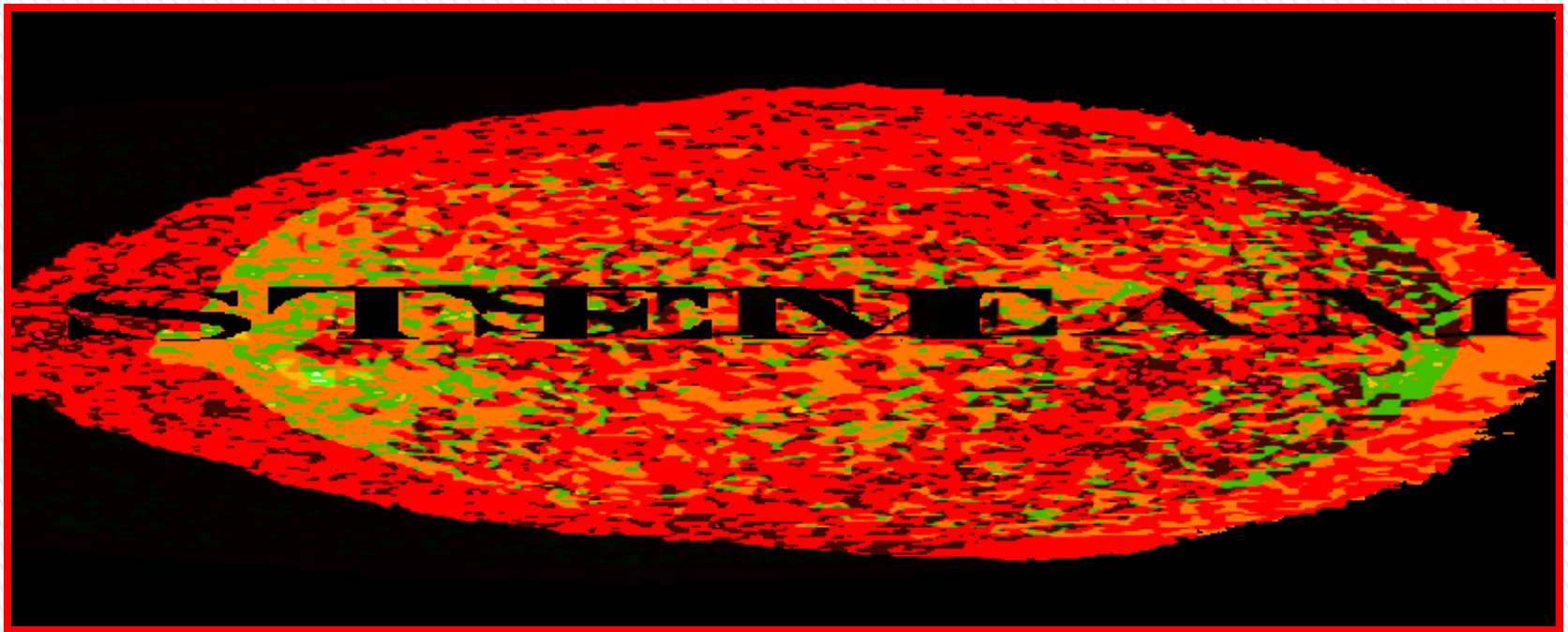
Again, the students were tasked to research the various topics/concepts about Space weather (Sun, Sunspots, solar flares, CMEs [Coronal Mass Ejections], solar winds, Earth, Earth's magnetic fields, Earth's magnetosphere, magnetic reconnection, Auroras) as well as NASA's MMS 2014 Mission, and then translate the information in graphic arts software as Digital Art.



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The interesting thing about their research ... studying and note taking ... is the fact that they took this process in stride. They were eager to partake because of the anticipation of making Digital **Art** via hardware and software. This is the crux of this presentation.



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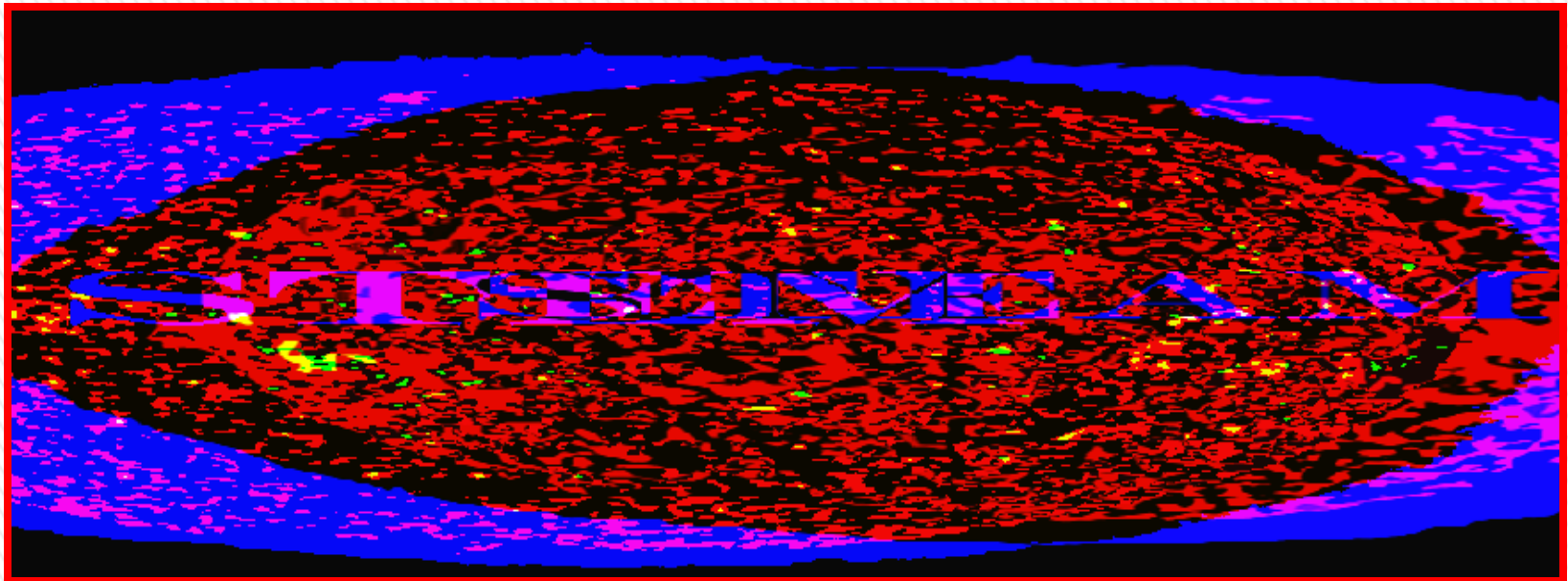
In other words, they were motivated to study because of the dynamic, curricular approach ... this approach being hands-on in a technological sense with hardware and software, involving the Internet and incorporating the **Arts** to visualize content for greater understanding and retention.



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Again, the key factor is the willingness of the teacher to learn and teach graphic **arts** software such as GIMP. Interestingly enough, all students (some with peer assistance) were able to grasp the program concepts via the tools and filters to visualize the content ... the reason being, they wanted to.



So, whether the students realized it or not, they were totally engaged in a STEM activity ... Science ... Space Science ... motivated to do such, or learn via the Arts (digital) as they honed their skills with software application (vocational) ... a double whammy, if you will.



Allow me to move it up a level ... I'll call it transcendence ... by talking about these students teaching other students to use the same graphic **arts** software to visualize STEM content, again, Space weather and the NASA Magnetospheric Multiscale 2014 mission.



My students are seen (maroon shirts) teaching Dublin (Texas) Intermediate students how to use the graphic **arts** software.



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The teachers ... including me ... seemed secondary during this student workshop. Let's take a look at a few more pictures of this activity in larger format.



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RYSS-Dublin ISD Student Workshop (4/12/2012)

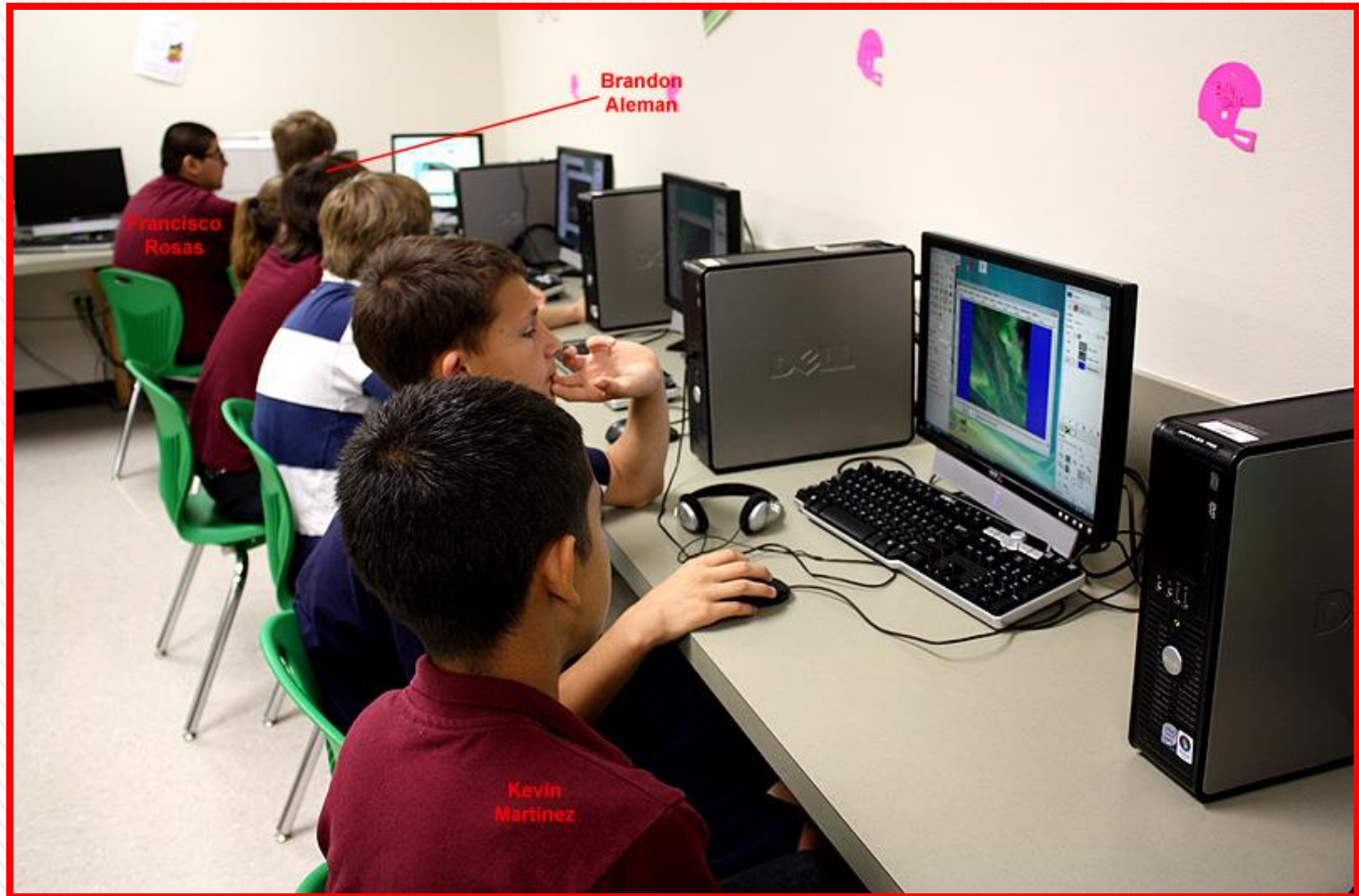




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RYSS-Dublin ISD Student Workshop (4/12/2012)





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RYSS-Dublin ISD Student Workshop (4/12/2012)





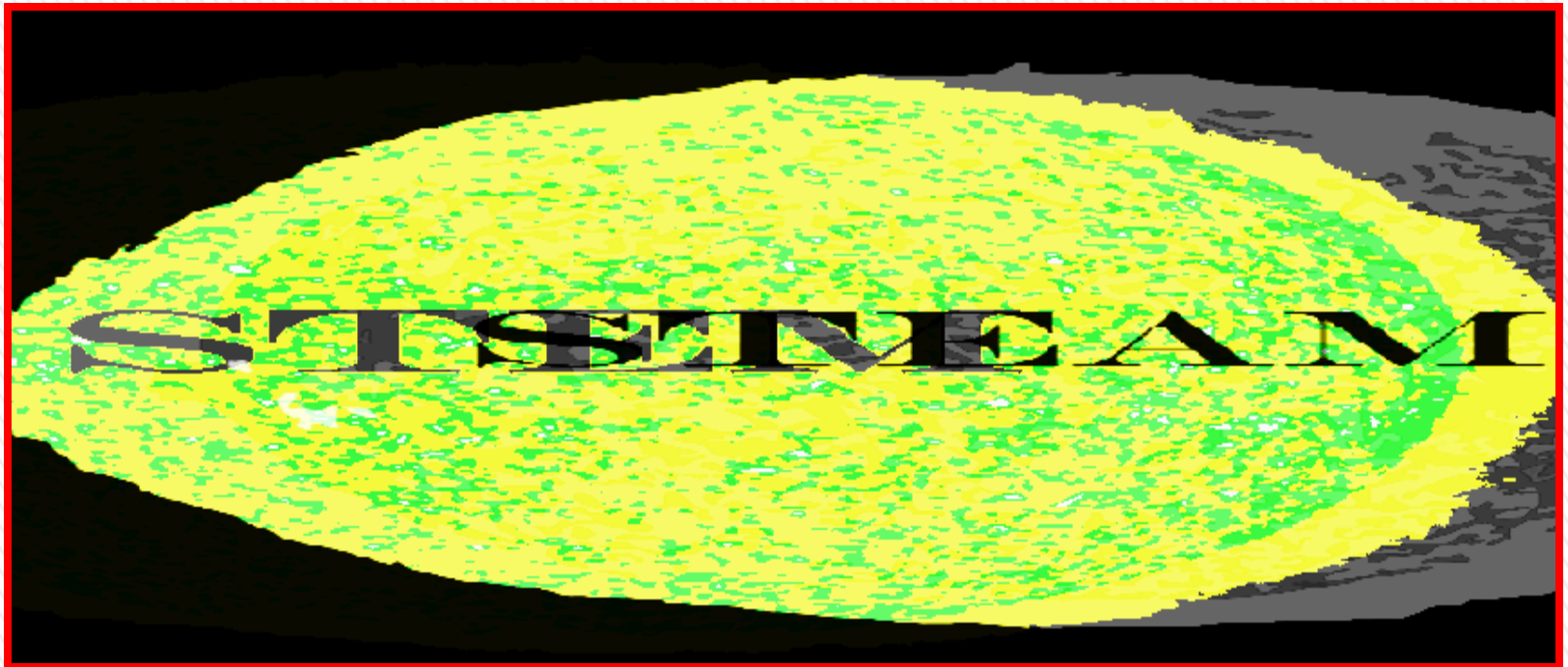


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RYSS-Dublin ISD Student Workshop (4/12/2012)



What we just witnessed with these students teaching students ... the gist of education in my mind ... was total motivation, engagement and empowerment re: STEM (Space Science in this case) because of the **Arts** or STE**A**M and hands-on Technology.



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My students were able to convey what they knew to other students, and those students were motivated through the **Arts** (and peer teaching) to produce “product” that was a translation of their Space weather and NASA MMS research activities.



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The Digital **Art** Movement is here to stay, and what better way to excite and help students re: STEM content than to engage them with graphic **arts** software to visualize this content, and create Digital **Art**. I assure you that the process will accentuate, or improve the learning curve as well as begin to prepare the students to manage the digital graphic **arts** in higher education and at the workplace.



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Let's take a look at a few more projects that use the power of the **Arts** (digital) for greater understanding and retention of Science and other subject content. I consider all of these activities STEM-related for the simple reason that Technology ... hardware (computer) and software (graphic arts) ... was the main vehicle for execution.



DA\_SCI7\_RYSS



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DA\_SCI7\_RYSS, Clara Hernandez

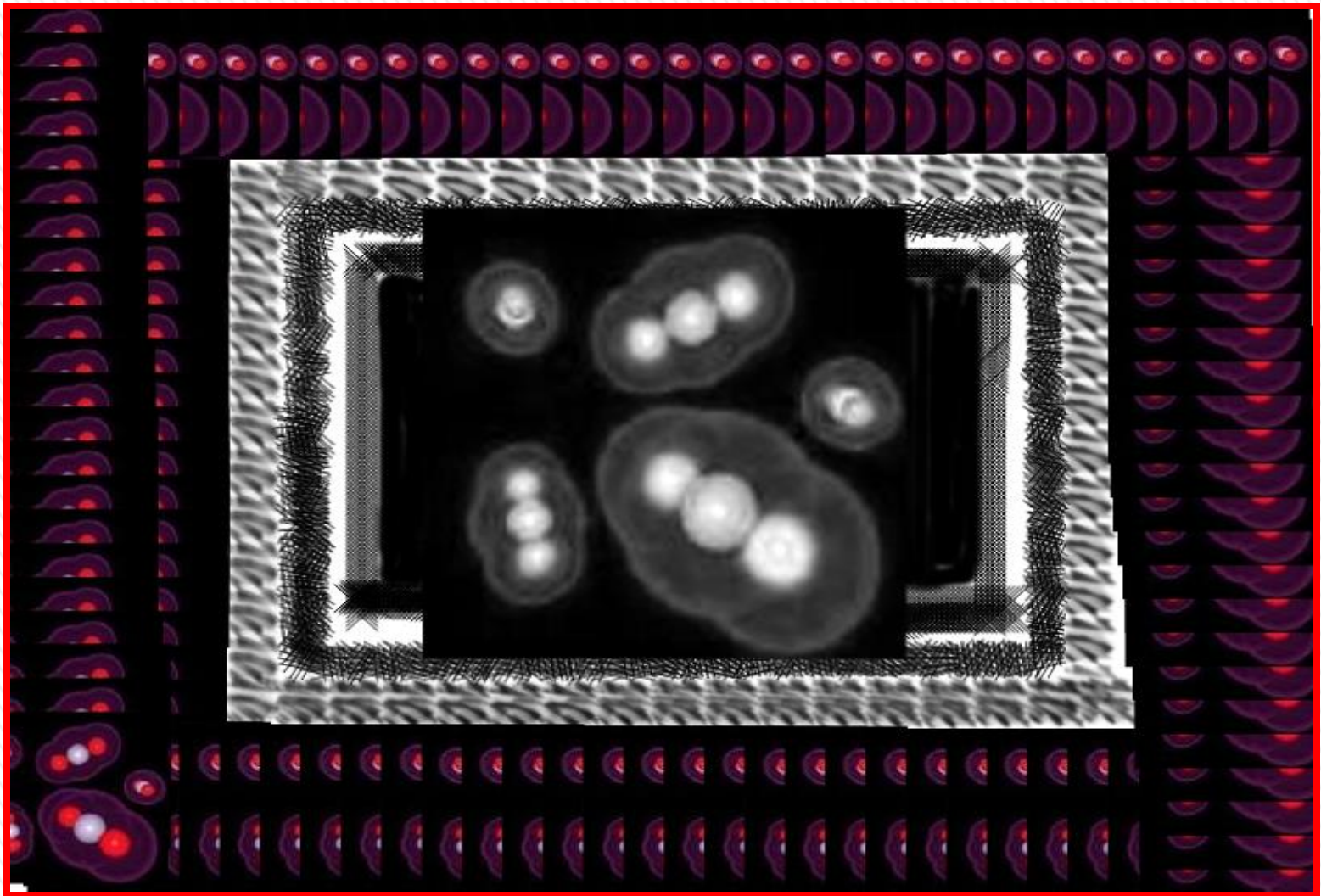




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DA\_SCI7\_RYSS, Sofia Jimenez





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DA\_SCI7\_RYSS, Gerardo Gonzalez









Echo  
DA\_7\_8\_RYSS, Priscilla Cortez



This project pays tribute to Sarah Sandel, who was born in South Carolina in 1783, and died in Galveston, Texas in 1872. It focuses on the fact that this woman was born just two years after The American Revolution. There is a good possibility that her father/grandfather (other relatives) fought in the war to gain America's independence. She was in her late twenties/early thirties during The War of 1812 and in her late seventies/early eighties during The Civil War. Again, there is a good possibility that her relatives and friends fought in these wars.



Rachel Arce



Jennifer Barajas



Eduardo Barrera

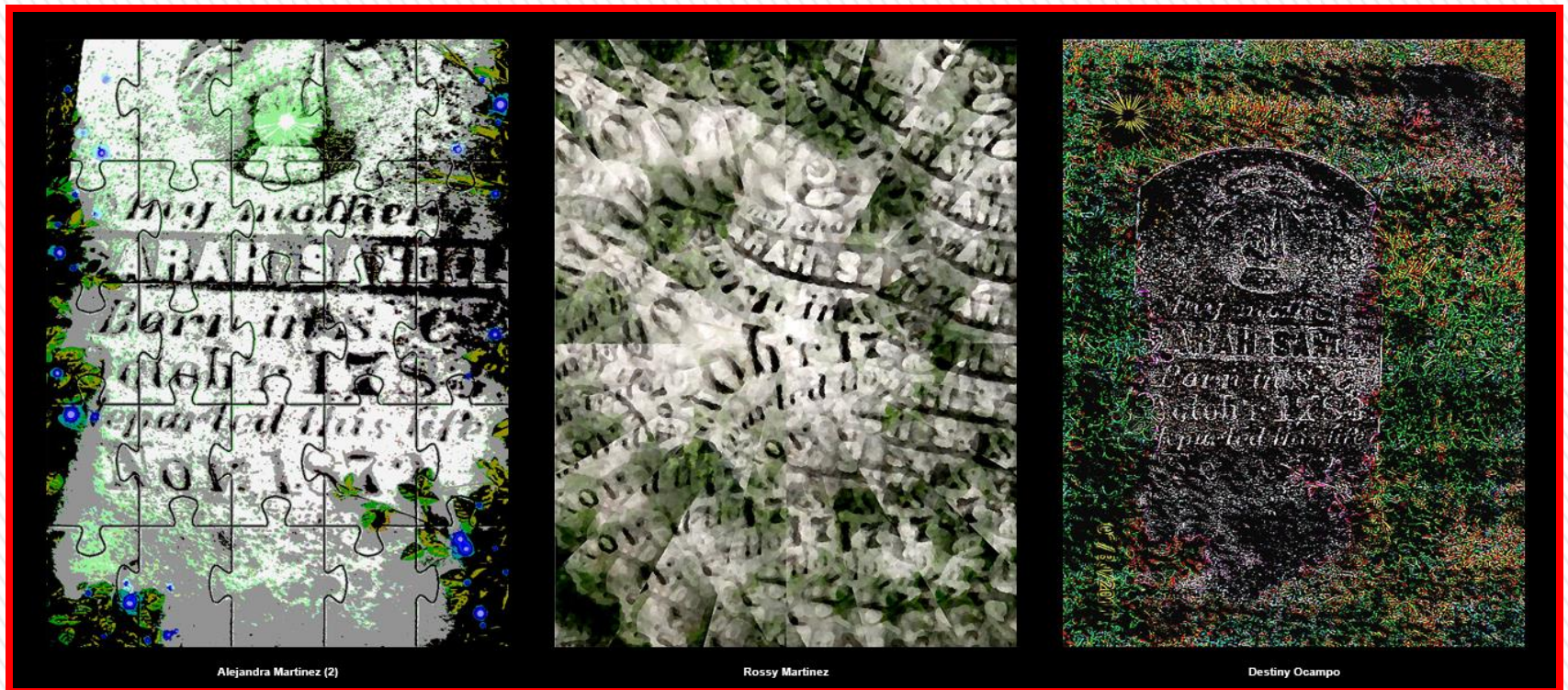


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SARAH, Early American History



The point of the project is to add relevance to the study of Early American History by making a connection with an individual ... "a real person" ... who was born shortly after the American Revolution, and whose remains are now at the cemetery ... just a few feet below the headstone. This immediacy of the remains and the original headstone brought this history "closer" to the students as they documented the gravesite, and later, made Digital **Art** to pay their respects.



Let's take a look at a few more student workshops where the power of the **Arts** (digital) and peer teaching is used to motivate, engage and empower student "self" for greater involvement with the learning process. Again, students teaching students ... the gist of education.



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RYSS-Harmony Hills Elementary  
Student Workshop (5/11/2011)



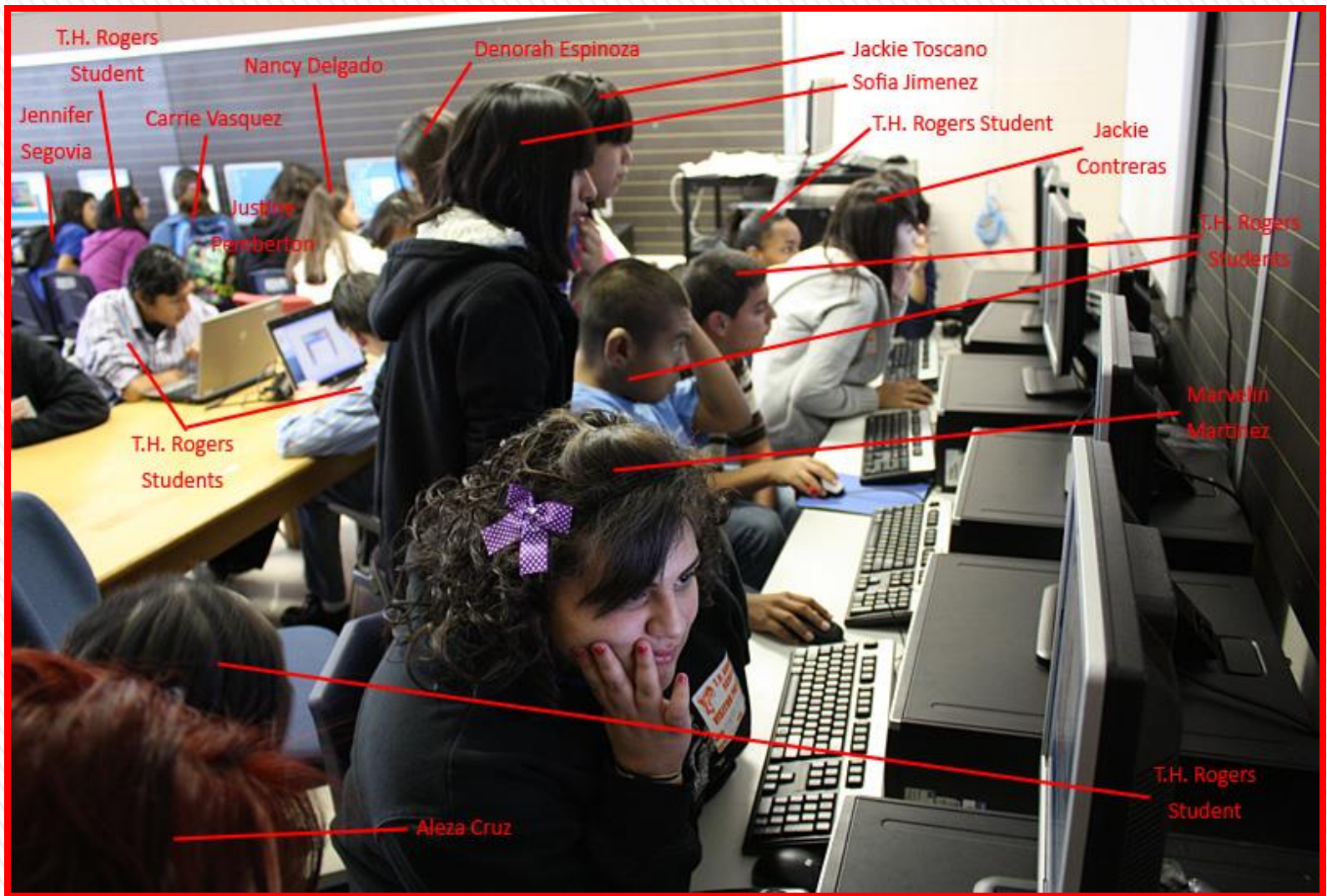
The left and center banks of computer stations are seen as the RYSS 7th grade core group [names indicated in red] works with the Crespo students to learn the graphics software to be able to make Digital Art.



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RYSS-Crespo Fine Arts Academy  
Student Workshop (1/13/2010)





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RYSS - Harmony Hills Elementary  
Student Workshop (5/11/2011)



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RYSS – Junior/Primary Academy  
Student Workshop (1/26/2012)



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RYSS – Harmony Hills Elementary  
Student Workshop (10/9/2012)



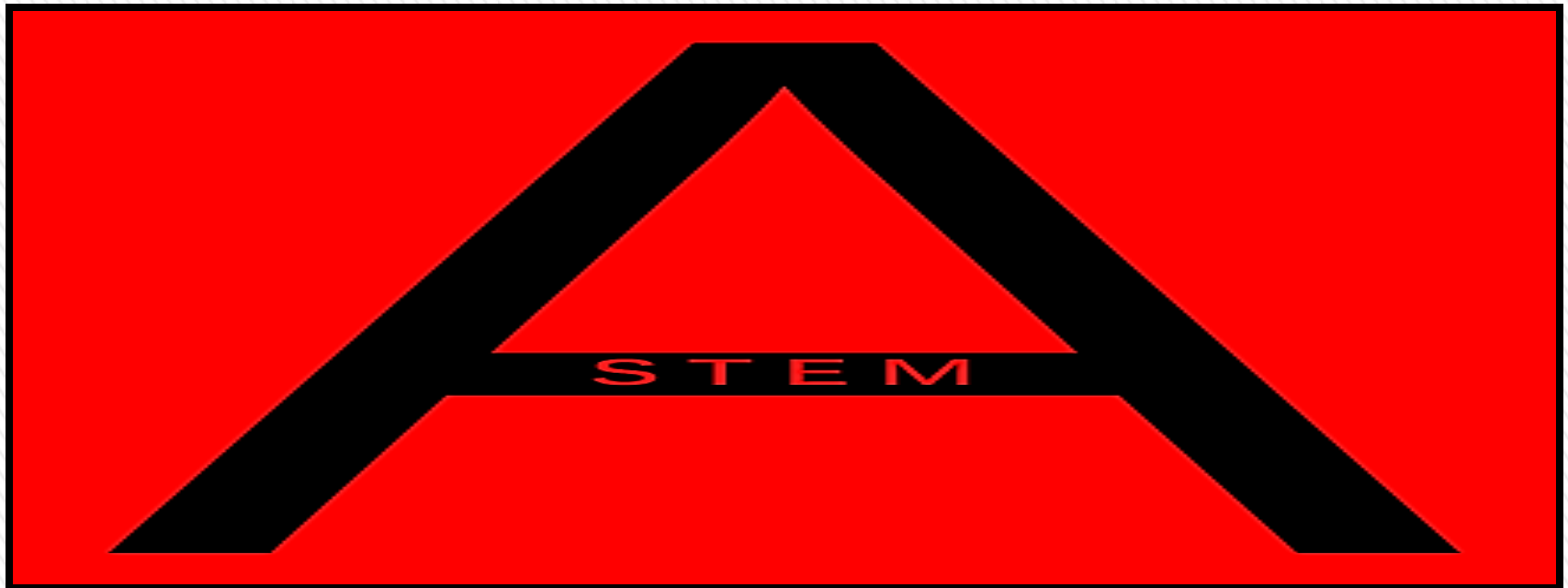
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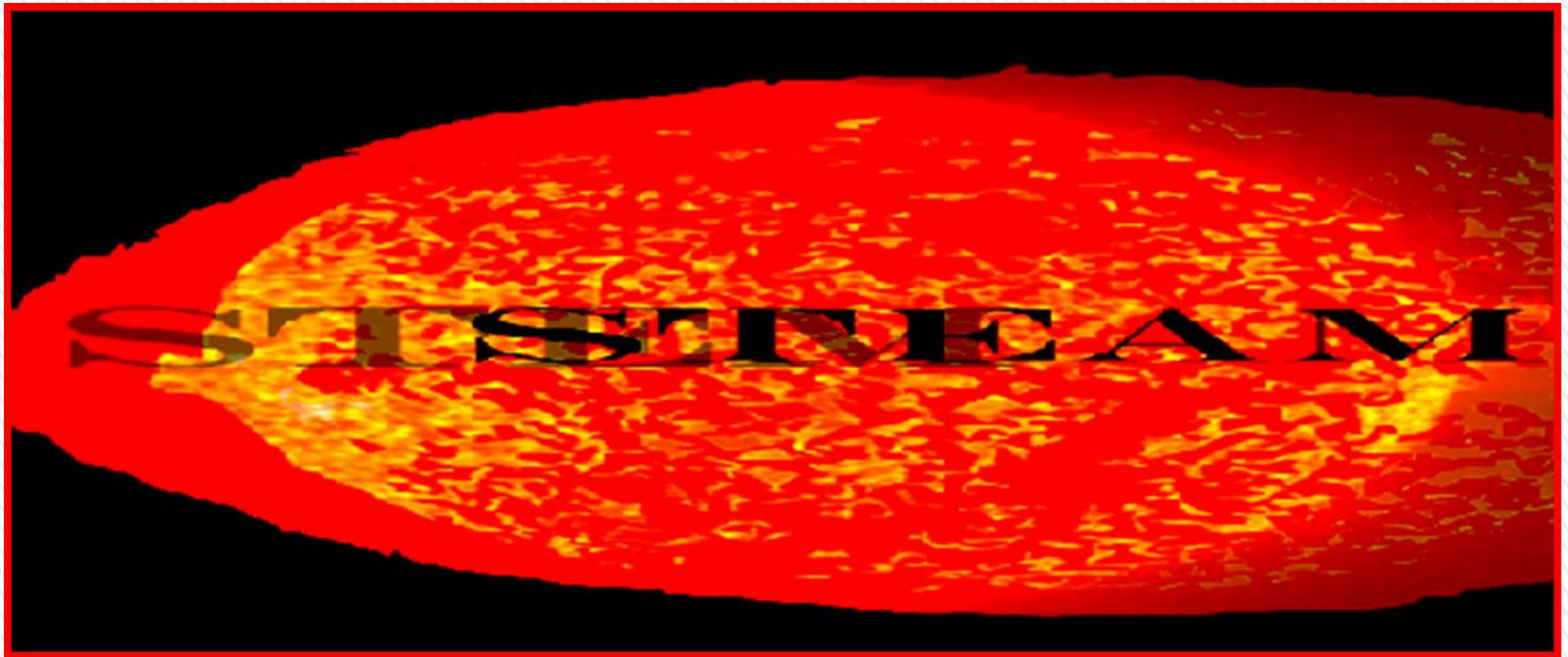
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RYSS – Harmony Hills Elementary  
Student Workshop (5/22/2013)

Challenging the student to take control of the learning process is tantamount to his/her enthusiasm for such and desire to want to know, and complete the task. To take control is to own, and to own is to establish relevance, and give purpose to the process. The **Arts** as a part of the STEM curriculum ... STE**A**M ... give the student this opportunity. He/she is motivated, engaged and empowered to learn his/her way.



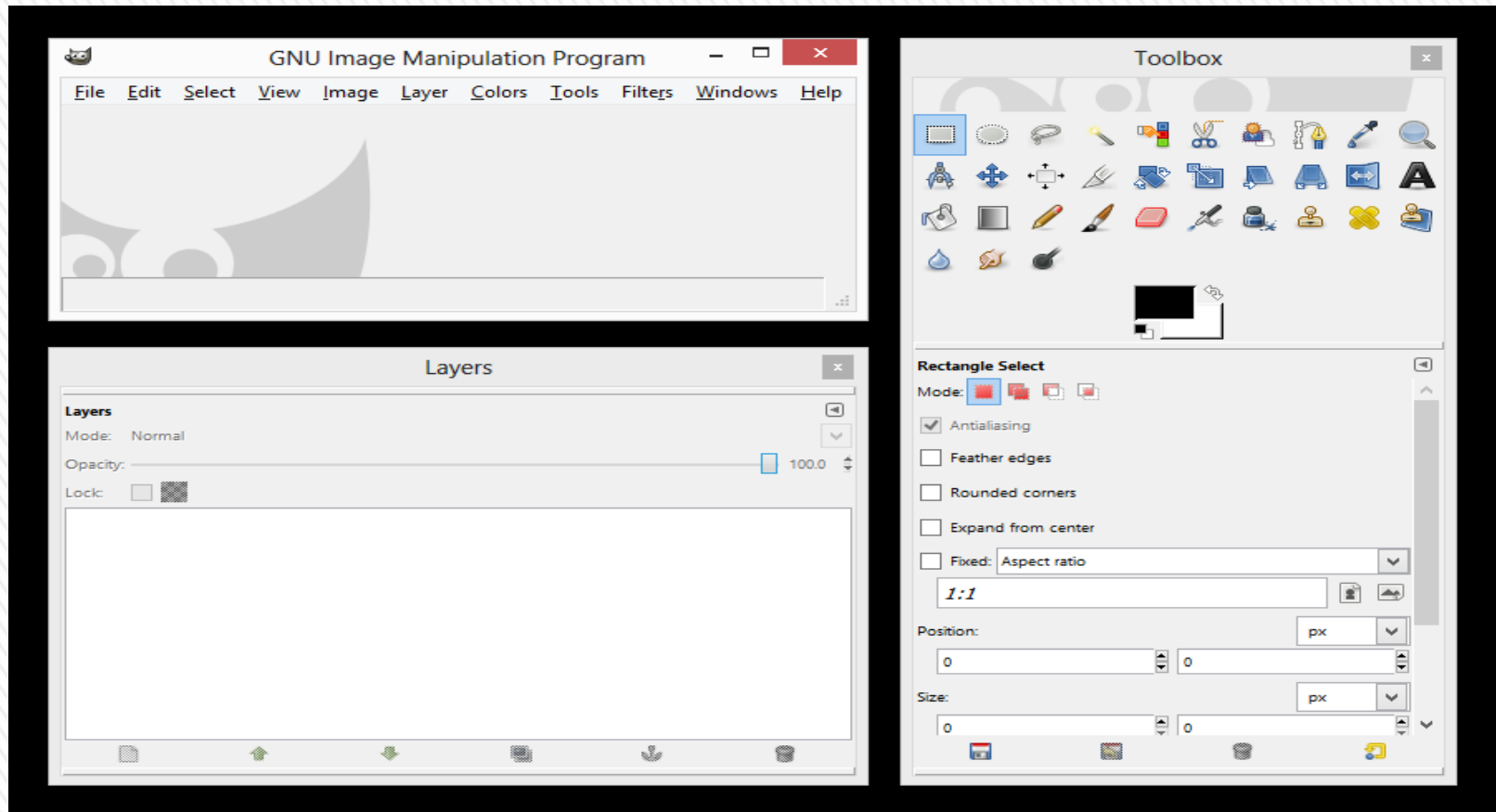
I'll take those of you who are very interested in incorporating the Digital **Arts** as a part of your STEM curriculum ... STE**A**M ... through a few slides of how to manipulate a photograph to create this genre of **art**.



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Let's take a look at GIMP, the graphic **arts** software that my students used over the years. The letters represent GNU Image Manipulation Program. GNU is a Unix-like operating system that is free software.

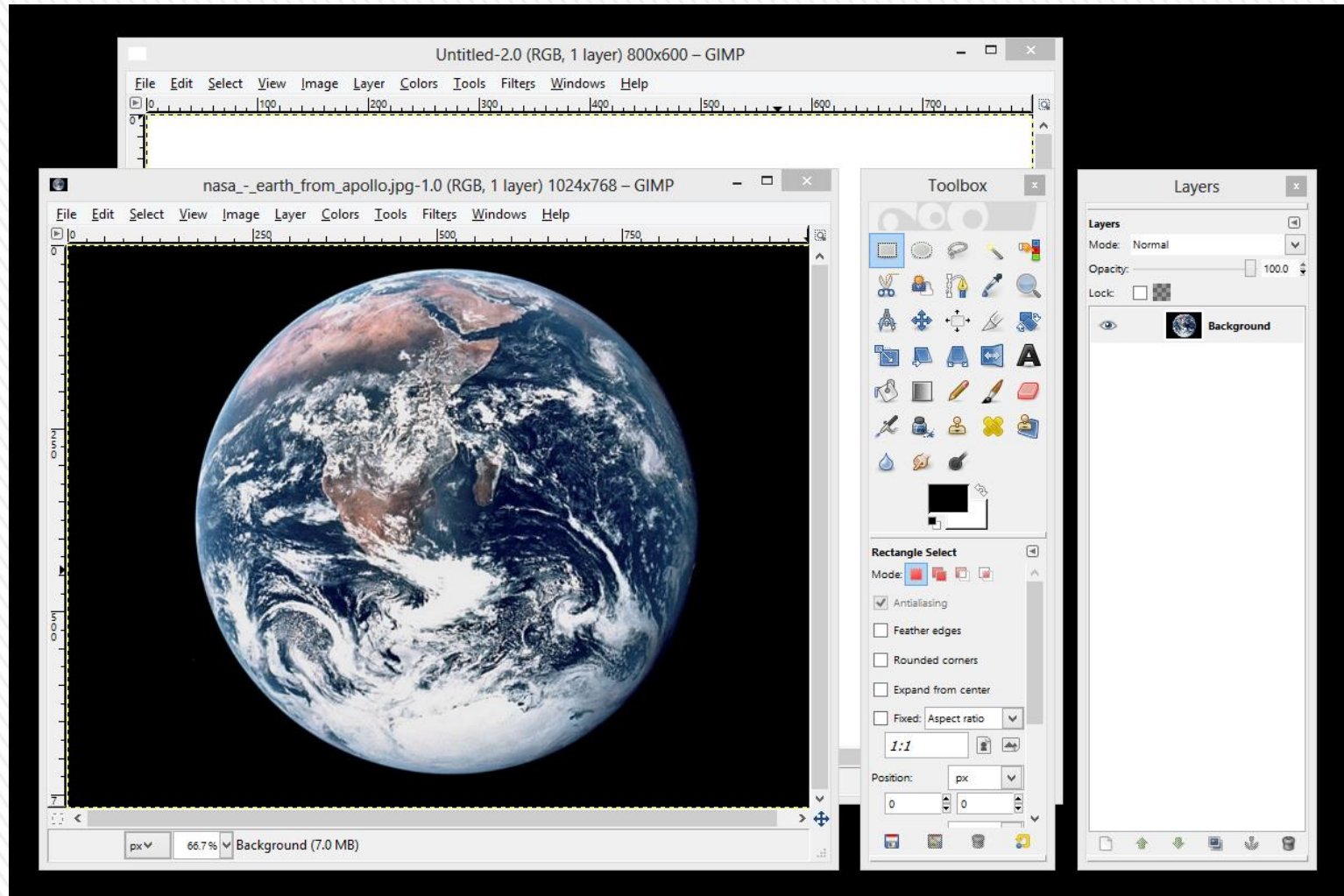


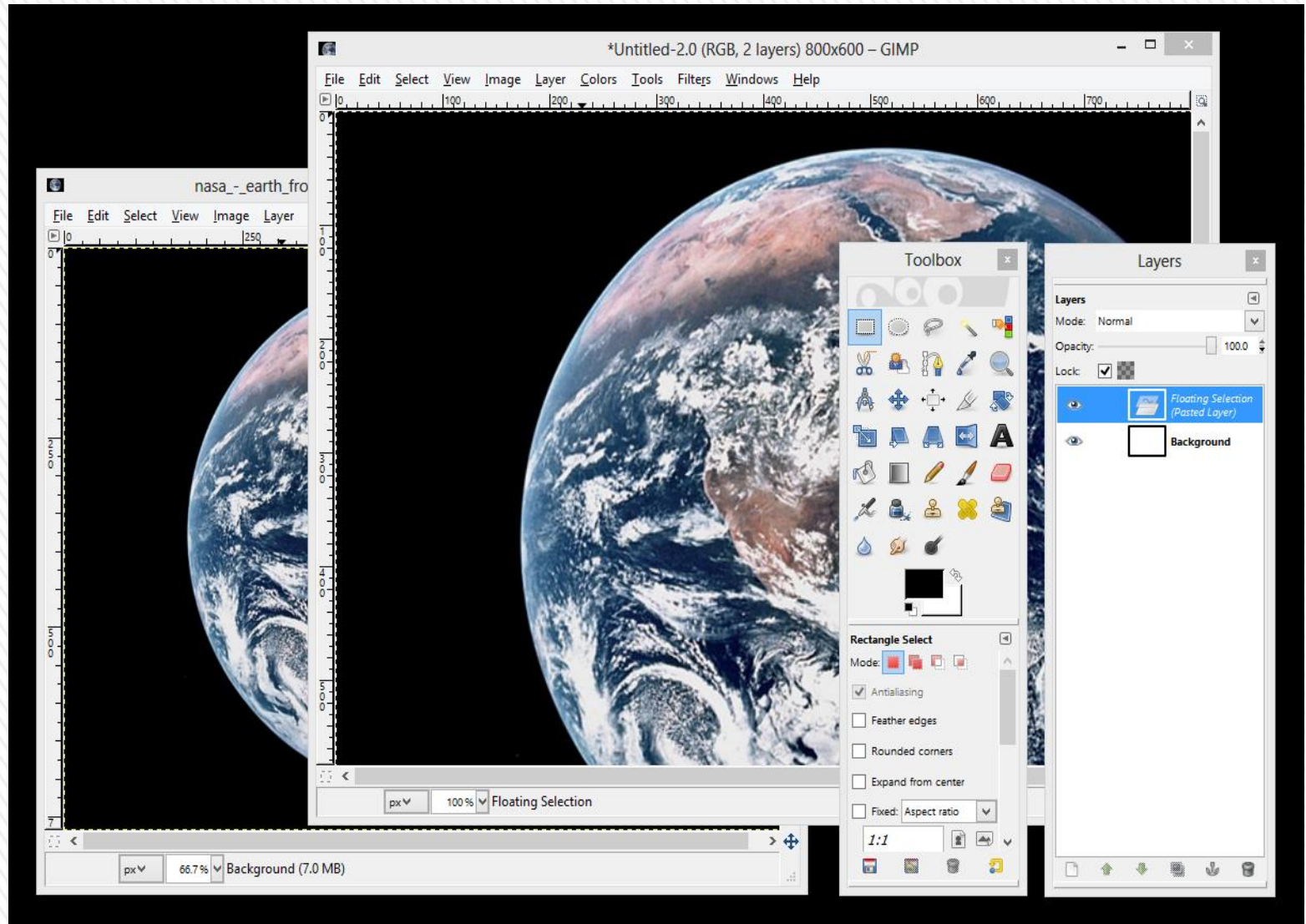
Gimp.org



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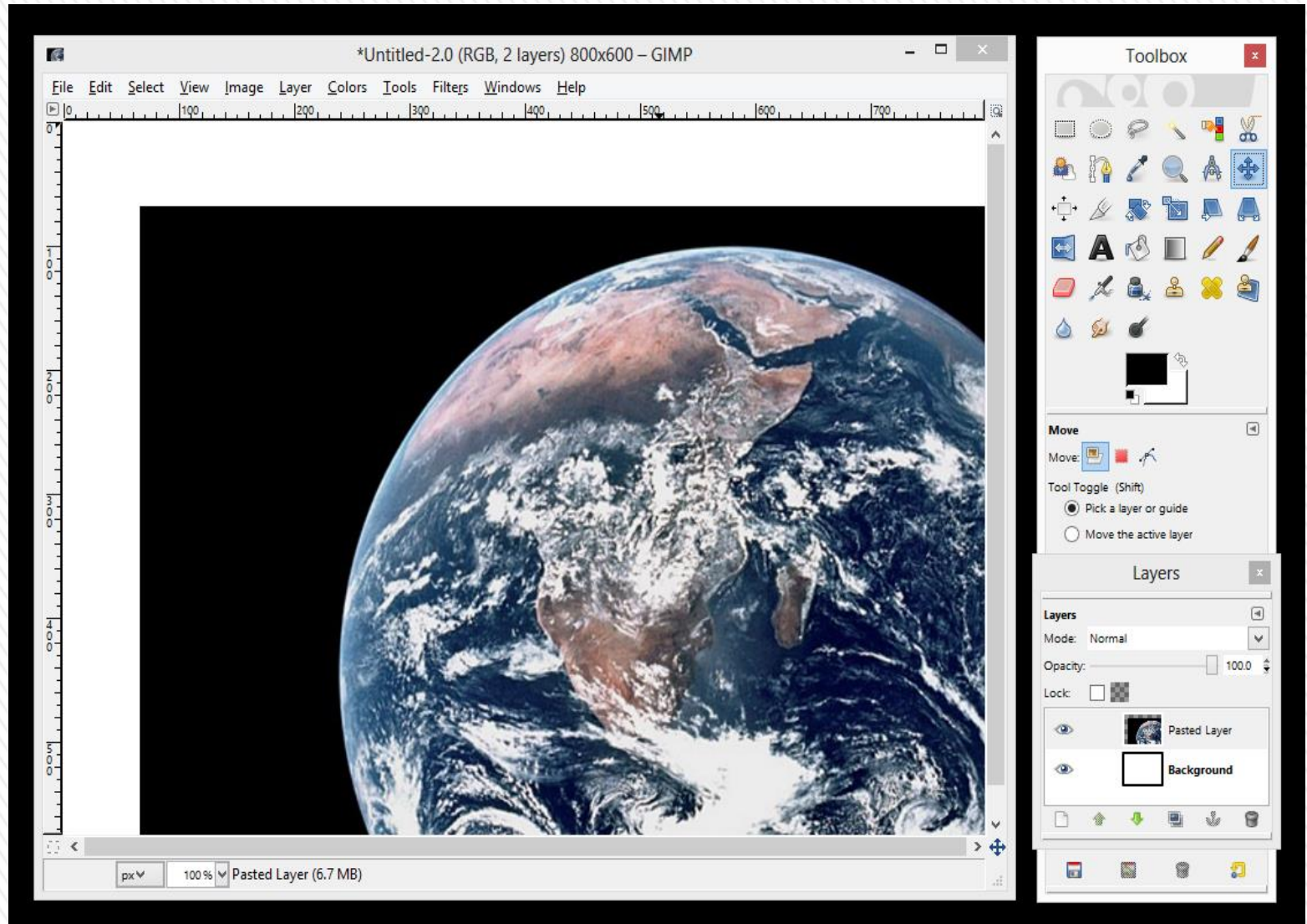
Let's create Digital **Art**, and we'll use a Space Science image, courtesy of NASA ... Earth (Apollo 17 [AS17-148-22727], December 7, 1972).



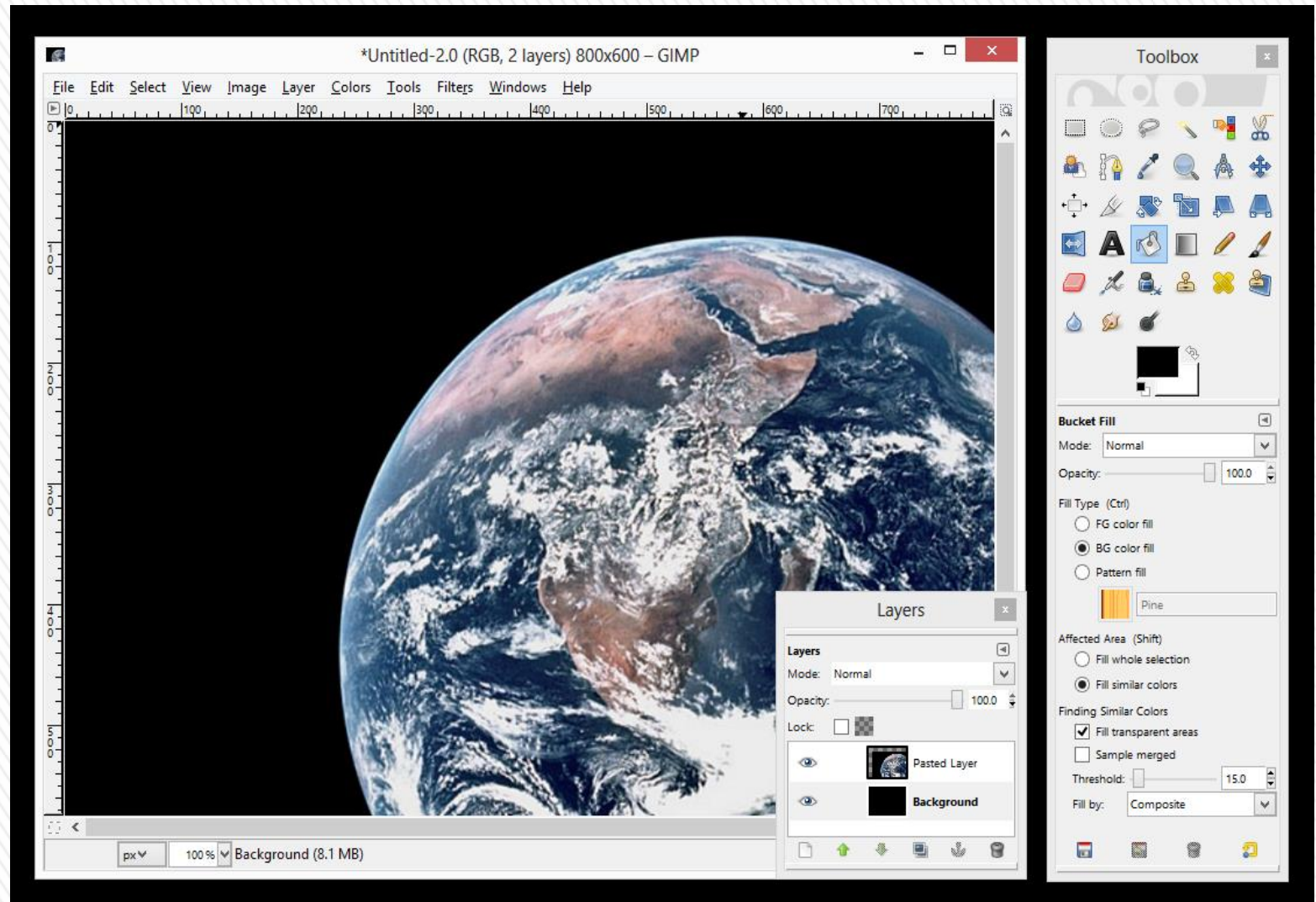


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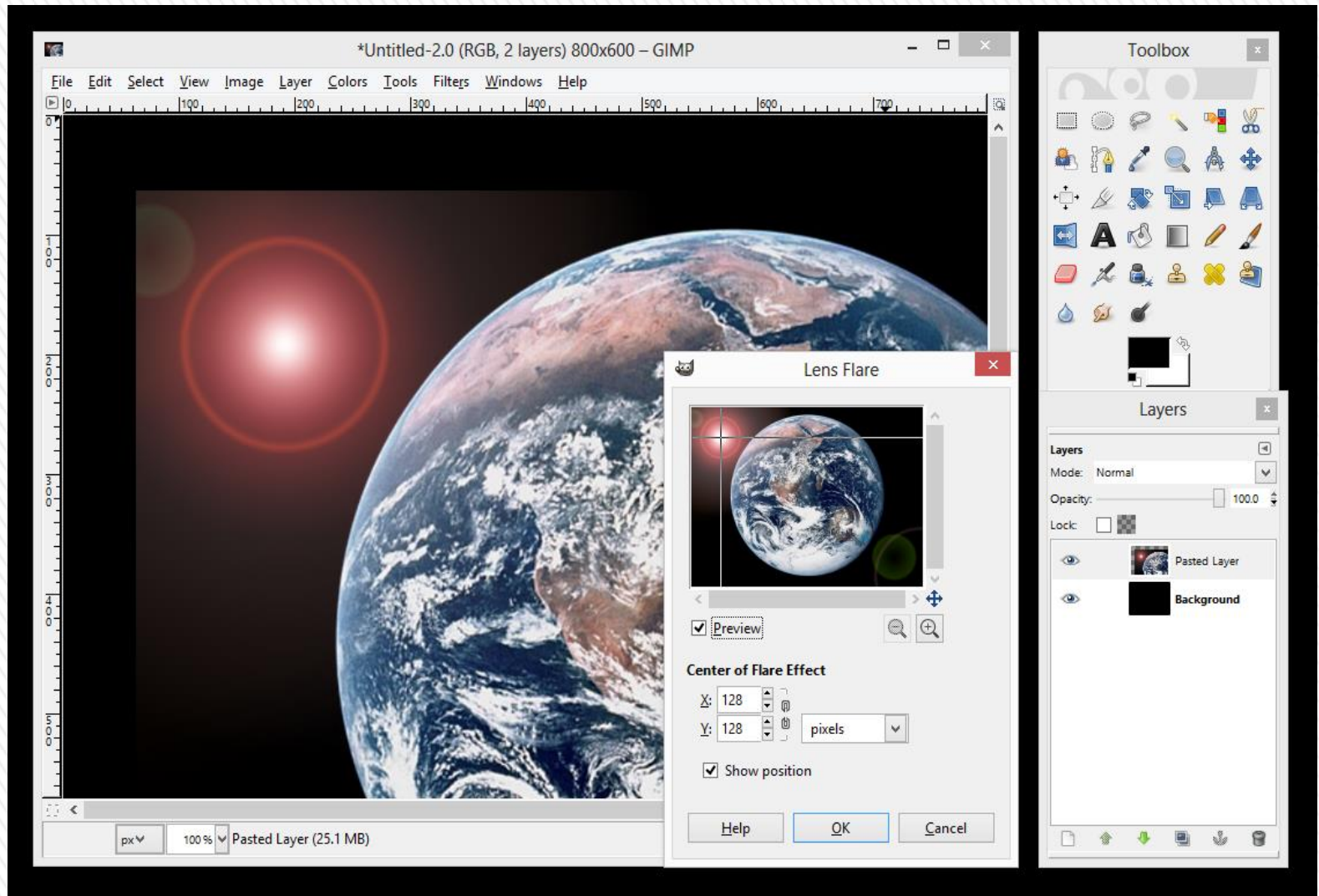


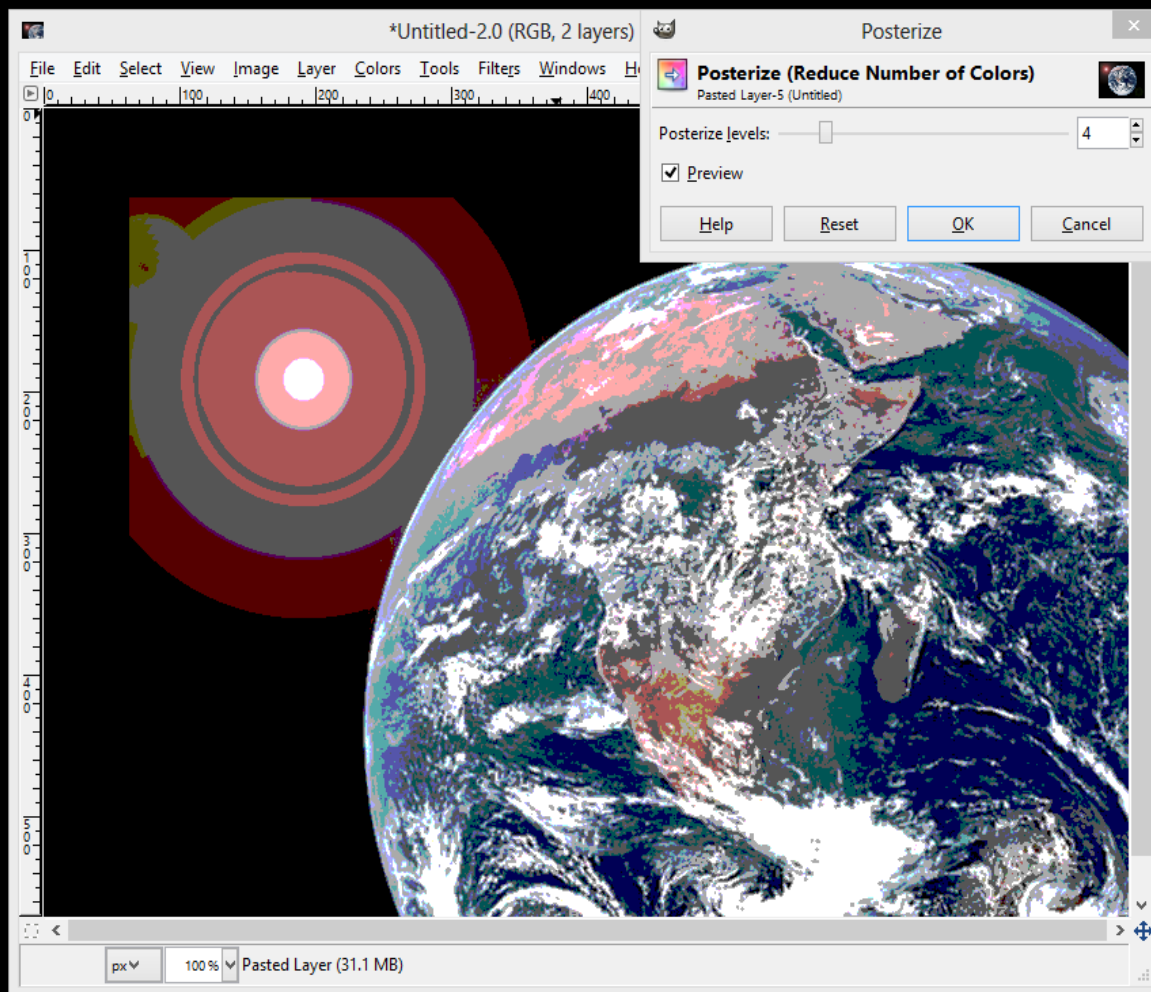
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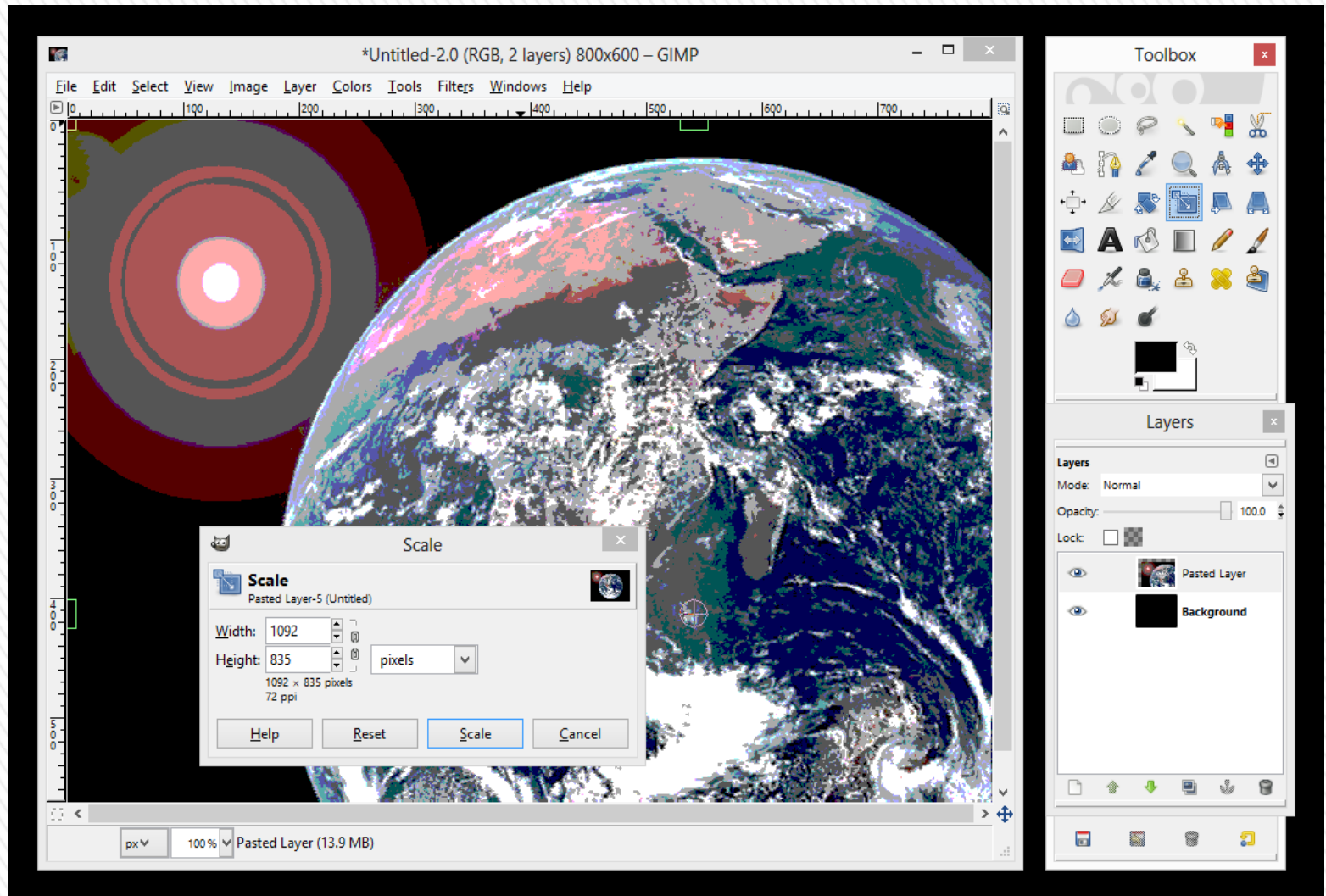


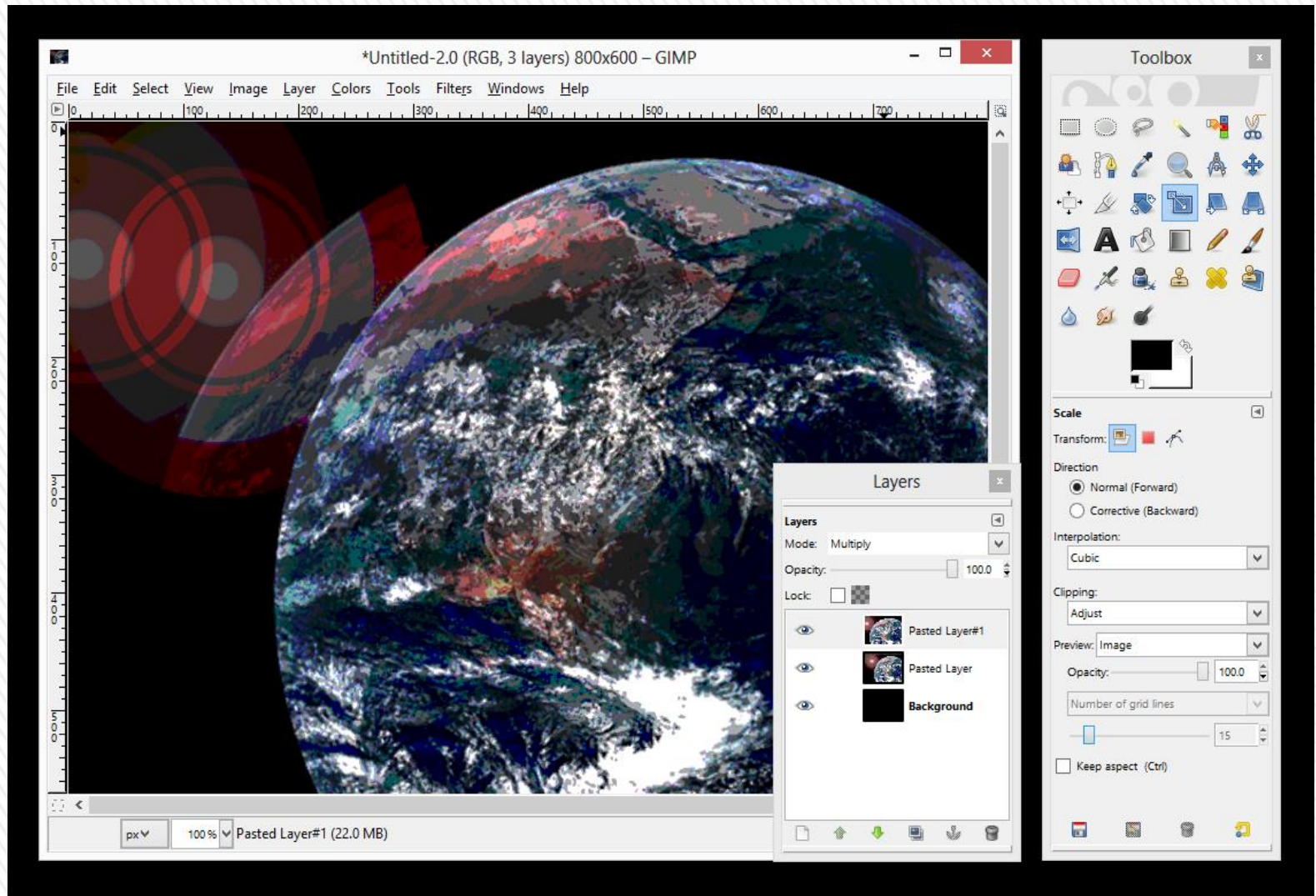
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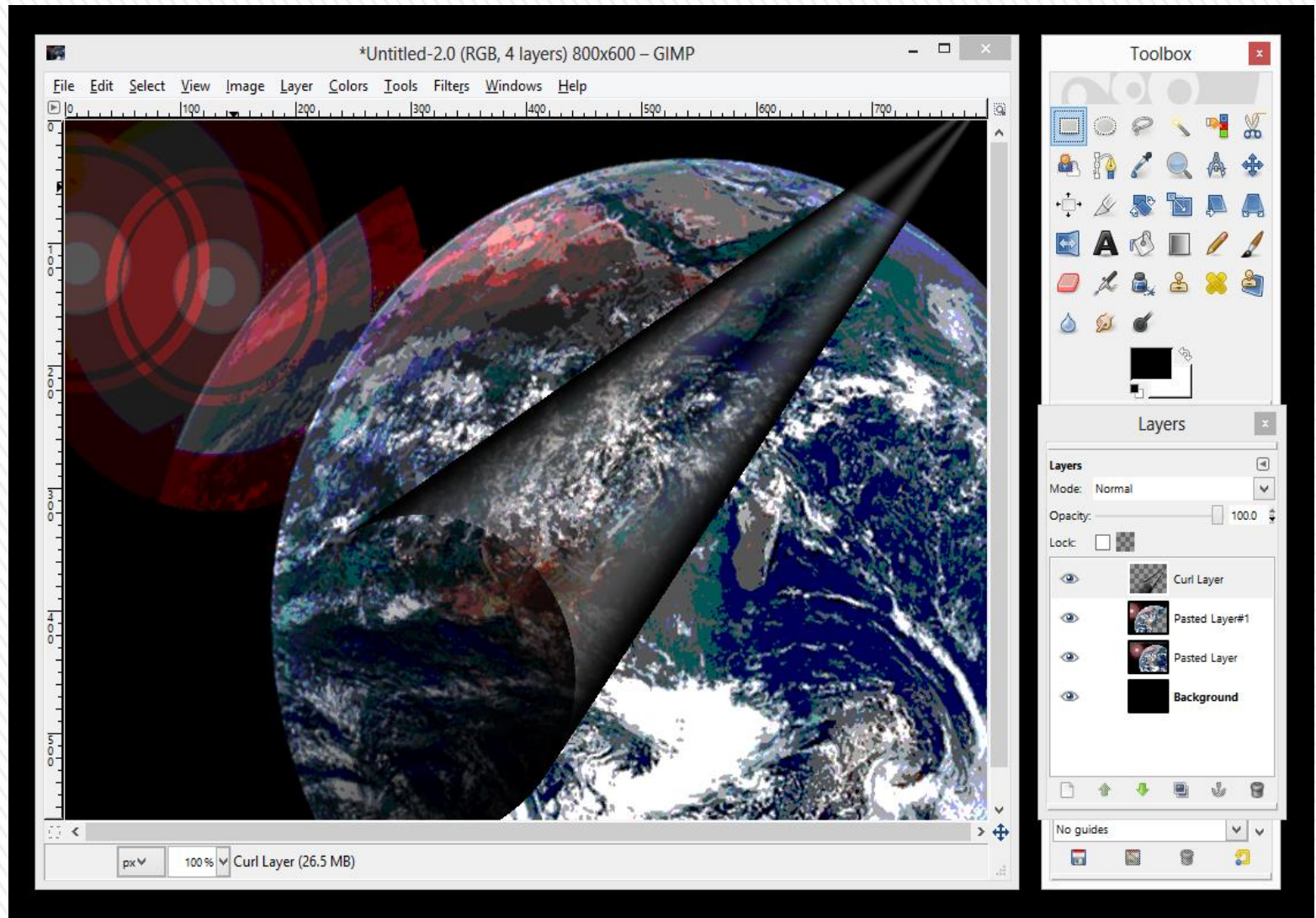






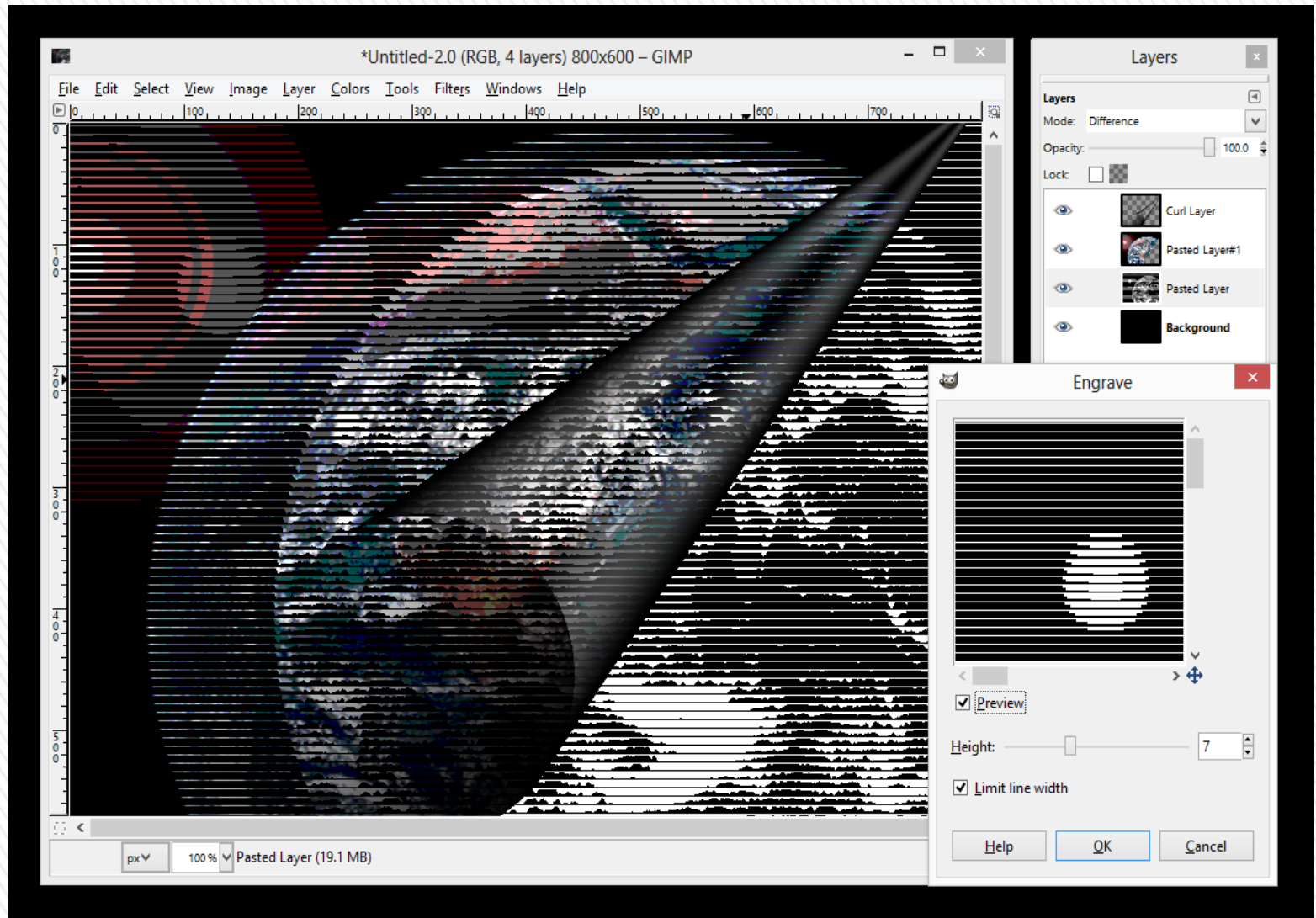
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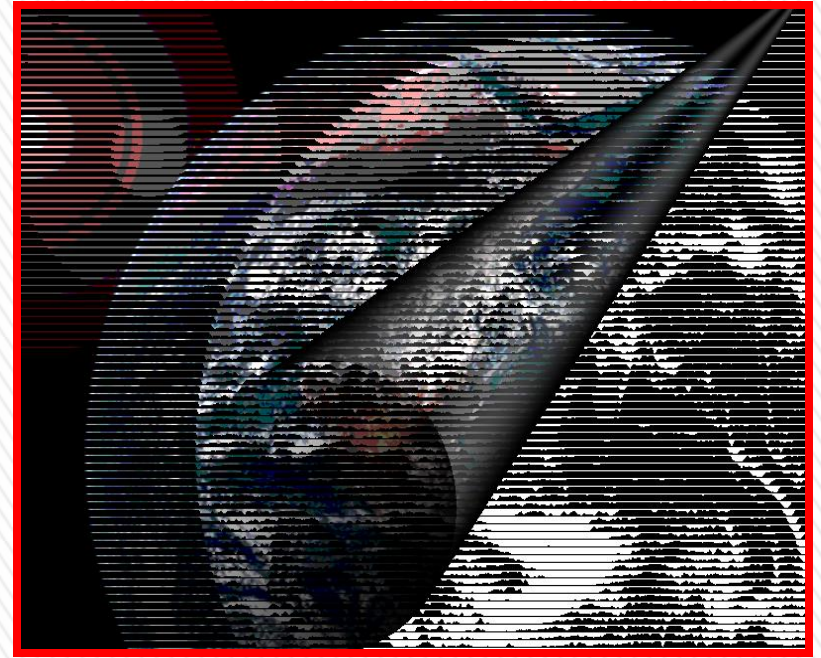
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MATHEMATICS • ARTS • HUMANITIES





Before and after manipulation above, and the point is to empower the students through the acquisition of graphic **arts** software skills for greater understanding and retention of STEM content. This act of creating with software to produce Digital **Art** provides an excitation factor that works on the psyche to want to study and learn the curriculum.



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# Thank you.

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