ARBSE: A NEW EDUCATIONAL RESOURCE IN ASTRONOMY AND SPACE SCIENCE. S. K. Croft[1], K.Garmany[1], and S. M. Pompea[1]. [1]NOAO, 950 N. Cherry Ave, Tucson, AZ 85719. scroft@noao.edu. kgarmany@noao.edu. spompea@noao.edu.

Introduction. Astronomy Research Based Science Education (ARBSE) is a middle school and high school teacher professional development program that has been created at the National Optical Astronomy Observatory (NOAO) in Tucson, AZ. It integrates several prominent trends in American science education, including the use of technology in the classroom, the development of inquiry-based science curricula closely modeling professional science practice, and the creation of communities of science learners consisting of both teachers and students. The project has reached a certain level of maturity, having run for four years as the Research Based Science Education (RBSE) project that emphasized bringing research and scientific data into the classroom, four years as Teacher Leaders in Research Based Science Education that added a teacher retention and renewal component, and now as ARBSE where the focus is again on teachers and students doing astronomical research in the classroom.

Description. ARBSE has national scope. Nearly one hundred and seventy teachers from forty states and Puerto Rico have participated in the program. Most of our teachers are still active in the program, using research-based science education in their classrooms in one form or another. ARBSE is designed to give middle and high school science teachers experience in working on real earth and space science research projects with professional scientists using professional, world-class telescopes. The teachers are also trained in research-based pedagogy so that they can effectively take these research projects into their classrooms to share with their students and colleagues. Our teachers begin the program with a semester-long graduate-level distance-learning course. The course of instruction is divided between science content, inquiry-based pedagogy, and training on image processing software and specialized techniques relevant to our research projects. Classroom interaction is intense, emphasizing collaborative activities to help build community between the teachers. The next step is a two-week on-site training workshop in Tucson that includes a week's observing at Kitt Peak. The teachers run the big telescopes themselves, and the data they gather is added to an online archive. They work on specific problems with professional scientists and report the results of their work to their fellow teachers at the end of the workshop. In this way the teachers model the process that they will subsequently take into the classroom.

After the workshop, the teachers return to the classroom to instruct their students in the same projects, software, and data processing techniques that they have learned to use. New data are provided to the teachers and their students via the online archives. Once the students are familiar with the data and processing techniques, they are encouraged to develop research projects of their own. Students write papers describing their projects and submit them for review by our scientific staff and publication in our own RBSE Journal.

Demonstration. In the past, our instructional materials and data archives have been restricted to program participants. We are now in the process of making the materials and data archives openly available online to any interested party. We currently have four research projects:

1. Solar magnetic fields – using Zeeman splitting of lines in the near IR to explore the distribution and evolution of magnetic fields on the solar surface;

2. Nova Search – using periodic images of nearby galaxies (principally Andromeda) to investigate the nature and distribution of novae in different classes of galaxy;

3. Spectroscopy of Giant and Supergiant Variable Stars – using very high resolution spectroscopy to investigate the nature and evolution of late-type semi-irregular variable stars;

4. AGN Spectroscopy – using high resolution spectroscopy to investigate the nature and distribution of active galactic nuclei (quasars, etc.) in the early universe.

We will be demonstrating some of the data sets from the archive, their classroom use, and provide samples of some of our classroom materials. We will also be showing samples of the RBSE Journal, designed specifically for student and teacher publications.