Project Summary

1. Objectives
   1. Continued development of Pychron
      1. Fully featured data acquisition and processing platform for Ar/Ar geo/thermochonology
   2. Start community based effort to create robust and sustainable software tools and support
   3. Software validation
   4. Version controlled data (snapshots of datasets with different processing)
   5. Platform for future development
2. Intellectual Merit
   1. Software integral to Ar/Ar and laboratory in general
   2. Written in popular, accessible programming language, python
      1. Rapid development/prototyping
      2. Easy to learn, good for beginners but extremely powerful, good for advanced users
   3. Add confidence to numbers produced
      1. Ensuring both intra and interlab consistency
   4. Add new ways of visualizing and handling large data sets
   5. Ease sharing of data
      1. Use github or gitlab hosting of raw data
   6. Efficient integration with new hardware
      1. New features readily added
      2. Increase throughput and analyses quality by using efficient and effective algorithms
      3. Capitalize on multi-collection (ratio vs intensities)
   7. Integrate with existing geo databases such as geochron.org, earthchem etc.
   8. Full audit trail for analyses
      1. Track sample from collection to analysis
         1. Pychron smart phone app.
            1. Use in the field to record sample info
         2. Sample prep info into the database
   9. Integrate with existing hardware
      1. Demonstrate ability to control MAP
3. Broader impacts
   1. Student mentorship
   2. Expose geoscientists to python/programming
   3. Community based open source effort
   4. Provide community with new software tools
      1. Open, robust, sustainable
   5. Integratable with existing software tools for thermochonology
      1. Lovera MDD
   6. Ultimately increase collaboration among laboratories
   7. Extendable to other systems

Project Description

1. Continue development of pychron
2. Current status of pychron
   1. Data acquisition
      1. 40,000 analyses
      2. operating since 2012
      3. interface with photon machines/thermo
   2. data reduction
      1. beta testing since winter 2013
3. development objectives
   1. Add features
      1. Visualization
      2. Scriptable interface
      3. Batch processing
      4. Permutation generator
      5. Version controlled data
      6. Ratio vs intensity determinations
   2. Optimization
   3. Documentation
4. Background
   1. Not using recent advancements in software development techniques
      1. Version control
      2. Open source packages
      3. Properitary platforms
   2. Black box applications
      1. Mass Spec
         1. Cumbersome to modify
      2. ArArCalc/Isoplot
         1. Requires outdate Microsoft Excel,
         2. Does not work well with Mac
         3. Limited to no database support
   3. Pychron
      1. Work currently supported by NMGRL. Strongly behind current effort
      2. Continuation of the work performed for dissertation
      3. Uses git flow branching model
      4. Public hosted at github
5. how the project will integrate research and education by advancing discovery and understanding while at the same time promoting teaching, training, and learning;
   1. community collaboration
   2. readily available documentation for end users and developers
6. ~~ways in which the proposed activity will broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.);~~
7. how the project will enhance the infrastructure for research and/or education, such as facilities, instrumentation, networks, and partnerships;
   1. new software tools for ar/ar
   2. interface with new generation mass spectrometers
   3. interface with custom and industry hardware
   4. new updated interface for preexisting hardware
   5. ease ability to collaborate and share data
8. how the results of the project will be disseminated broadly to enhance scientific and technological understanding;
   1. documentation and course material for end users
      1. doc easily accessible at readthedocs.org
   2. publicly available at github
   3. publication in Computers in Geoscience
   4. blog/wiki
9. potential benefits of the proposed activity to society at large.
   1. Make geochronology data more accessible to public
   2. Better data for geology with societal implications
      1. Climate
      2. Hazards
      3. Economic

Results From Prior NSF funded work

Unfunded Collaborations

Group Proposals

Proposals for Renewed Support

References Cited

Facilities

Post Doc Mentoring Plan

Biographical Sketches

1. Professional Preparation
2. Appointments
3. Publications
4. Synergistic Activities
5. Collaborators and other activities

Budget

1. Salaries
   1. 1 yr post doc
   2. 2 weeks Heizler
   3. 2 weeks McIntosh
2. Fringe benefits
3. Equipment
   1. Laptop
   2. 2 monitors
4. Travel
   1. Pycon, Montreal April 2015
   2. AGU/GSA/Goldschmitt, etc ?
   3. Travel to other labs for consultation
5. Participant Support
6. Other Direct Costs
7. Total Direct Costs
8. Indirect Costs
9. Total Direct and Indirect Costs
10. Amount of this Request