Writing a Successful (GSA) Grant Proposal

Grants In Aid Of Research Committee, Geological Society of America

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Funding details

• Funding rate ~50%
  – Most awards $1,000- $2,500
  – In 2015 52% funded, average award $1,851

• Specialized awards
  – Exxon Mobil $7,500
  – Study area (geography or discipline)
  – Demographics
Applicant Requirements

• GSA Member
• Enrolled at a US, Canadian, Mexican or Central American university in an earth sciences program with a geologic component
• Only two GSA student grants during academic career

• Advisor appraisal
• Progress report
Follow the Rules & Submit on Time

Proposals due Monday
February 1, 2016 by 5pm MST
Proposal format 2015

1. Present the problem, hypotheses, and the overall objectives of the project.

2. Discuss the scientific and societal significance; what is the importance of this project?

3. Concisely state your research plan and how it will test your hypothesis stated above.

4. Figure.

5. Budget and budget justification.

6. Additional funds, CV, references
Introducing your project

Discuss the disciplinary and regional context. Importance of the project and state testable hypotheses.

Clearly state problem and specific objectives
Hypotheses: Multiple and Realistic

Many strong proposals seek funding to test competing hypotheses that can realistically address the broader problem/question you will raise in the next section.
Hypotheses: Logical connection to proposed exp

- Before you can reasonably discuss your test(s) you will need to detail the logical connection between your hypothesis and your proposed test.
  - Hypothesis X predicts that Y will happen because…
  Therefore, it follows that test Z could be applied to learn if Y actually happened.

Don’t leave it to the reviewer to connect these dots.
Put your project in a broad context

- Demonstrate that you have done your homework; citing relevant publications
- Clearly state the significance of the topic
- You don’t need to solve the entire problem, but demonstrate that you are aware of it
- Help the reviewer understand how the proposed work fits into the larger context

Significance
Why is your research worth doing?
Example- Broader Impacts

Paleoseismology of Rose Canyon Fault

*Not:* “The seismic history of Rose Canyon Fault has not been studied previously”

*Instead:* “The seismic history of fault zones are critical to developing accurate hazard assessments. The magnitudes of prehistoric earthquakes, their timing, and their recurrence intervals are significant in developing such assessments.”
Research Plan

Concisely state your research plan and how it will test your hypothesis stated above.

Get concrete, what will you do?

Is problem well constrained and feasible? Will you be able to collect the data you need?

Are the techniques appropriate to questions asked and will they address the problem?
A good figure helps explain your research

Your proposal must contain a single figure (1 page)
This is a GREAT opportunity!
PDF format no larger than 5 MB

Do:
Make figure focused, clear
Minimize clutter
Cite references, if appropriate
Readable at screen resolution

Don’t:
Cut and paste a figure from a publication or your advisors grant!

Your figure can (and should?) have multiple parts
What kind of figure is most effective?

1. What is the purpose of your figure?
Help explain some complexity- save text
Conceptual model you’re testing
Highlight impact of your research

2. What kind of figure might be appropriate?
Picture
Conceptual model
Map
Flow chart of research plan

3. Building and refine your figure
Title- orient your audience
Images- cartoons, pictures, schematics, maps, etc
Caption- why is this figure useful?
Figure 1. Particle size distribution by mass, metal content by size fraction, and Pb sequential extraction. (A) Particle size analysis of tailings, (B) lead content of tailings by size fraction (sand >2 mm, silt >20 μm, clay <2 μm), (C) sequential extraction of lead from whole tailings (modified from Hayes et al.). (D) Sequential extraction steps: water (H₂O), ammonium acetate (AA), ammonium oxalate at 25 °C (AAO 25C), ammonium oxalate at 80 °C (AAO 80C), hydrogen peroxide (H₂O₂), nitric and hydrochloric acids (Acid), and residual.

Figure 2. Linear combination fits of tailings using plumbojarosite (Pb-jar) and anglesite (PbSO₄). (A) First-derivative XANES (arbitrary units), (B) normalized EXAFS. Fits shown by dashed line and results are presented in Table 1.
Iron King mine tailings are located in semi-arid central Arizona and contain elevated levels of toxic metals. (A) Mine tailings are located adjacent to the town of Dewey-Humboldt. (B) Dust emissions is the principal mechanism of metal transport off site. (C) Tailings were sampled as a function of depth. Redox boundary at \(~35\) cm indicated by change in color (grey to orange) and pH.
The formation of efflorescent salts in mine tailings results in the accumulation of bioavailable, transportable forms of toxic metals at the tailings surface. They form through (1) water infiltration into pores during wetting cycles that dissolve minerals, liberating ions to solution. (2) During drying cycles, evapotranspiration translocates these ion rich pore waters to the surface. The water evaporates, concentrating the solutions until salt formation occurs.
The devil is always in the details

- Legend, scale bars
- Annotate figure to highlight key elements
- Easy to read all text
- Visually appealing
- Use colors to make understanding intuitive
- Write a good caption
- Cite references, if appropriate
Budget Do’s and Don’ts

You may request up to $2,500

Your project can cost more than $2,500, but you should tell us how you are going to pay for the remainder.

Your project must be distinct from larger projects funded through another agency (e.g. NSF).

Funds can not already have been allocated for this exact project.
Allowable expenses

Things you can ask money for:
• Travel and lodging for field work (including per diem, mileage)
• Analyses
• Consumables in the field/lab
• Field assistant expenses
• Equipment rentals

Things you can’t ask money for:
• Travel to or registration for meetings!!!!!!
• Personal equipment (e.g. boots, tents, sleeping bags)
• Standard equipment (e.g. Brunton compass, thin sectioning machines)
Budget Justification

Justify how you know how much things cost. (And why you need it.)

• Explicitly tied to the research you outline in the project description section
• Reflect accurate prices for the services and commodities you need, and to sum properly.
Example: Collect data at Stanford-USGS SHRIMP lab

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flight</td>
<td>$817</td>
</tr>
<tr>
<td>Ride share</td>
<td>2@$30</td>
</tr>
<tr>
<td>Lodging</td>
<td>7@$137</td>
</tr>
<tr>
<td>Per Diem</td>
<td>8@$59</td>
</tr>
<tr>
<td>Lab supplies and hourly use fee</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$2,458</strong></td>
</tr>
</tbody>
</table>

**Justification:**
7 days instrument time scheduled February 3-10, 2016

Alaska Airlines FAI → SFO → FAI (only carrier servicing FAI, priced 10-20-2015)

Eco-lodge ($137 per night) cheapest option available within walking distance of SHRIMP and several restaurants, meaning no rental car is necessary.

SHRIMP lab requires users purchase their own epoxy for mounting grains ($30) and use of heavy liquid separation lab (~4 hrs @ $30/ hr).
Other Justifications

Hertz Rental Car: 9 days at $89. Pickup with 4WD is required to carry field equipment and reach remote mountain field sites.

Gas: 357 miles Denver to Gunnison (357 x 2), 50 miles per day to field site (50 x 8). 1,114 miles x gal/18 mi x $4.15/ gal = $257

Samples must remain frozen prior to analysis, requiring storage in dry ice (30 lbs @ $5.00/lb) and overnight shipping (3 coolers at $45 ea).

WD-XRF 12 samples @ $16 at Activation laboratories

Shipping to Activation laboratories via Fed-Ex $35

Arizona Laboratory for Emerging Contaminants: 55 element ICP-MS 12 samples @ $37

Acme labs: Radiogenic nuclides 12 samples @ $150
Writing Quality

It is never too early to start writing!

“If I had more time I would write a shorter letter”

Samuel Clemens

• Don’t write in a vacuum. Seek out others to review your writing, especially your advisor(s).

• Write for the appropriate audience. In this case professional geologists who may not be in your field.

• Make sure you have addressed the question(s) asked in each section.
Be kind to the reviewer

Each reviewer reviews 50+ proposals

Keep in mind that your reviewers may not be specialists in your field.

- Avoid excessive jargon
- Minimize the number of acronyms you employ

Don’t leave it to the reviewer to connect these dots.
Logical flow (a very simple) example

BUDGET
Funds to map individual intrusions in pluton X

METHODS
Mapping individual intrusions will allow us to constrain the number and volume of melt pulses

HYPOTHESES
1) Plutons can be constructed by many small melt pulses, or
2) a small number of very large pulses

PROBLEM/QUESTION
How are plutons/magma chambers constructed?
Good luck...

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Results and reviews are sent in mid April
Award checks will be mailed by the end of April