Ground-Truth Strategy

Life in the Atacama 2004
Science & Technology Workshop

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Presentation Outline

Overall Ground-Truth Campaign Strategy

- Schedule of Ground-Truth Activities
- Overall Objectives
- Field Work
  - During the Rover Field Experiment
  - Post Field Experiment
- Laboratory Analysis
- Products
  - Ground-Truth Report
  - Database
## Schedule of Ground-Truth Activities

<table>
<thead>
<tr>
<th>Date</th>
<th>Number of Days</th>
<th>Activity</th>
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<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 8</td>
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<tr>
<td><strong>2004</strong></td>
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<tr>
<td>July 14-16</td>
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<td>CMU: Year 02 Kickoff Workshop and Sci.Tool Training</td>
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<tr>
<td>July-Sept.</td>
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<td>Database Task Groups: Organization of Data Spreadsheets</td>
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<td>Sept. 12-18</td>
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<td>Site A: Remote Science Operations, CMU</td>
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<td>Sept. 12-18</td>
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<td>Site A: Sci. targets ground-truth and sampling <em>in situ</em></td>
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<td>Oct. 3-9</td>
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<td>Site B: Remote Science Operations, CMU</td>
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<td>Oct. 3-9</td>
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<td>Site B: Sci. targets ground-truth and sampling <em>in situ</em></td>
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<td>Nov. 6-10</td>
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<td>Grin/Cabrol/Chong: Regional geology ground-truth</td>
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<td>Oct.-Jan</td>
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<td>Laboratory Analysis of samples <em>Blind to Remote Sci. Team</em></td>
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<td><strong>2005</strong></td>
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<td>Jan. 3</td>
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<td>Deadline: Remote Earth Science Report to Science and Ground-Truth Leads</td>
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Overall Objective 1

• Assess the accuracy level of RST interpretation compared to ground-truth in order to:

  • Assess the ability of the RST to understand the reality of the field through the rover’s payload;

  • Assess the efficiency of RST methods (through collaboration with Geb Thomas et al.,) and if needed suggest new ones for Year 03;

  • Assess the role (or lack thereof) of rover mobility in favoring a greater understanding of the geological, mineralogical, environmental, and biological diversity of the investigated traverses; If needed,

  • Suggest new rover science exploration strategy and sampling method for Year 03 campaign;

  • **Assess the gap (if any) between the interpretation potential of a human with science instruments in the field vs. automated robot and RST in the search for life (tie to human exploration)**
Overall Objective 2

• Generate a Science Database Showing the Gradient of Life in the Atacama, which will include:

• Data Spreadsheet with geological, mineralogical and biological information related to the samples;
• Geological, mineralogical, and biological maps along the rover traverses;
• Data obtained from other Atacama projects to complete our project’s vision of the Atacama;

Note: Each habitat and type of life correctly identified by the RST will be notified to the RST at the Year 02 campaign debriefing; All other missed will not be released. They will be kept blind to the RST until (a) they are possibly discovered in Year 03 campaign, or (b) the end of the LITA project.
Method

Year 02 Ground-Truth: A 4-Step Process

Step 1: Field Campaign 1 and 2: Instrument PIs: Local-Samples

Step 2: Post-Field Campaign 1 and 2: Regional

Step 3: Sample Laboratory Analysis

Step 4: Comparison and Conclusions

RST Data Interpretation During and After Field Campaign
Step 1 : Mission Field Activity

• *In Situ* Ground-Truthing by Instrument PIs in the Field During the Rover Field Experiment at Both Sites

  • RST requests sample data acquisition; Through normal daily rover operations, field data is acquired and uploaded from the field to the RST for interpretation;

  • In the field, instrument PIs make a first assessment of the nature of the samples (blind to RST) and:

    • Collect a given set of information relative to the samples, (geographical, mineralogical, biological) on a spreadsheet;

    • Collect any other additional context information.

  • In the field, all sample positions are flagged and the flags numbered. A Ground-Truth sample documentarian logs the sample position and flag number. Context photos are taken and logged.
Step 1: Sample Data Spreadsheet

Organization of a Sample Database Task Group

• Prior to the field Campaign the science team defines and agrees on a consistent content and organization of the sample field spreadsheet that will allow tracking of samples from the field to the lab.

Ex:

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Lat/long/Elev</th>
<th>What mineralogical information?</th>
<th>What biological information?</th>
<th>What context information?</th>
</tr>
</thead>
</table>
Step 2: Post-Mission Field Activity

• Ground-Truthing of the Geological and Environmental Context at both sites (November 2004)
  
  • Grin, Cabrol, Chong characterize the morphology and geology of both sites;
  • Mapping and documentation of both rover traverses and regional scouting;
  • Ground-Truth Preliminary Field Report
Step 3 : Laboratory Analysis

None of the lab. analysis results must be communicated to the RST, which remains blind.

- Returned samples from Step 1 and possibly Step 2 are analyzed in lab.
  - Thorough analysis in search of microbial activity and/or fossils, and new types of microbial habitats;
  - Lab. Report must be communicated to the Ground-Truth Lead no later than Jan. 3, 2005 to allow final comparison between RST interpretation and ground-truth;
Step 4 : Expected Products

• Ground-Truth Final Report (Comparison of Field, Lab, and RST results)
  • Recommendation (if any) for modification (for instance) of science exploration strategies, sampling methods, data collection…
• Report on RST positive findings during Year 02 campaign debriefing; No mention of ground-truth findings other than those matching RTS’s.
• Ground-Truth Lead provides the list of RST samples # corresponding to positive findings to webmaster. This partial database is posted and accessible to RST;
• Ground-Truth Lead provides the complete list of positive findings (field, lab, and RST) to the webmaster. This complete database is not accessible to RST.