Spectroscopic Survey
Pipelines for the GBT

Erik Rosolowsky
Use-Cases

• Operation on sdfits data (after filling)
• OTF spectral line mapping
• Multi-pixel receivers, multi-lines
Not These Use Cases

MUSTANG2 Galactic Plane Survey
PI: Adam Ginsburg
Images courtesy of Brian Mason
Survey Software Roles

Data and Observing Management
Mapping connecting log data to output products

Calibration
Raw telescope data into astronomer units

Mapping
Individual spectra converted into data cubes

Analysis
Derived science projects.
## The Landscape

<table>
<thead>
<tr>
<th>Stage</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibration</td>
<td>GBTIDL, gbt-pipeline, user software (TMBIDL, Robishaw and Heiles, etc.)</td>
</tr>
<tr>
<td>Mapping</td>
<td>AIPS griddler, gbtgriddder, cygrid, sdgrid (CASA)</td>
</tr>
<tr>
<td>Analysis</td>
<td>GBTIDL, pyspeckit, user software</td>
</tr>
<tr>
<td>Observation Management</td>
<td>Whatever you like</td>
</tr>
</tbody>
</table>
How we got here

How standards proliferate:
(see: A/C chargers, character encodings, instant messaging, etc)

Situation: There are 14 competing standards.

14?! RIDICULOUS! WE NEED TO DEVELOP ONE UNIVERSAL STANDARD THAT COVERS EVERYONE'S USE CASES.

Situation: There are 15 competing standards.

xkcd.com
GAS

Observation Management ➔ Google Docs

Pipeline Manager ➔ gbt-pipeline

gridding ➔ pyspeckit

Analysis Manager ➔ https://github.com/GBTAmmoniaSurvey
Observing logs control pipeline

In [1]: import GAS
In [2]: GAS.updateLogs()
In [3]: GAS.reduceAll()  
Pulls from Google Docs
Calibrates all new data
KEYSTONE

PI: James DiFrancesco

Similar mapping strategy
Different spectral setups (KEYSTONE uses RAMPS setup)
DEGAS
PI: Amanda Kepley

New mapping strategy
New calibration data needed
gbtpipe

https://github.com/GBTSpectroscopy/gbtpipe

Packaged version of the GBT pipeline

Provides interface to GBT calibration framework in python
Github model for pipeline management

- Allow multiple contributors to the pipeline development via pull request model
- Data release
  - Build end-to-end script for making data products
  - Create tag in github
- Documentation and public release
- Possibility for regression testing
Areas for Partnerships

- Web-based access to GBT weather data
- Connections between software teams on different surveys
- Local storage and faster access to on site machines (X2GO rather than VNC)?
Community Development Partnerships

Green Bank Telescope Spectroscopic Surveys
Survey support software for the GBT developed by the community

https://github.com/GBTSpectroscopy

Stupid ideas: software bounties. Hack meetings. Community software manager
Data Access and SRDP

SRDP = Science-Ready Data Products

Accessibility

Discoverable

Public

Proprietary

Level of Calibration

Raw

Calibrated

Science-Ready

$ $$ $$ $$
Discoverability — Ability to find a product without knowing that the survey exists.

This is hard. Useful but difficult.
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Lessons Learned

• Efficiencies gained from parallel development across different surveys

• Excellent software exists in GBT legacy

• Access to individual software pieces allows rapid development of pipelines:
  • ON/OFF pairs
  • Logging
  • Weather
  • Spectroscopic transforms