FASR – RHESSI SIMILARITIES

- Both use high-resolution imaging spectroscopy to study high-temperature thermal and non-thermal electrons on the Sun.
- Both use indirect (Fourier-transform) imaging.
- Both have similar primary data products (light curves, spectra, images, dynamic spectra…)
- Both rely on comparisons with other data sets to achieve much of their science.
- Both must reach out to a user community that is largely unfamiliar with image reconstruction techniques.
- Both offer the user exceptional flexibility in choosing time-resolution, energy/frequency-resolution and imaging parameters.

RHESSI APPROACH TO DATA ANALYSIS SOFTWARE

- Users and RHESSI team have equal access to all data products and tools
- Some standard quicklook products (eg lightcurves, images, flare lists, etc)
- Most analyses begin with automatically-generated level-0 database
- Object-oriented IDL code
- Support for both Windows and UNIX platforms
- Distribution via Solar SoftWare (SSW) system (NASA / GSFC)
- User interface options (all based on same analysis code)
  - Object-oriented IDL commands
  - Graphical User Interface
  - Web-based access to basic analysis tools via HEDC (Zurich)
  - Web-based access to quick-look products
- Integrated access to other data sets
- Significant effort to reach out to broader user community

STRENGTHS AND WEAKNESSES OF RHESSI DATA ANALYSIS APPROACH

STRENGTHS

- Automated generation of level-0 data base and quicklook products is quick and cost-effective.
- Level-0 starting point preserves flexibility in choosing analysis parameters
- SSW provided a pre-existing framework for development and an effective mechanism for propagating software/calibration updates
- Solar community is quite familiar with SSW and IDL analyses
- Encourages user-generated software modules

WEAKNESSES

- It takes longer to generate than to retrieve an image
- User-generated maps/spectra have potential for misinterpretation
- Frequent software updates can make for an unstable analysis environment
- Users are vulnerable to single-source characteristics of IDL $oftware
- Relies on ‘goodwill’ of many software developers

IMPLICATIONS FOR FASR ANALYSIS SOFTWARE

- FASR task differs from RHESSI in important respects
    - Much larger data volume (> 100 Gbytes / day for FASR vs ~2 Gbytes / day for RHESSI)
    - Time-dependent calibration parameters (eg atmospheric phase)
    - More diverse user community and data product requirements
        - Real time output for space-weather now-casting
        - Prompt, standard, well-calibrated data products (eg coronal field maps)
        - Support for user-defined analyses
- RHESSI approach may not necessarily be the optimum one for FASR.
- Lessons that might be learned from RHESSI
    - Importance of user-transparent or automated generation of data products
    - Use of a common analysis kernel for diverse data products and user interfaces
    - At user level, support for both Windows and UNIX platforms
    - Early initiation of documentation and user outreach activities
    - Importance of integration of other data sets
    - Encouragement of user-generated analysis tools