The Antelope Toolbox for Matlab

New Mexico Tech

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Established Antelope Interfaces

- Command-line
- C
- Fortran
- Perl
- TCL/Tk
- PHP
- Python

Antelope Toolbox for Matlab

- 12,000+ lines of code
- Publicly available
  (Antelope contributed code distribution)
- 1997 – 2009
- Representative hierarchy of Antelope Tools
- Datascope Database Interaction in Matlab
  - Notably CSS3.0
- Orb interactions
- parameter-file interactions
- Etc. (Response files, stock functions)

ATM History

- Originated 1997 Chicago “FISSURES” meeting
  - Seeking common seismology software framework
- Spurred by comment from Danny Harvey
- Matlab MEX-file connection to Antelope libraries
  - (grassroots approach to software interoperability)
- Four generations
  - Initial foray (two functions, 1 wkend coding)
  - Rough datascope support (2 wks coding; 1 yr light use)
  - Interface solidification (off-hrs coding, used for test projects)
  - Current version (widespread usage)

ATM Availability

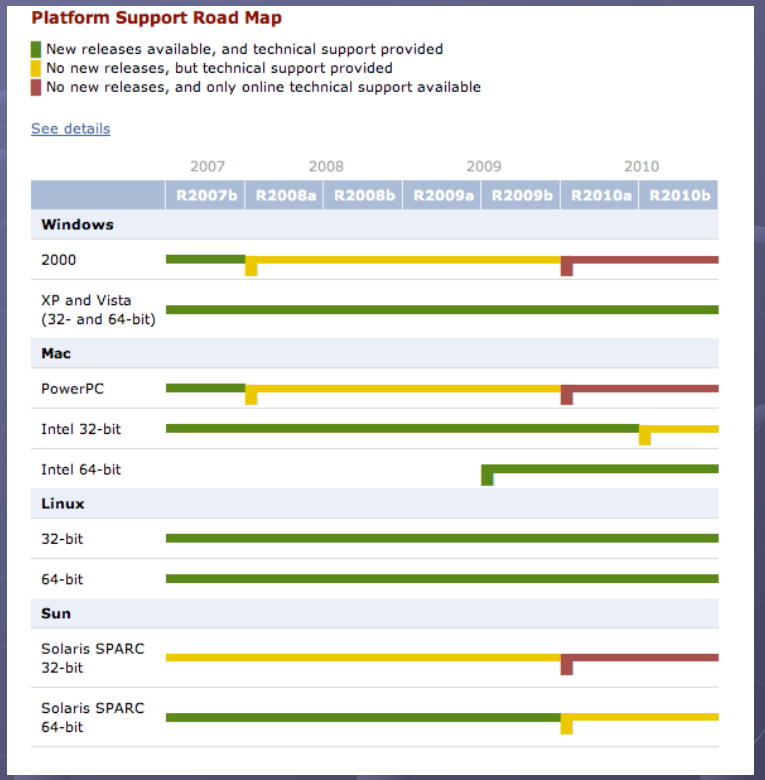
- Antelope contributed-code repository
  - http://github.com/antelopeusersgroup/antelope_contrib/tree/master
  - Git clone git://github.com/antelopeusersgroup/antelope_contrib.git contrib
  - src/contrib/data/matlab/antelope
- Compiled along with Antelope 4.11
  - Version 7.8 (at least on Mac)
  - Version skew => need to recompile

ATM Installation

- cd $ANTELOPE/src/contrib/data/matlab
- setenv MATLAB ….
- make
- make install
- Test
  - (instructions coming…)

ATM Platform Compatibility

- Antelope: 32-bit
- OS: 32-bit support
- Matlab: needs 32-bit also



http://www.mathworks.com/support/sysreq/roadmap.html

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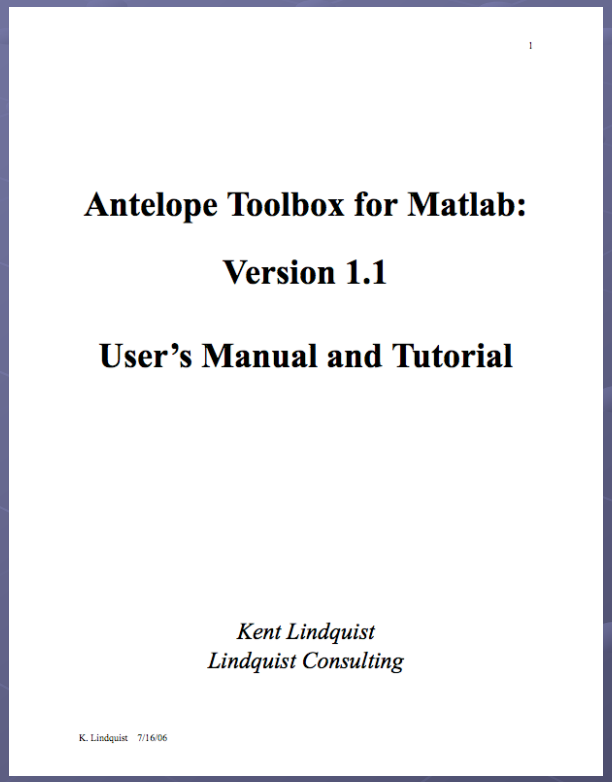
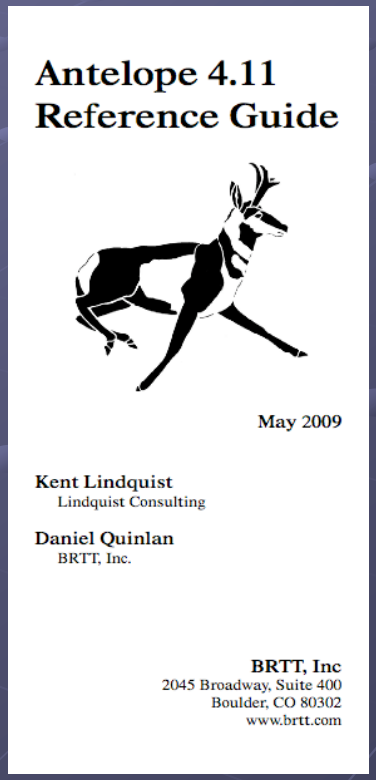
ATM Startup

- Easiest:
  - >> run '/opt/antelope/4.11/data/matlab/antelope/scripts/setup_antelope.m'
- Basic idea:
  - addpath([getenv('ANTELOPE') , '/data/matlab/antelope/antelope']);
  - addpath([getenv('ANTELOPE') , '/data/matlab/antelope/scripts']);
  - addpath([getenv('ANTELOPE') , '/data/matlab/antelope/examples']);
  - addpath([getenv('ANTELOPE') , '/data/matlab/antelope/user']);
- Requires $ANTELOPE to be set
- Can use
  - pathdef.m
  - startup.m
  - See Matlab documentation

ATM Tutorial

- $ANTELOPE/doc/matlab/Antelope_Toolbox_for_Matlab.pdf
- $ANTELOPE/doc/antelope_refguide.pdf





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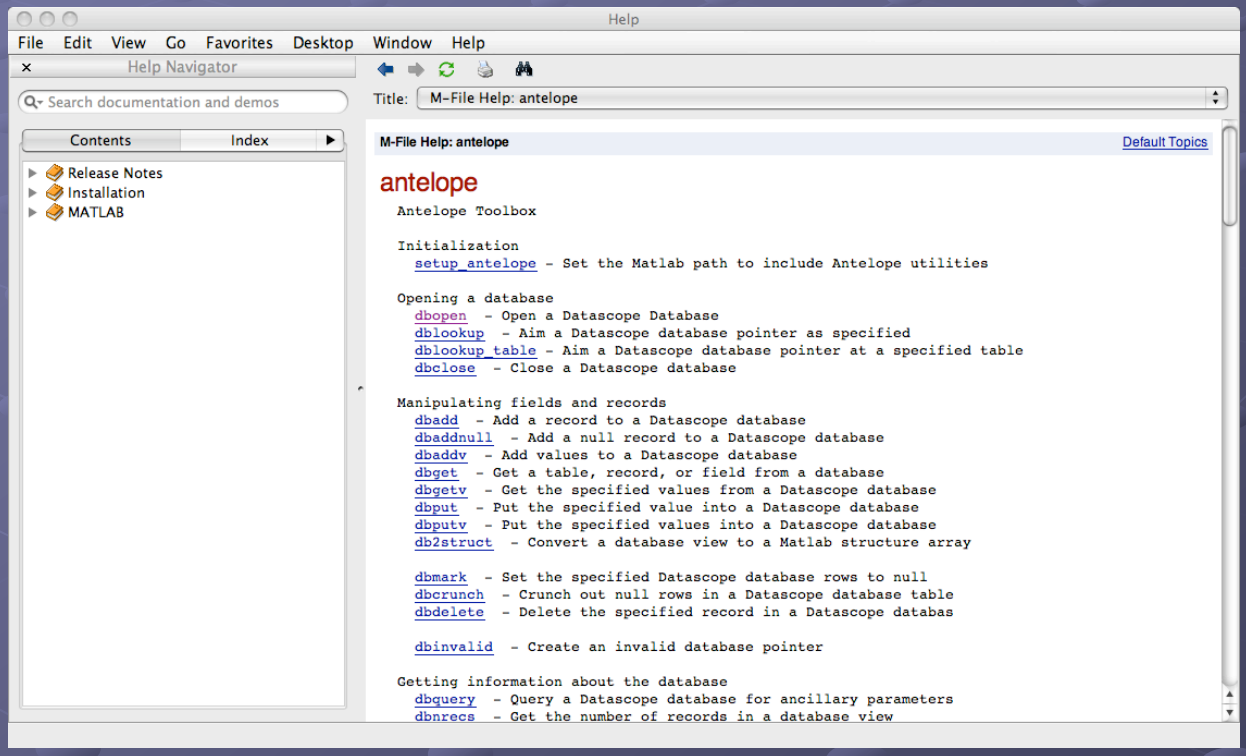
ATM Help

- >> help antelope
- >> helpwin antelope
- >> doc antelope



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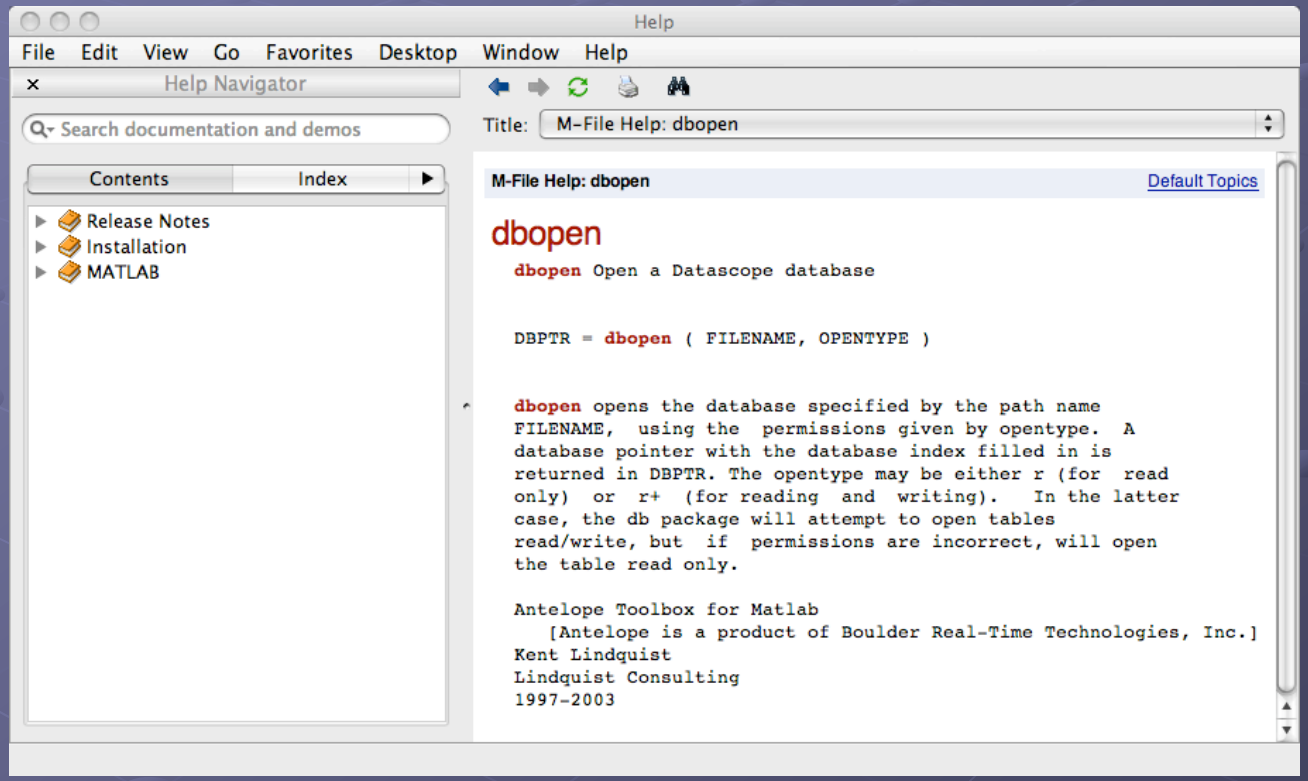
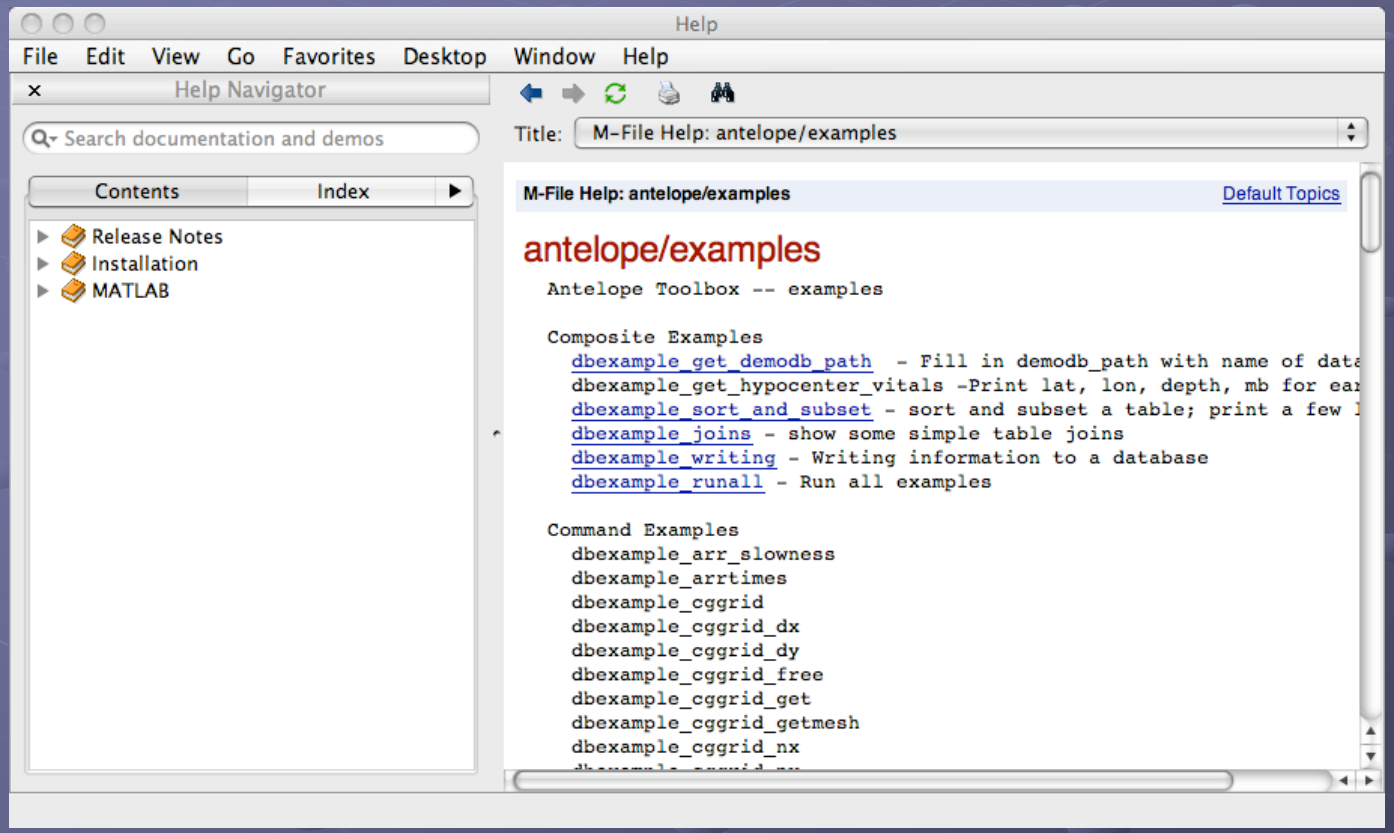
ATM Help

- >> doc dbopen



ATM Examples

- >> help antelope/examples



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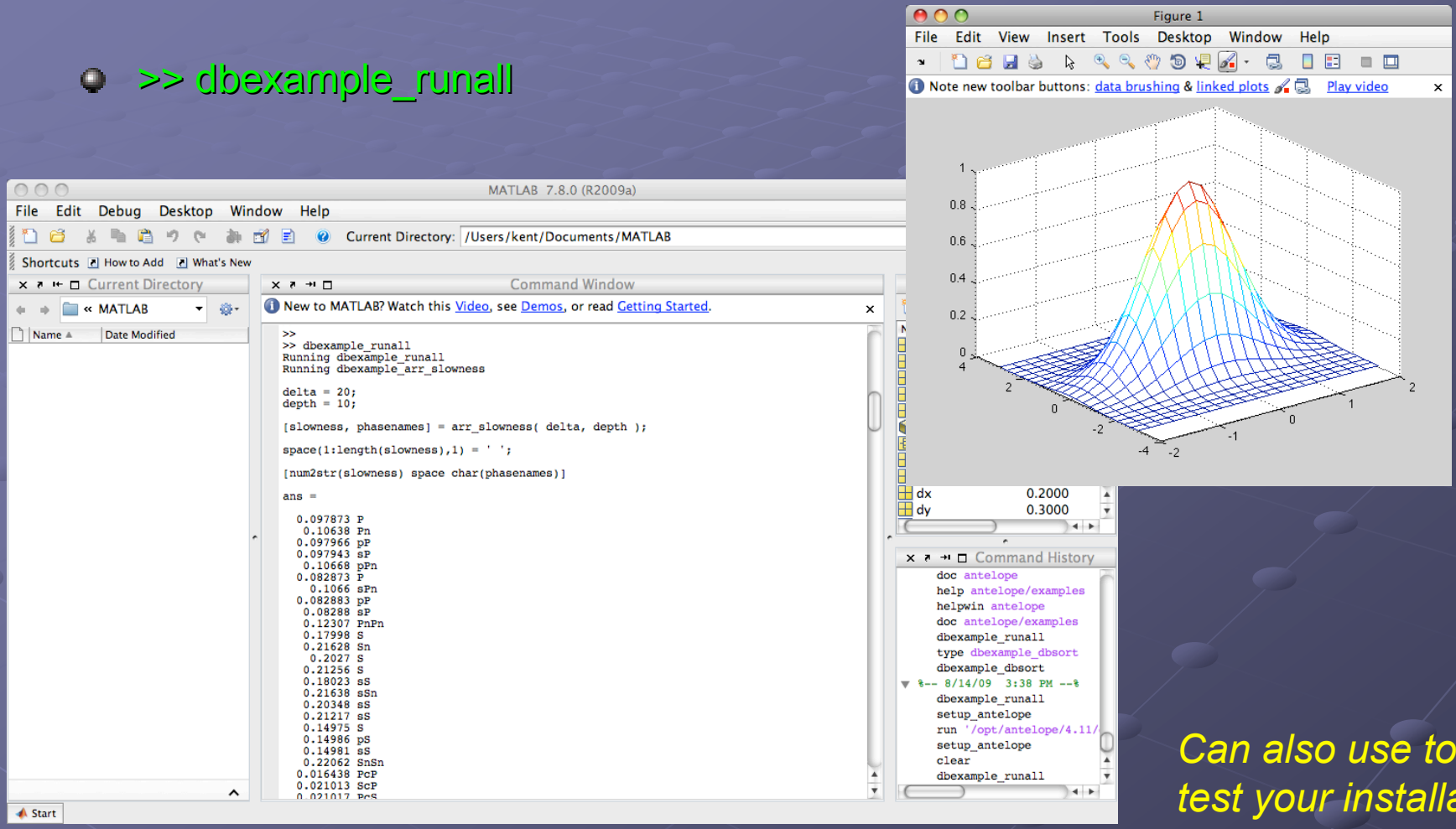
ATM Examples

- >> dbexample_runall



Can also use to test your installation

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ATM Examples

```
>> type dbexample_dbsort
display('Running dbexample_dbsort')
dbexample_get_demodb_path;
echo on
db = dbopen( demodb_path,'r' );
db=dblookup_table( db,'origin' );
db=dbsubset( db,'mb>6.3' );
db=dbsort( db,'mb' )
dbgetv( db,'mb' )
dbclose( db );
echo off
>>
```

ATM Examples

- >> dbexample_dbsort
- display('Running dbexample_dbsort')
  Running dbexample_dbsort

- dbexample_get_demodb_path;
- display('Running dbexample_get_demodb_path')
  Running dbexample_get_demodb_path
- demodb_path = '/opt/antelope/data/db/demo/demo'
- demodb_path =
  /opt/antelope/data/db/demo/demo
- echo on

- db = dbopen(demodb_path,'r');
- db=dblookup_table(db,'origin');
- db=dbsubset(db,'mb>6.3');

- db=dbsort(db,'mb')
- db =
- database: 1
- table: 42
- field: -501
- record: -501

- dbgetv(db,'mb')

- ans =

- 6.3100
- 6.4000
- 6.4000
- 6.4200
- 6.5000
- 6.5700

- dbclose(db);

- echo off
- >>

ATM Special Properties

- Matrix orientation for dbgetv ‘column’ retrieval:

```
db=dbsort( db,'mb' )
db =
    database: 1
      table: 42
      field: -501
     record: -501

dbgetv( db,'mb' )

ans =

   6.3100
   6.4000
   6.4000
   6.4200
   6.5000
   6.5700
```

ATM Special Properties

- Db2struct:
- db = dblookup_table(db, 'origin');
- db.record=0;
- % Example 1:
- db2struct(db)

- ans =
- lat: 40.0740
- lon: 69.1640
- depth: 155.1660
- time: 7.0437e+08
- orid: 1
- evid: -1
- jdate: 1992118
- nass: 7
- ndef: 7
- ndp: -1
- grn: 715
- srn: 48
- etype: '-'
- review: ''
- depdp: -999
- dtype: 'f'
- mb: 2.6200
- mbid: 1
- ms: -999
- msid: -1
- ml: -999
- mlid: -1
- algorithm: 'locsat:kyrghyz'
- auth: 'JSPC'
- commid: -1
- lddate: 790466871

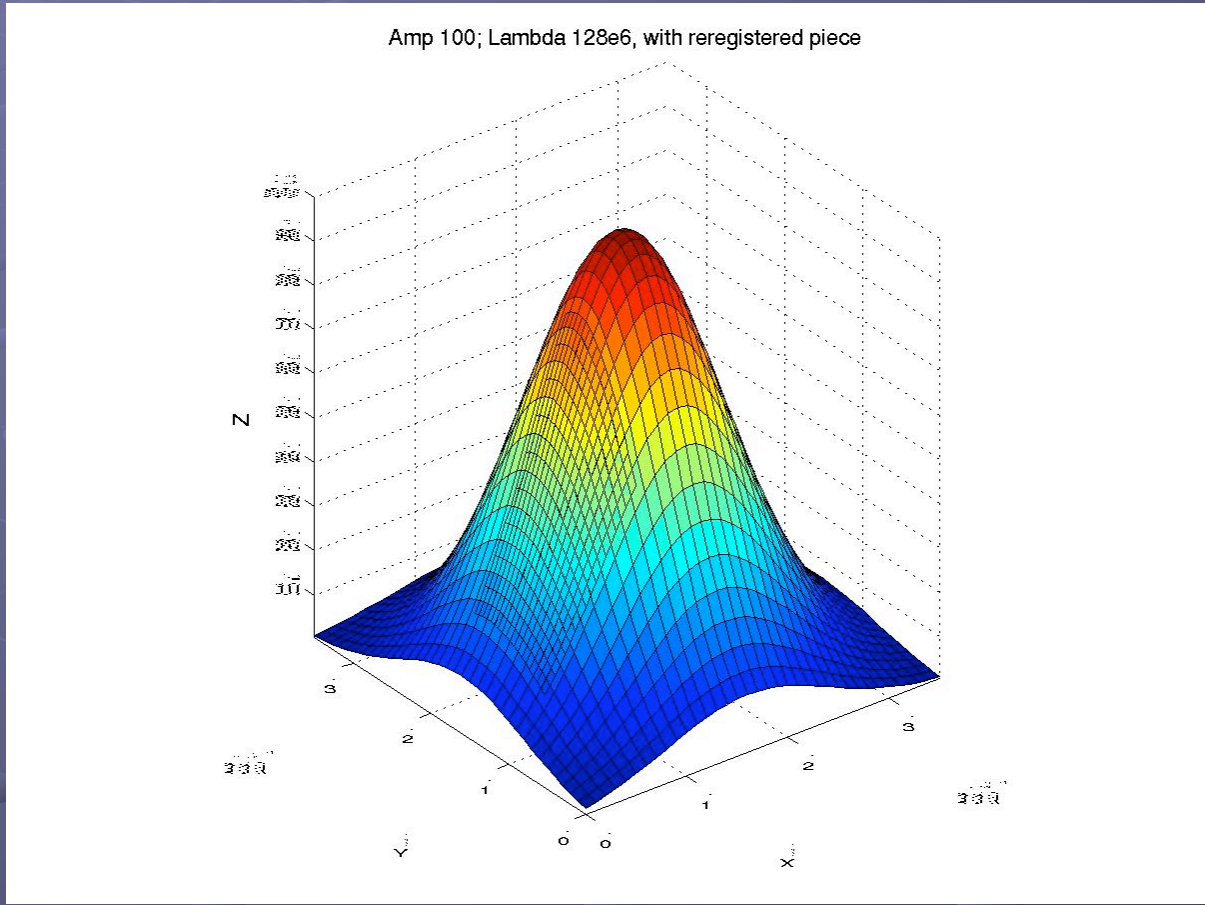
- dbnrecs

ATM Types of routines

- Datascope database interaction
- Basic orbserver interaction
- Instrument response routines
- Parameter files
- Error handling
- Special functions (travel times, time conversion, misc)
- Computational Geometry routines

Libcgeom: various utilities

for example:
re-registration of grids,
Interpolation,
Generic functions



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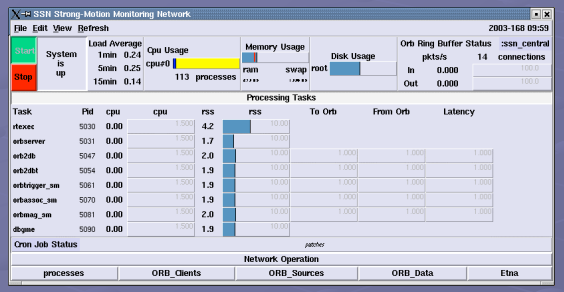
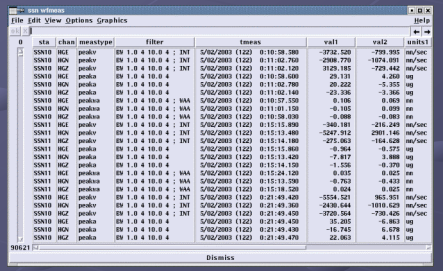
Ground-motion monitoring tools



Orbserver

orbwfmeas

wfmgme table



dbgme

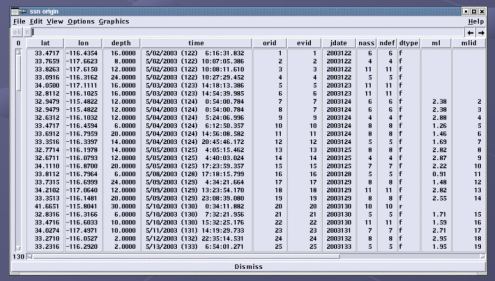
orbdetect

orbtrigger

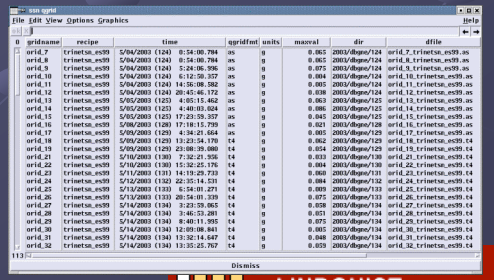
orbassoc

orbmag

origin table



gme1.0: qgrid table



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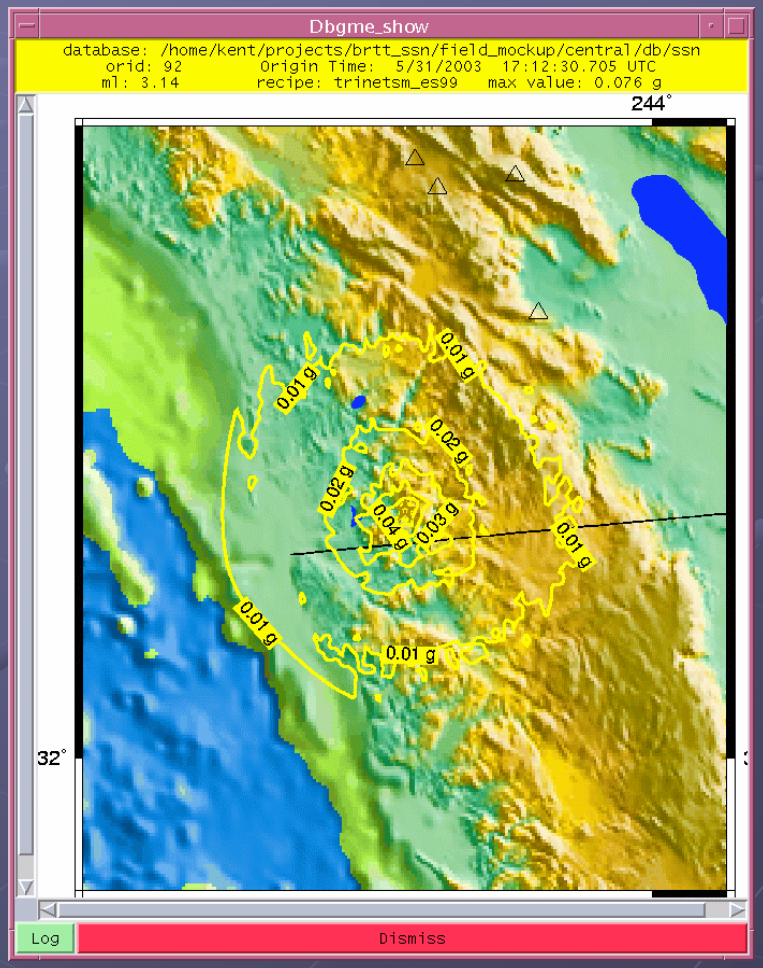
Ground-motion Estimation

Peak Ground Acceleration

Trinetsm_es99 delegate

May 31, 2003
17:12 GMT
ML 3.14
Max 0.076 g
Lat 32.6513
Lon -116.7682



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Ground-motion from an Earthquake Empirical/Theoretical Hybrid

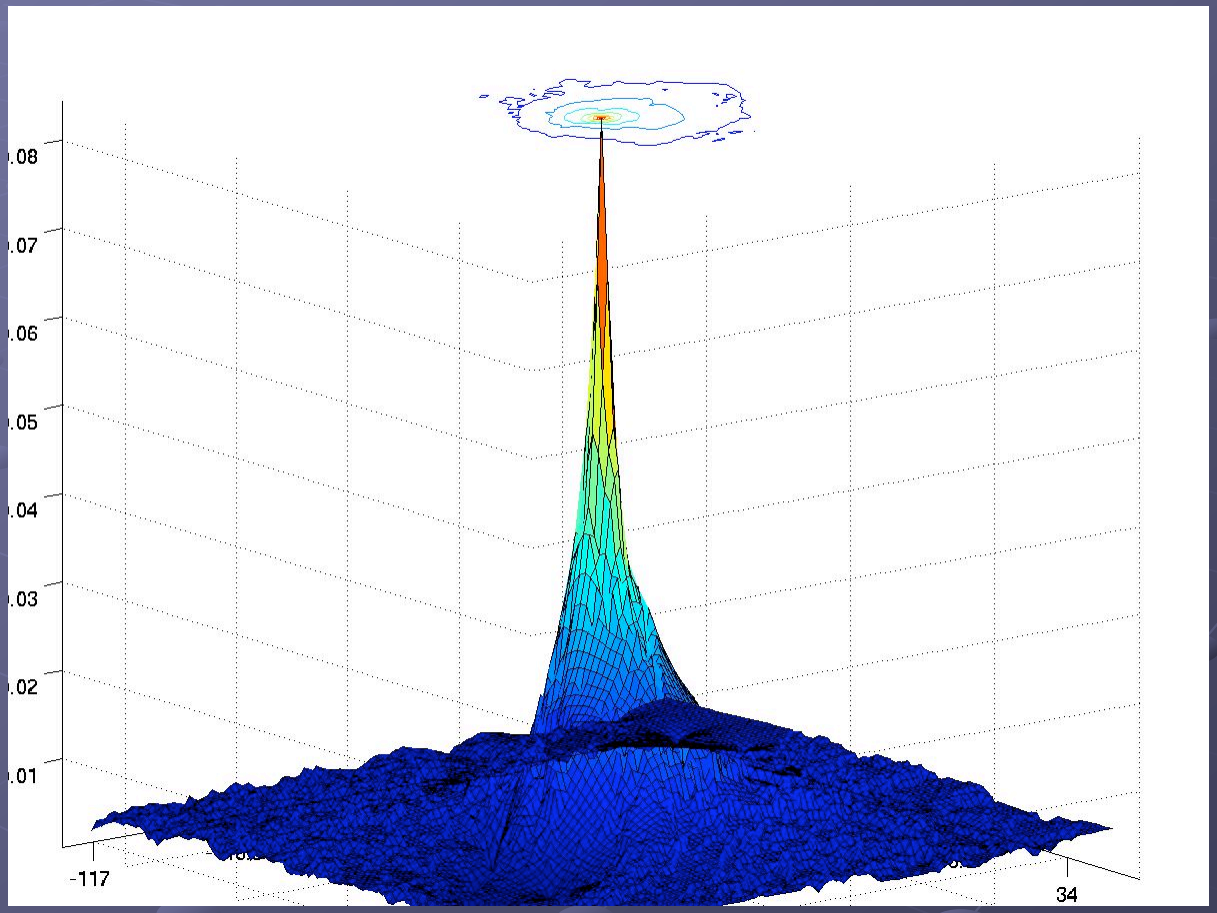
May 12, 2003
22:35 GMT

ML 2.95

Max 0.084 g

Lat 33.2710

Lon -116.0527




```
db=dbopen('ssn','r');
db=dblookup(db,'','qgrid','orid','24');
cgg=cggrid(dbfilename(db));
[x,y,z]=cggrid_getmesh(cgg);
mysurfc(x,y,z)
```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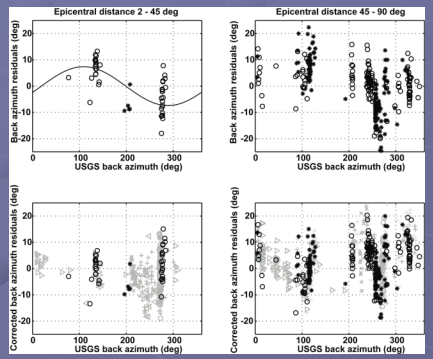
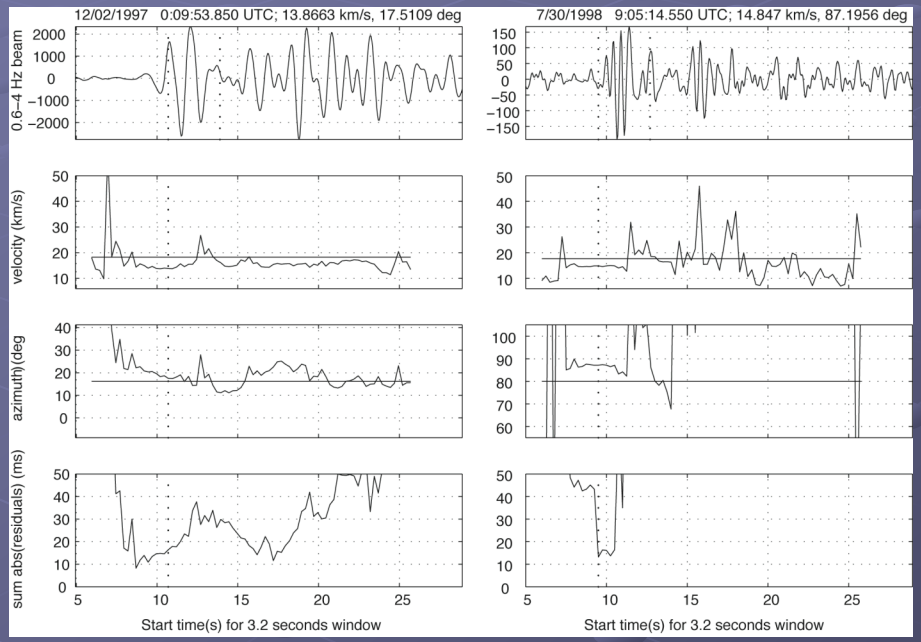
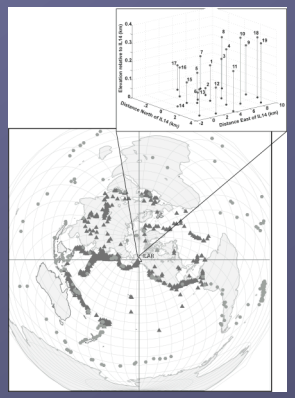
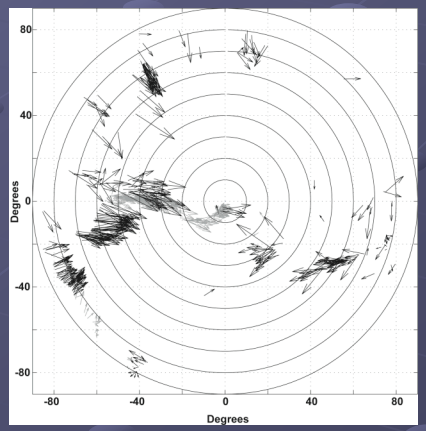
Research with ATM









- *Lindquist, Tibuleac, Hansen BSSA 2007*

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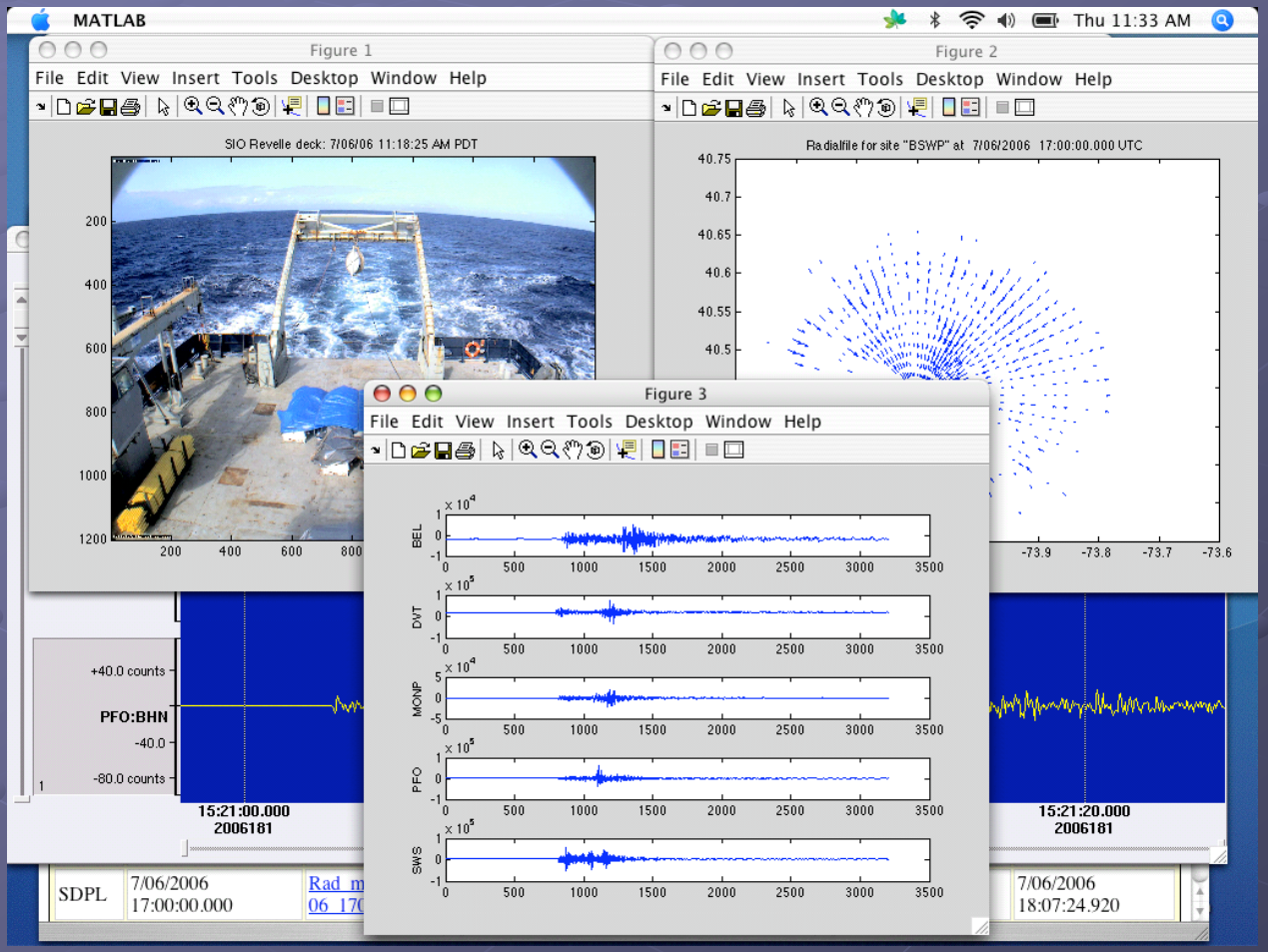
LOOKING (UCSD) 2006 multidisciplinary demo

Antelope acquired Image data



Antelope acquired HFRadar data

Datascope Seismic Data

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Future Directions

- Mature interface
- Low-level support as public service by LCI

Exercises

- Explore capabilities of toolkit
- *All questions welcome ! …*
- Caveat:
  - No promises to solve all programming problems…
  - No promises to solve all *Antelope* programming problems…
  - Focus is on what's in the toolkits