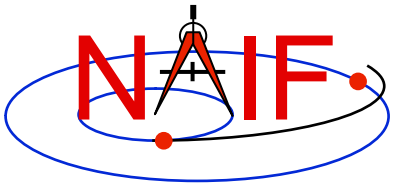


Navigation and Ancillary Information Facility

What's Up at NAIF?

Chuck Acton

August 2010

Rev. 1

SPICE in Mission Operations

Navigation and Ancillary Information Facility

- **Ongoing**
  - **With NAIF participation:**
    - » **Odyssey, MER, MRO, Cassini, Dawn, Stardust/NExT, EPOXI, MESSENGER, New Horizons, MEX, VEX, Rosetta**
  - **Without NAIF participation**
    - » **LRO, Spitzer, Kepler, WISE, STEREO, IBEX?, Planck?, VCO*, (and some others)**
- **Upcoming**
  - **With NAIF participation:**
    - » **MSL, Juno, PhSRM, Yinghuo-1, MAVEN, Grail, LADEE, SMAP, Mars 2016, Mars 2018 (?), JEO**
  - **Without NAIF participation:**
    - » **BepiColombo, JGO, more JAXA, more RSA, more ISRO (?), more ESA (?)**

* Have applied to ROSES for “Participating Scientist” funds

Node Archive Operations

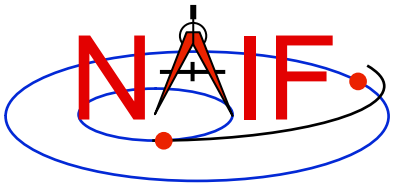
Navigation and Ancillary Information Facility

- **Incremental archives for "regular" NASA missions are up to date**
  - **Odyssey, MRO, Cassini, MER, MESSENGER, New Horizons**
- **Incremental archives for "occasional" missions are up to date**
  - **EPOXI, Stardust/NExT, Dawn**
- **Archive chunks for ESA's ongoing missions:**
  - **accepted (only 1st increment) for MEX (behind schedule)**
  - **need fixes for VEX and Rosetta (behind schedule)**
- **Archives done for Clementine, VO, DI, MGS, DS-1, EPOCH, Hayabusa**
- **Restoration is "ongoing" for MGN, Galileo, and probably some more for Voyager**
  - **Prognosis is TBD**

Node Archive Services

Navigation and Ancillary Information Facility

- Archived SPICE data are best gotten through the NAIF Node website, as opposed to the central catalog
- "FURNSH kernels" are now provided for all data sets
  - Provides aggregations of all needed kernels for a specified period of the mission
- A data set "subsetting service" was added to the NAIF server
  - Allows selection of a subset of a data set based on time
  - Creates a corresponding "furnsh kernel"
  - Creates a Unix wget download command



Node Backup Arrangements

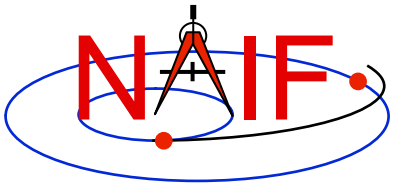
- **NAIF has made one submittal of archived data sets to the NSSDC**
  - **Time for another is at hand**
- **GEO has agreed to serve as a hot backup for archived SPICE data and the corresponding portions of the NAIF website**
  - **Have provided needed facilities**
  - **NAIF needs to set up the system at GEO**
- **Regular testing of NAIF's on-line archives**
  - **Checksum computed and tested every week–all ok so far**

SPICE Ops at Other NASA Centers

Navigation and Ancillary Information Facility

- **APL: Ops and archiving going well**
  - **MESSENGER and New Horizons**
- **GSFC: Problems with ops and archiving**
  - **LRO**
  - **For MAVEN, NAIF and LASP will do the SPICE job**
- **AMES: Problems with ops and archiving**
  - **LCROSS**

  (For LADEE, Ames promises better results

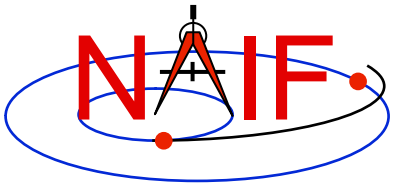


International SPICE - 1

- **European Space Agency (ESA)**
  - SPICE mission ops are mostly ok (MEX, VEX, Rosetta)
  - SPICE archiving needs more attention
  - We presume SPICE will be used on BepiColombo, Mars 2018
- **India (ISRO)**
  - Poor SPICE ops on Chandrayaan-1
    - » Much good data cobbled together by M**3 team
    - » No sign of an archive so far
- **Russia (RSA)**
  - Work appears to be going pretty well for Phobos GRUNT

International SPICE - 2

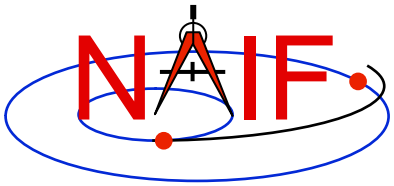
- Japan (JAXA and more)
  - A Hayabusa archive finally got completed
    - » Required much help from Boris
  - Think there is SPICE data for SELENE being archived
  - Intended for full use on Venus Climate Orbiter (Akatsuki)
    - » NAIF has just submitted a proposal to ROSES for financial support to help (better) train all Japanese parties
- China (CSSAR,CSA)
  - Introduction to SPICE presented in July
  - CSSAR subsequently decided they want to use SPICE on Yinghuo-1 and beyond
  - NASA's current "no training" stance makes further and timely progress a question



SPICE and IDPA

- The “ancillary data project” started a year ago made little progress
  - Due to no Acton action
- Has been put on “sleep status” for this year
- Possibly resurrected a year from now?

- In the meantime, the IPDA “recommends use of SPICE for ancillary data”



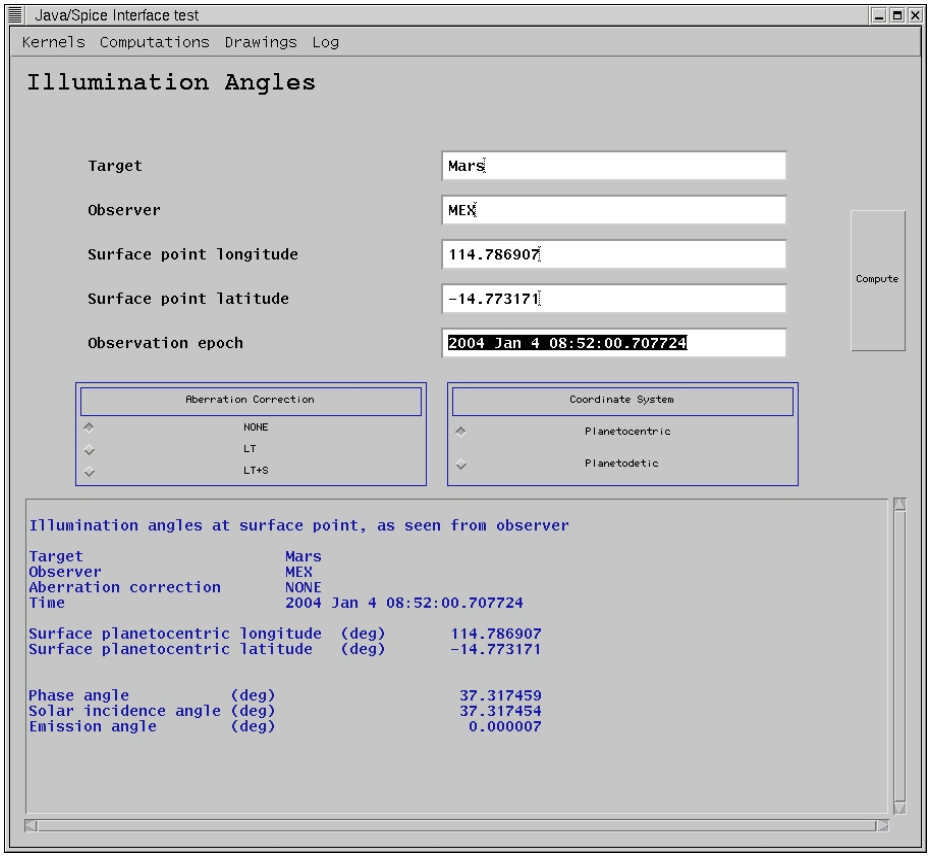
Core SPICE Development - 1

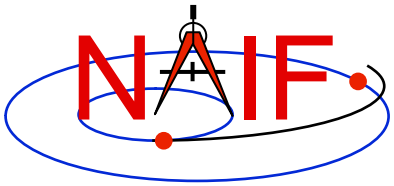
- Working towards completion of a Java Native Interface version of the SPICE Toolkit (JNISpice)
- Python Toolkit (PySpice) work on hold but will eventually be re-started
- Working on two new shape model capabilities
  - Tessellated plate model, for small irregularly shaped objects
    - » Partial capability has been demonstrated using Lutetia, Steins and Phobos
  - Digital elevation model (DEM)
- "Geometry finder" subsystem
  - Find time(s) when geometric condition exists
  - Much capability now in official Toolkit (N63/N64)
  - Some more still to be added

Core SPICE Development - 2

Navigation and Ancillary Information Facility

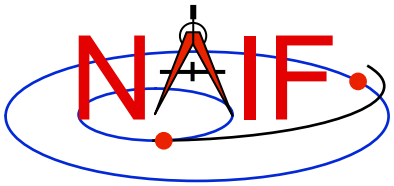
- **Web-based geometry engine: "Web Geocalc"**
  - **Ames (Trimble's group) is on-board to do most of the development, starting in FY11**
  - **(Funding is from AMMOS, not PDS)**
- **Should be a useful tool in and of itself**
- **Will serve a bit as a proof of concept for future GUI SPICE tools**





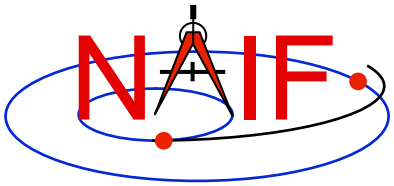
Core SPICE Development - 3

- NAIF must start planning for the eventual disappearance of FORTRAN as its base language
- What to do, when, and how are all questions
- May get some AMMOS funding to help



Training Curriculum

- **NAIF has decided training should be broken into as many as four "classes"**
  - **SPICE beginners class**
    - » **A shortened, simplified version of the current "User's Class"**
  - **SPICE advanced user's class**
  - **SPICE data producers "class"**
    - » **More of a few-on-few deal than a formal class**
  - **SPICE archiving "class"**
    - » **More of a one-on-one deal than a formal class**
- **This would call for a great deal of new and changed tutorials and programming lessons**
  - **No time to do it…**



Training Schedule

- No classes of any sort are currently scheduled
- Should the next domestic class occur on the east coast (near GSFC and APL)?
- Should NAIF refrain from teaching further classes until at least a revised “Beginner’s Class” curriculum is set?

Issues

- **Need increased staff: too much work and some real mission ops risk at present**
  - **Mitigation: HQS is trying to provide additional funds for another person**
- **Training for SPICE producers is inadequate**
  - **Mitigation:**
    - » **More NAIF staff (see above) could help some**
    - » **Need to increase awareness in both managers and workers of the need to really learn SPICE production/validation skills**
      - **Requires attention and financial resources at production centers**
      - **How to achieve this is ???**
- **Attention to producing high quality SPICE archives is often inadequate**
  - **Mitigation:**
    - » **More nagging**
    - » **???**