PDS Data Review –Tony Farnham

# Documentation pertaining to Shape model products generated from the Double Asteroid Redirection Test (DART) Mission

May 13, 2022

# Data Set

- Two Documents supporting the shape model data set
    - Explanation of how coordinate systems are to be defined
    - Software Interface Specification (SIS)

# Coordinate system for Didymos and Dimorphos

- Document issues

  - Not sure whether this is a long-term document
    - Should be replaced by the description of the coordinate systems
    - Will this be kept as Version 1?

  - Remove instances (2) noting that the positive pole will informally be referred to as North

# Coordinate system for Didymos and Dimorphos

- Questions about proposed applications

  - Didymos PM
    - Will the Naidu (2020) reference point be illuminated and in the 1/3 of the asteroid that will be imaged at high resolution?

  - Dimorphos PM
    - If it is tidally locked, then this is simply the sub-Didymos point
    - Will this point be imaged?  Isn't it on the limb and beyond the terminator?
    - How do you deal with evidence of complex rotation/libration?
      - E.g., long axis not pointed at Didymos

  - Shape and COF of Dimorphos
    - Might be useful to include a caveat that the information will depend on the coverage from DRACO and LICIAcube and may be incomplete

# Coordinate system for Didymos and Dimor

- Typos
  - "Such data allows resolving surface features on of ~10 m on Didymos and ~2 m (but not all objects of this scale)."   Numerous problems …

  - "… structures to which the location of prime meridian can be defined relative to."
    --> "… structures relative to which the location of the prime meridian can be defined."

# SIS

- Update Daly et al reference if possible (published?)
- page 10-11:
  - Talk about providing average tilt information and relative tilt information.  But these sound like they are dependent on what the user wants for the average.  Is this actually being provided, or is it simply defining how the user would compute it from what is provided (normals and radial vectors)
- Table 3 title:  "Altimetry" ????
- Page 13:
  - Naming convention list has two underscores in a row (between "mm" and SDP area
- Tables 4 and 5
  - Value column says "example values in parentheses", but there are some that are obviously examples that are not in parens
  - Coordinates given to 13 decimal places??

# SIS

- Table 5
  - Secondary header:
  - Axis descriptions don't match what's in the data files
  - Formats are given as "E16.0"
  - The XML headers in the data set list a data type of IEEE754MSBSingle which is single precision

- Page 34: Definition of the shape model coordinates
  - "the +z axis along the direction of the smallest moment of inertia nearest the right-handed rotation axis"
  - Presumably this is not in conflict with the rotational frame, but is accounting for wobble or libration?

- Sec 5.2.6
  - BODY920065803_POLE_RA says "and first order and second order time dependence of declination"
  - Presumably this should be "Right Ascension"

# SIS

- Typos and suggested changes
  - Page 7:
    
    "The effects of Dimorphos pull on Didymos "
    
    --> "The effects of Dimorphos' pull on Didymos "
    
    " entire surface of either Dimorphos and Didymos"
    
    --> " entire surface of either Dimorphos or Didymos"
    
    "distance of a few 15 cm or better."
    
    -->  distance of 15 cm or better."

# SIS

- Page 9

  "surfaces of Dimorphos and Didymos are taken to slowly create"
  --> remove "slowly"

  "the tilts of a piece of asteroid surface imagined at multiple emission"
  --> "imaged at"

- Page 10

  "With surface terrain models in hand, it is now possible to compute"
  --> "With surface terrain models in hand, it is possible to compute"

- In example of starting lines on page 34

  "The x, y, and z components of the vertices precede the letter 'v' ..."
  --> the components in the data table follow the letter 'v'