

Hera International Workshop
Oct. 10-12th, 2023
ESTEC, Erasmus auditorium

10 October

Session 1: Hera Spacecraft, Payload, and Science status

- 10:00 Introduction, Logistics (M. Küppers)
- 10:05 DART outcome (A. Rivkin, O. Barnouin)
- 10:30 Hera status (I. Carnelli)
- 10:50 Hera spacecraft (S. Voegt)
- 11:05 Hera Science update (P. Michel)
- 11:20 AFC update (J.-B. Vincent)
- 11:30 Hyperscout update (J. de Leon)
- 11:40 TIRI update (T. Okada)
- 11:50 PALT update (P. Gordo)
- 12:00 RSE update (P. Tortora)
- 12:10 Milani update (M. Cardi, T. Kohout, E. Palomba, F. Ferrari)
- 12:25 Juventas update (O. Karatekin, A. Herique)

12:40 Lunch

Session 2: Rapid Apophis Mission for SEcurity and Safety (RAMSES)

- 14:00 RAMSES Overview and status (P. Martino)
- 14:20 JHU APL potential contributions to RAMSES: a high-heritage Narrow-Angle Camera for asteroid exploration and a novel flyby mass experiment (O. Barnouin, R. Ballouz)
- 14:30 Seismometer to Investigate Interior Asteroid Structure (SIAS, K. Walsh)
- 14:35 An innovative InterSatellite Link (ISL) transceiver for the RAMSES mission (P. Tortora)
- 14:40 A compact seismometer for RAMSES (N. Murdoch)
- 14:45 Investigating Aphophis Gravity Field and Tidal Deformation by Tracking Artificial Particles (P. Panicucci, F. Ferrari)
- 14:50 Monostatic and bistatic sounding of Apophis from cubesats (A. Herique)
- 14:55 Requirements on optical and spectral observations of Apophis (T. Kohout, O. Karatekin)
- 15:00 Thermal Imager TIRI for RAMSES (T. Okada)
- 15:05 Potential use of the flight-spare of OCAMs-MapCam from OSIRIS-ReX for RAMSES (B. Rizk)
- 15:10 Discussion

15:30 Coffee break

Session 3 : Ground-based observations (WG 2)

- 16:00 Report on modeling from the 2022-2023 observations + Lessons from previous fainter apparitions 2015-2021 (P. Pravec)
- 16:30 Planning mutual event observations in the next apparition (June 2024-March 2025) (P. Pravec)

- 16:45 Stellar occultation observations in 2022-2023 and plans for 2024 (D. Souami)
- 17:30 VLT/XSHOOTER spectra of Didymos around the DART impact (J. de León)
- 17:40 Ground-based characterization of Didymos with the TNG (S. Ieva)
- 17:50 Context of formation of satellites among taxonomies (K. Minker)
- 18:00 Adjourn

- 19:00 Cocktail dinner at ESTEC

11 October

Session 4: Impact modeling and experiments (WG 1)

- 09:00 Introduction (K. Wünnemann)
- 09:10 Momentum Enhancement β in a variety of targets, including crushed basalt, with comparison to DART (J. Walker)
- 09:26 Impulse coupling measurement of metallic and carbon targets during laser ablation with ballistic pendulum experiment and simulation (Le Bras)
- 09:42 The capacities of the Experimental Projectile Impact Chamber (EPIC) at Centro de Astrobiología (CAB), INTA-CSIC, Spain, in support of the DART-Hera mission (J. Ormö, I. Herreros)
- 09:58 Validation of ejection processes of large boulders in impact experiments (R. Luther)
- 10:14 Numerical simulations for impactor hitting on large boulder of rubble-pile asteroid - the effects for the kinetic impact test (K. Dai, M. Zhou)

- 10:30 Coffee Break

- 11:00 Interactions between impactor and boulder geometry in a DART-like impact (K. Kumamoto)
- 11:16 Physical properties of asteroid Dimorphos as derived from the DART impact (S. Raducan)
- 11:32 Late stage crater evolution and ejecta re-accumulation (M. Jutzi, Della Mogli, S. Raducan)
- 11:48 Feasibility of WCSPH Adaptations in Spheral to Achieve Long Run-Out Times (E. Bjonnes)
- 12:04 Discussion/conclusions (S. Raducan, M. Jutzi, K. Wünnemann)

- 12:15 Lunch

Session 5: Dynamics and physical properties modeling (WG 3)

- 14:00 General Presentation of WG 3 (A. Campo-Bagatin, M. Tsiganis, S. Charnoz)
- 14:10 Dynamical problems in the frame of the Hera mission (M. Tsiganis)
- 14:15 Summary of results from the DART Dynamics working group and handoff to Hera (D. Richardson)
- 14:25 Details on expected post-impact dynamics of the system (H. Agrusa)
- 14:35 Dynamics and Modeling of the Full Two-Body Problem (D. Scheeres)

- 14:45 Perturbative treatment of the post-impact dynamics of Dimorphos (M. Gaitanas, M. Tsiganis, I. Gkolias)
- 14:55 Discussion
- 15:10 Effects of ejecta in the system (re-impacts, material in orbit?)(S. Charnoz)
- 15:15 Is/was mass shedding due to the primary fast spin possible? (N. Trógo)
- 15:25 Morphology of Ejecta after DART impact and implications for Hera (F. Ferrari)
- 15:35 Long term modelling of boulders dynamics around the Didymos-Dimorphos system (K. Langner, A. Rossi, F. Marzari)
- 15:45 Could Didymos harbor material? A study of long-term dynamics in Didymos and Dimorphos system (G. Madeira, S. Charnoz)

- 15:55 Coffee Break

- 16:25 Dynamics around the Didymos system (X. Fu, S. Soldini)
- 16:35 Spatial periodic motion of a spacecraft in the environment of Didymos-Dimorphos (G. Voyatzis et al.)
- 16:45 Questions/Discussion
- 17:10 Adjourn

12 October

Session 5: Dynamics and physical properties modeling (WG 3), continued

- 09:00 Looking for the link between gravity field, internal structure and system formation (A. Campo Bagatin)
- 09:05 Direct N-body simulations of Dimorphos's formation and origin of its oblate shape (H. Agrusa)
- 09:15 Dynamical origin of Dimorphos from fast spinning Didymos (G. Madeira, S. Charnoz)
- 09:25 Forming Dimorphos using a combination of SPH and granular N-body codes (J. Wimarsson et al.)
- 09:35 The collisional history of Didymos (A. Campo Bagatin et al.)
- 09:45 Questions/Discussion
- 10:05 Realistic modelling of the internal structure of rubble-piles (P.-Y. Liu et al.)
- 10:15 FFT based method for efficient gravity field computation in wide space regions (M. Pérez-Molina et al.)
- 10:25 Internal structure and cohesion analysis of Dimorphos from gravity field and tides (L. Pou)
- 10:35 Questions/Discussion

- 10:50 Coffee break

Session 6: Data analysis, exploitation and interpretation (WG 4)

- 11:20 Replenishing the sparse data cubes from the near infrared spectral imager Hyperscout-H of the Hera mission (B. Grieger)
- 11:30 3D-GIS + Hera Data Provenance Support: PROVEX (G. Paar)

11:50 Lunch

13:20 The geology and evolution of a the Near-Earth binary asteroid system (65803) Didymos (O. Barnouin)

13:35 Topographic roughness (J.-B. Vincent)

13:45 Boulder size distribution and taxonomy (M. Pajola, F. Tusberti)

14:00 Morphological analyses of surface boulders (A. Duchene)

14:15 Boulder cracks from thermal fatigue (A. Luchetti)

14:30 The bearing capacity of asteroid (65803) Didymos estimated from boulder tracks (N. Murdoch)

14:40 Modeling linear polarization of the Didymos system before and after the DART impact (A. Penttilä)

14:55 Coffee Break

15:25 Investigation of Non-Gravitational Acceleration on a Binary Asteroid for the Hera Mission (M. Kanamaru)

15:35 Application of the ATPM to the Hera mission (S. Jackson)

15:45 Thermophysical Modelling of Binary Asteroid Didymos (G. Henry)

15:55 Characterization of (65803) Didymos - Dimorphos System using the HyperScout - H instrument (M. Popescu)

16:05 ASPECT data products as insight into composition and space weathering (T. Kohout)

16:15 Search for meteorites analogous to Didymos through spectral investigation (G. Massa)

16:25 Impact of ISL and LIDAR operations on gravity science results (E. Gramigna)

16:35 A new method to retrieve internal mass anomalies from small bodies gravity data (A. Caldiero)

Session 7 : Meeting summary, AOB

16:45 Meeting highlights, actions from meeting (P. Michel, M. Küppers)

17:15 Any Other Business, next meeting

17:30 End of Meeting

Science Operations Working Group meeting

13 October 2023

ESTEC, Erasmus auditorium

- 09:00 Introduction (H. Goldberg)
- 09:05 Hera Mission Operations Centre Update (S. Lodirot)
- 09:15 Hera CMOC update (J. Coheur)
- 09:25 Cubesats Flight Dynamics and Science Operation Center update (P. Annat)
- 09:35 Hera SPICE and Cosmographia update (A. Escalante)
- 09:45 Hera Scientific payload calibration update (G. Kovacs)
- 10:00 Payload data interface into 3D GIS (G. Paar)
- 10:15 Deimos observation opportunities with updated Mars fly-by orbit design (S. Sugita)

- 10:30 Coffee break

Cruise phase operations planning

- 11:15 Hera trajectory update (P. Muñoz)
- 11:30 AFC plans for cruise phase (J.-B. Vincent)
- 11:45 Hyperscout-H plans for cruise phase (J. de León, M. Popescu)
- 12:00 TIRI plans for cruise phase (T. Okada)
- 12:15 PALT plans for cruise phase (P. Gordo TBC)
- 12:30 Discussion
- 12:45 AOB, next meeting
- 13:00 Adjourn