

Rationale and Roadmap for Moon Exploration

B.H. Foing and ILEWG team

ESA & ILEWG , Bernard.Foing@esa.int

We discuss the different rationale for Moon exploration. This starts with areas of scientific investigations: clues on the formation and evolution of rocky planets, accretion and bombardment in the inner solar system, comparative planetology processes (tectonic, volcanic, impact cratering, volatile delivery), records astrobiology, survival of organics; past, present and future life. The rationale includes also the advancement of instrumentation: Remote sensing miniaturised instruments; Surface geophysical and geochemistry package; Instrument deployment and robotic arm, nano-rover, sampling, drilling; Sample finder and collector. There are technologies in robotic and human exploration that are a drive for the creativity and economical competitiveness of our industries: Mecha-electronics-sensors; Tele control, telepresence, virtual reality; Regional mobility rover; Autonomy and Navigation; Artificially intelligent robots, Complex systems, Man-Machine interface and performances. Moon-Mars Exploration can inspire solutions to global Earth sustained development: In-Situ Utilisation of resources; Establishment of permanent robotic infrastructures, Environmental protection aspects; Life sciences laboratories; Support to human exploration. We also report on the IAA Cosmic Study on Next Steps In Exploring Deep Space, and ongoing IAA Cosmic Studies, ILEWG/IMEWG ongoing activities, and we finally discuss possible roadmaps for robotic and human exploration, starting with the Moon-Mars missions for the coming decade, and building effectively on joint technology developments.