ESA moves forward with Harmony

February 24 2021

ESA has chosen Harmony, to move to the next phase, Phase-A, of development as the tenth Earth Explorer mission. Harmony is envisaged as a mission with two satellites that orbit in formation with one of the Copernicus Sentinel-1 satellites to address key scientific questions related to ocean, ice and land dynamics. Credit: European Space Agency

Following the selection of three Earth Explorer candidate missions to

enter a first feasibility study in September 2018, ESA has chosen one of the candidates, Harmony, to move to the next phase of development. Harmony is envisaged as a mission with two satellites that orbit in formation with one of the Copernicus Sentinel-1 satellites to address key scientific questions related to ocean, ice and land dynamics.

Earth Explorers are research missions applying new observation techniques to respond to the needs of the scientific community in their quest to understand different aspects of the Earth system and the interactions that bind the system as a whole. Advancing science and technology, they address questions that have direct bearings on societal issues such as the availability of food, water, energy and resources, public health and climate change.

Three concepts, Daedalus, Harmony (formerly called Stereoid) and Hydroterra (formerly called G-Class), have spent the last two years being scrutinized as to their scientific, technical and budgetary feasibility to be ESA's tenth Earth Explorer mission.

This step has now culminated in ESA's Programme Board for Earth Observation (PB-EO) accepting ESA's proposal, based on the recommendation from the Advisory Committee for Earth Observation (ACEO) and its own evaluation that Harmony should be taken forward to the next study phase.

This phase, Phase-A, includes further feasibility assessment after in-depth system definition, including the design of the satellite platform and instruments, flight operations, technology developments and how best to exploit the data.

Josef Aschbacher, Director of ESA's Earth Observation Programmes, said, "Harmony is an exciting concept and we are thrilled to have it moving to the next step for further design consolidation and feasibility

assessment. We expect that a firm decision on full implementation, meaning development through to launch and commissioning, will be taken in autumn 2022 by ESA Member States, upon completion of Phase-A activities."

The Harmony concept comprises two identical satellites that would fly in convoy with a Copernicus Sentinel-1 satellite. Each Harmony satellite is being designed to carry a receive-only synthetic aperture radar as its main instrument. Working together with Sentinel-1's radar, Harmony would provide data to measure small shifts in the shape of the land surface such as those related to earthquakes and volcanic activity, thereby contributing to risk monitoring. It would also allow for the study of 3-D deformation and flow dynamics of glaciers at the rapidly changing marginal zones of the ice sheets for a better understanding of sea-level rise.

Both Harmony satellites would also carry a multibeam thermal-infrared instrument, which in the presence of clouds will enable the measurement of height-resolved cloud movements. In absence of clouds, this multibeam thermal-infrared instrument will measure sea-surface temperature differences.

Harmony would also be the first mission to provide data to improve our understanding of interactions between the air and the ocean surface by providing simultaneous measurements of wind, waves, currents, that together with measurements of sea surface thermal differences and cloud motion will enable an unprecedented view of the marine atmospheric boundary layer.

In essence, Harmony addresses key science questions in several domains. Its observation concept enables unique measurements over timescales ranging from tens of milliseconds (to measure ocean currents) to years (to measure solid Earth surface motion).

Dr. Aschbacher added, "Though the recommendation of ACEO had also included Daedalus as a potential Phase-A candidate, it was not proposed for selection due to strict adherence to the cost constraints established by the PB-EO. Nevertheless, ACEO commended both Daedalus and Hydroterra mission concepts for the exploratory nature of their observations and potentially ground-breaking science objectives.

"ESA plans to explore options to further study the Daedalus concept in a different framework, through potential international cooperation. Meanwhile, some risk-reduction studies will continue on both Daedalus and Hydroterra in order to further mature each concept."

Provided by European Space Agency

Citation: ESA moves forward with Harmony (2021, February 24) retrieved 23 May 2024 from https://phys.org/news/2021-02-esa-harmony.html