

## **The europa initiative for esa's cosmic vision: a potential european contribution to nasa's Europa mission**

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The assessment of the habitability of Jupiter's icy moons is considered of high priority in the roadmaps of the main space agencies, including the decadal survey and esa's cosmic vision plan. the voyager and galileo missions indicated that europa and ganymede may meet the requirements of habitability, including deep liquid aqueous reservoirs in their interiors. indeed, they constitute different end-terms of ocean worlds, which deserve further characterization in the next decade.

esa and nasa are now both planning to explore these ice moons through exciting and ambitious missions. esa selected in 2012 the juice mission mainly focused on ganymede and the jupiter system, while nasa is currently studying and implementing the europa mission. in 2015, nasa invited esa to provide a junior spacecraft to be carried on board its europa mission, opening a collaboration scheme similar to the very successful cassini-huygens approach.

in order to define the best contribution that can be made to nasa's europa mission, a europa initiative has emerged in europe. its objective is to elaborate a community-based strategy for the proposition of the best possible esa contribution(s) to nasa's europa mission, as a candidate for the upcoming selection of esa's 5th medium-class mission

. the science returns of the different potential contributions are analysed by six international working groups covering complementary science themes: a) magnetospheric interactions; b) exosphere, including neutrals, dust and plumes; c) geochemistry; d) geology, including expressions of exchanges between layers; e) geophysics, including characterization of liquid water distribution; f) astrobiology. each group is considering different spacecraft options in the contexts of their main scientific merits and limitations, their technical feasibility, and of their interest for the development of esa-nasa collaborations. there are five options under consideration:

- (1) an augmented payload to the europa mission main spacecraft itself.
- (2) a free-flyer released from the main craft and staying on a jupiter orbit.
- (3) a small autonomous satellite injected into europa orbit.
- (4) a penetrator of europa's surface (including instrumentation on the descent module).
- (5) contributions to a soft lander, if developed by nasa in an increased europa mission scenario.

in this talk we will report on the conclusions of the crossed analysis between science themes and spacecraft options performed during a dedicated project workshop held in madrid on feb. 29 and march 1st, which will be the scientific and technical base for any relevant europa-related response to the upcoming esa call.