ASTROBIOLOGY WET LABORATORY FOR EUROPA LANDER. J. Gómez-Elvira[1,2], M. Moreno[1],V.Parro[1], O. Prieto-Ballesteros[1], [1]Centro de Astrobiologia (gomezej@cab.inta-csic.es), 28850 Torrejón de Ardoz, Madrid, SPAIN, [2]Instituto Nacional de Técnica Aeroespacial (INTA).

Introduction: The search for life at Europa led to focus on the coupled ocean-ice shell system and its boundaries as Europa's potential biosphere. But how could life possibly emerge in this environment?. An efficient strategy to search for life at Europa should explore three main types of contexts: the biological, the chemical, and the geological/geophysical contexts.

Traces of extant or extinct life could be found potentially at the surface and near-surface layers, which might be incorporated through reworking (impact gardening, mass wasting and internal dynamics) of material brought up from aqueous reservoirs by geological activity such as plumes spewed up into the exosphere: those are the places to look for molecular evidence of life. The organic molecules are likely to be refractory, particularly if they have been exposed to the surface for long periods of time. Therefore, the search for signs of life needs access to fresh endogenic materials, which should be coming from the aqueous habitable environment in the case of extant life, and must be performed with a specific instrumentation and in the appropriate layers: i) subsurface sampling for better protected samples that could be analysed in different physical states (solid/liquid). Analysis of samples in the aqueous phase will be obtained by melting near-surface ice samples, while chemical disequilibria will be simultaneously characterized during the search for biosignatures.

AWL concept: The Astrobiology Wet Laboratory (AWL) is the name given to the small platform composed by: i) Shallow Surface Sampler incharges of making a 10 cm hole on the water ice surface and take liquid sample, ii) the Data Processing Unit; iii) Power Unit; iv) Communication Unit to establish physically the connections with the An external structure allows to deploy the AWL with the lander manipulator, v) Multi-Probe ArraySensor (MPAS) a biosensor based on lateral flow immunoassay concept and vi) Multipareametric probe (MPP), with a set chemFET sensor to determine different physco-chemical parameters.

For the Shallow Surface Sampler , we have evaluated different alternatives ([1,2,3,4]) for drilling. Taking into account the limitations on resources and trying to reduce as much as possible the use of any mechanism the most promising option is the use of a drilling system based on laser. Sakurai (2016) has demonstrated the capabilities of this concept.

The water sampling is peformed in two steps: i) the first 5 cm of ice (altered by the radiation) are sublimated by the laser and ii) the tube is moved down by a pneumatic actuator and once in contact penetrates in the ice 5 cm. The tube is pressurized and heated to get a conditions where the water is stable at this moment the sample is sucked by syringe (controlled by a spring) to fill the sample deposit. From this deposit the instruments are filled.

Figure 1 show the AWL mechanical configuration. It was the warm box (WB) to maintain the operative temperature and protect all the electronics for radiation. The WB by design will guarantee bio-cleanliness after integration. The WB will have an opening for the SSS, it wil be closed once at the end of the integration to maintain the biological cleanliness. An opening protected with an EPA filter will allows the decompression during landing. The external structure supports the magnetometer boom and also allow the hanging by the manipulator lander.

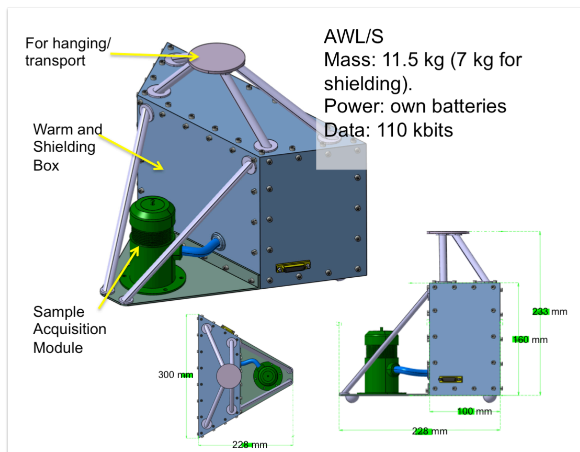

Figure 1. AWL concept. MPAS and MPP are located in a radiation protection box to minimize the effects of the extreme Europa surface radiation levels. The AWL is left on the Europa surface by the lander robotic arm or could be operated at the lander platform, in this case the SSS is not required.

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