

L1 Mission Requirements

Issued: February, 29, 2016

- Note:** The L1 Mission Requirements describe the main drivers of the SA2017 mission and are at the highest-level of the requirements tree. Any subsequent lower-level requirement (i.e. L2A, L2B) shall be a derivation, clarification or assignment from one or more L1 requirements.
- L1_001.** The SA2017 mission shall be a technology demonstration mission with the objective of space-flight qualification/validation of a 3U Cubesat and two on-board instruments: a Data Collection Receiver and a Technology Demonstration Camera.
- L1_002.** A 3U Cubesat shall provide all the mechanical, thermal, power and data interfaces necessary for hosting and operating the two on-board instruments; while being compliant with the criteria set forth in the document "CubeSat Design Specification", Rev.13 (or a later edition, if available), issued by the CubeSat Program of the California Polytechnic State University.
- L1_003.** The operational lifetime of the satellite shall not be less than six months.
- L1_004.** The orbit shall be a sun-synchronous circular orbit with an altitude between 500 and 700 km and a mean solar Local Time when crossing the Equator of 10:00am \pm 3 hours (TBC).
- L1_005.** The Data Collection Receiver shall provide the functionalities for uploading data sent by on-ground autonomous stations collecting weather and surveillance data for the Argentine National Glacier Inventory.
- L1_006.** The Data Collection Receiver shall be designed considering the following constraints:
- a) Minimum number of different stations whose data is successfully uploaded to the satellite within a five days time-frame: 10 (TBC)
 - b) Geographic area where stations can be located: anywhere within the Argentine continental territory (TBC)
 - c) Maximum data volume uploaded per station and per uploading contact: 120 KB (TBC)
 - d) Maximum percentage of end-to-end incomplete/failed uploads: 20%
- L1_007.** The Technology Demonstration Camera shall have the same sensor and some of the filters to be flown on SABIA-Mar mission in order to:
- a) Test sensor degradation during the entire mission lifetime.
 - b) Partially validate the calibration process, from photon emitted to data stored on-board (TBC).
 - c) Validate the data-flow, from raw data to value-added products (TBC).
- L1_008.** For relative calibration and sensor degradation analysis, the Technology Demonstration Camera shall obtain data throughout the entire mission operational lifetime from terrestrial and extra-terrestrial areas with known and stable reflectance signatures and/or with radiometric sensors measuring the radiance locally. The following calibration scenarios shall be used:

- a) Lunar calibration (at least two snapshots, once a month)
- b) Cold Sky calibration (at least two snapshots, twice a month)
- c) Terrestrial Calibration Site 1: Atacama dessert (at least two snapshots, once a week).
- d) Terrestrial Calibration Site 2: Marine Optical Buoy (MOBY), deployed 20 km offshore Lanai, Hawaii (at least two snapshots, once a week).
- e) Terrestrial Calibration Site 3: Bouée pour l'acquisition de Séries Optiques à Long Terme (BOUSSOLE), deployed in the Mediterranean Sea between the French Riviera coast and Corsica (at least two snapshots, once a week).

L1_009. The Technology Demonstration Camera shall take at least 80 images during mission lifetime over Argentine inland and oceanic waters. It should take images with a ground spatial distance of 200 m in order to adjust SABIA-Mar semiempiric atmospheric correction algorithms. The following sites shall be monitored simultaneously by satellite and field measurements:

- a) Site 1: Golfo de San Matías, Ro Negro, Argentina
- b) Site 2: Embalse de Ro Tercero, Córdoba, Argentina

L1_010. The Ground Segment shall include a Mission Station, which shall provide the following high level functions: user access, acquisition planning, raw data processing and data storage management.

L1_011. The Ground Segment shall include a Control Station, which shall provide the following high level functions: operations planning, orbit dynamics, operations and on-the-ground simulation.

L1_012. Both the Control and the Mission Stations, as a whole, shall be fully compatible with existing CONAE Ground Station infrastructure.

L1_013. As a technology demonstration mission, all the flight-related data including telemetry, trending, raw data and resulting value-added products, shall be available via web to the SA2017 community on a regular basis.

L1_014. The main mission deliverables shall be available according to the following schedule (where T0 is the project kick off milestone):

- a) Cubesat Engineering Model: (T0+13m) (TBC)
- b) Cubesat Partial Qualification Model: (T0+16m) (TBC)
- c) Control & Mission stations Engineering model (T0+13m) (TBC)
- d) Control & Mission stations Acceptance model (T0+16m) (TBC)
- e) Cubesat Proto-Flight Model: (T0+TBD)

L1_015. The costs of the entire SA2017 mission -excluding launch and manpower- shall be restricted to an assigned budget of 300,000 US dollars.