

Review of the Engineering Integrity and Safety of SCoPEX

Obligations/Issues for the Advisory Committee

SCoPEX has an obligation to submit a ‘Risk Management’¹ to be reviewed by the AC. In Frank’s letter of November 10th, SCoPEX is requesting (a) *review* and (b) *authorization* of the test scheduled for June 21st in Sweden.

The AC considers that it would be imprudent to authorize the test without a ‘*technical soundness review*’ of the platform, as part of its due diligence. Further, such review could not be objectively undertaken in the absence of certain engineering details. Consequently, we welcome your timely response to the following:

1. Has SCoPEX research team identified any *potential risks and/or matters relating to safety* associated with the engineering flight?
2. Has SCoPEX undertaken a risk assessment of the engineering launch? If affirmative, we are requesting a copy of same and a proposed mitigation plan.
3. Please describe the process by which the balloon and gondola will be returned safely and intact to the ground following completion of the engineering test.
4. Can Swedish Space Corporation *safely abort the launch without posing a danger to people and structures on the ground and retrieve the gondola*, in the unlikely event that something appears to be going wrong, or has actually gone wrong?
5. What degree of control does Swedish Space Corporation have over times when and the locations where the balloon and gondola return to land? Are there particular areas where this usually occurs?
6. Does the gondola crash land? Is there a risk that if it does, batteries or other equipment will ignite?
7. Has Swedish Space Corporation experienced any incidents where its balloons or gondolas have caused damage or injury on the ground?
8. Please expand on other potential fire hazards posed by the battery powering the balloon.
9. Can you outline the specific potential risks/safety issues associated with each phase of the operation, i.e. during launch/ascent, descent and retrieval?
10. Are there factors in the April 2010 balloon launch accident in Alice Springs, Australia that we should be concerned about for the upcoming planned launch? Specifically, are there lessons worth noting that may be relevant to SCoPEX? For example, NASA’s own accident report noted the following, *inter alia*:
 - i. Weather conditions were acceptable for launch and there were no technical problems BUT
 - ii. “..in the course of our investigation, we found surprisingly few documented procedures for balloon launches”.
 - iii. "No one considered the launch phase to be a potential hazard."
 - iv. There were some 25 causes identified as potential reasons for the accident, including “...insufficient risk analysis, government oversight and public safety issues”.

Background Information Extracted from Technical Document:

¹ Refer to document ‘Scientific and Technical Merit Review Process’.

- “SCoPEX focuses primarily on improving understanding of the first-order impacts in the stratosphere, i.e., risks and risk reduction associated with impacts of SAI within the stratosphere”.
- The technical document describes the role/purpose of each element of the gondola, but (intentionally) omits the engineering details of these components.
- The technical document describes the ascent phase of the launch but does not describe how the balloon and gondola will be returned safely to the ground.
- The gondola has three primary features: the frame, the ascender, and (off the shelf, repurposed airboat) propellers.
- The gondola will be powered by 28 V and 100 V DC power supplies which will power all operations on the platform including the propellers, ascender and instruments.
- Total mass (frame, all subsystems, hopper with ballast) is 600 kg .
- Platform Test Flight will be conducted to test the *durability and maneuverability* of the gondola.