

Remarks on ULDB Development Paths

W. Wiscombe, BWG Earth Science rep

Below is my attempt to put on paper the mental plot I tried to describe to the Balloon Working Group at our meeting of June 230, 2003. My thoughts on all this, some of which have already been communicated to John Campbell privately, follow the plot.

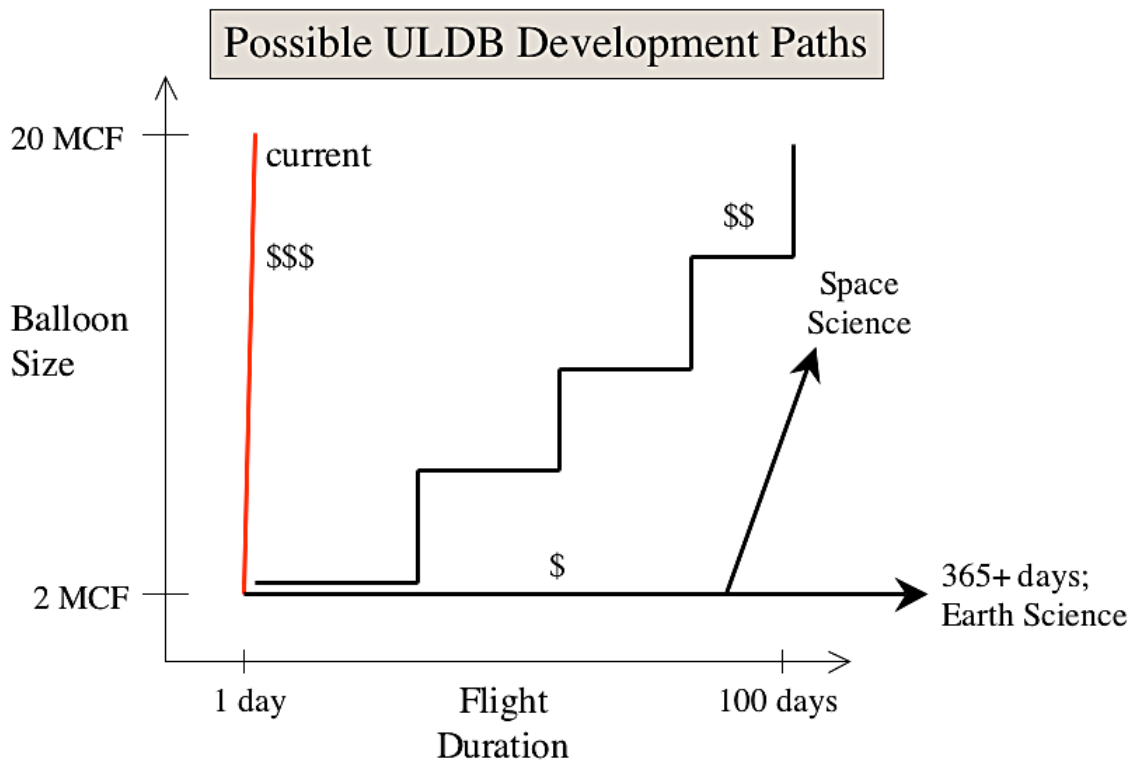


Figure ??. Possible development paths for the Ultra-Long Duration Balloon Program. \$ signs are an attempt to indicate total cost to achieve the final goal. Wallops chose the path labeled “current”. (MCF = million cubic feet)

The development path labeled “current” is based on slide 5 of the Henry Cathey (Wallops) presentation on the ULDB program to the BWG. That slide described the Phase III flight of a small (2.4 MCF) ULDB for 30 hr at 28 km altitude. The “unmitigated success” of this flight was used as a justification for the final line of the slide:

“Balloon was ready to be scaled up to the ‘full size’ balloon”

This sentence was in fact acted upon, and the very next developmental ULDB (Phase IV) was an 18.4 MCF balloon. Starting there, no flights have been an “unmitigated success”.

This is where I part company with the entire Wallops ULDB development philosophy. I fully understand the reasoning — to achieve an operational capability for Space Science ASAP — but I think common sense was abandoned in this rush to “scale up”. A technology development program calls for caution and incremental steps; letting the operational program force the development program into a dangerous and precipitous rush to huge size was, in my view, a fatal mis-step, and step that led us into the current crisis.

Now consider the stairstep development path in the figure. The stairstep path is the traditional cautious approach that almost any technologist or engineer would subscribe to. Why this path was not taken, remains a mystery. It has led to widespread suspicion that the Balloon Program does not know how to run a development program wisely. What would really have attracted favorable notice throughout the community (Earth and Space Science both) was longer flights, which is why the first leg of the stairstep is drawn horizontally. While the Space Science community ultimately desires heavy lift capability, this capability would not have attracted nearly as much press coverage or favorable notice from scientists and Congress as long flights would. Heavy lift is perceived as a “ho-hum” achievement, like building a bigger truck, and people more or less assume it can be achieved, even though the cognoscenti know differently. (We are talking about perception here, and while some may resent it, perception is what attracts new funds to the program. The larger community is not going to spend the time to study the fine details of this or any program.)

Finally, consider the horizontal development path in the figure. (At some point short of 100-day flights, it forks; one fork turns sharply upward toward huge balloons for Space Science, while the other fork continues horizontally to 365-day and longer flights for Earth Science.) While this path seems just as extreme as the current path, I submit the rather shocking idea that, among all three paths, it is the best, where “best” is defined as:

- manifesting the most rapid progress as viewed externally (because longer flights are much more easily achieved than huge balloons);
- costing the least in the long run (the true costs of the current development path are now known; engineering experience indicates that either of the other two paths would be cheaper);

- attracting the most new funds (esp. from new sources like Codes R, Y, and even outside NASA);
- arriving at the Space Science goal the fastest (this may seem counter-intuitive, but it counts on the previous bullet — money and people are limiting development speed now, not technological showstoppers).

By taking this forked path, you would arrive at a dual ULDB capability, one for Earth and one for Space Science, something that could never be achieved on the current development path. While Earth Science is always a reluctant bride, Earth scientists have proved again and again that, when shown a real proven capability that might be useful to them, the more adventurous will always step forward to try it.

Finally, consider cost. The sum total of costs to reach the same capability are very different for the different paths. It might have seemed, superficially, that the lowest cost would be the path labeled “current” — to jump directly to the final Space Science goal, a huge balloon. But that in fact has turned out to be the most expensive path, so much so that the ULDB program is nearly bankrupt at this point, with no successes since Phase III and enough funding for only two “huge-balloon” flights remaining. Only a huge investment of cash could allow the present strategy to succeed, but this cash will not be forthcoming without a success (or even a string of successes). It is a classic Catch-22 situation. Only a complete revamping of the current development strategy can extricate us from this Catch-22 situation.

Or, we can, as one BWG member suggested, roll the dice two more times and then bid farewell to the ULDB Program...