# Byron Midair 11/7/2020

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# Midair Investigation

- Mid air investigation conducted by NTSB and NCSA Safety Committee
- NCSA safety committee cooperated with NTSB and shared information
- NTSB preliminary report does not include any information besides date and aircraft info
- Safety Committee members traveled to the crash site, recovered the loggers and analyzed the data

# Midair Details

- FP and MA collided over Mt Diablo State Park (few miles south of the mountain) at 12:40 PM on a great soaring day
- Both pilots bailed out. Larry was injured and airlifted to hospital and nearly fully recovered.
- We were very lucky. Statistically the chance of surviving midair is 50%. We beat the odds.
- Multiple eye witnesses resulted in speedy rescue.

# Midair Details (continued)

- Midair happened at 5300 feet (3000-3500 AGL)
- Both gliders were cruising at around 60 Knots in opposite direction 45 degrees to each other. They hit each others left wing in a slight bank.
- The pilots were not aware of each other, were not in radio communication and did not see each other until a split second before impact with no time to react.

# Bailing out

- Both pilots reported that their gliders went into inverted dive, making the bailout relatively easy due to reduced or negative G.
- Gliders will normally lose control after midair due to the damage but also due to the pilot no longer flying the glider.
- If the glider enters a spiral dive or loops the G forces may prevent bailing out. Try to push the stick forward hard to generate negative G
- If you are very high you may want to check if the glider is still flyable and safe to fly. 3000 feet AGL is not high enough to try anything.

# Mid Air Results

- One pilot was seriously injured.
- Both gliders were remarkably intact with most of the damage from the mid air itself, most likely due to entering flat spin after bailout.
- “MA” was stuck in the trees and was missing few feet of the left wing tip.
- “FP” had substantial damage from the midair to the wing and control surface near the center of the left wing. It only sustained additional damage to the tail boom upon impact with the ground.

# Larry under canopy

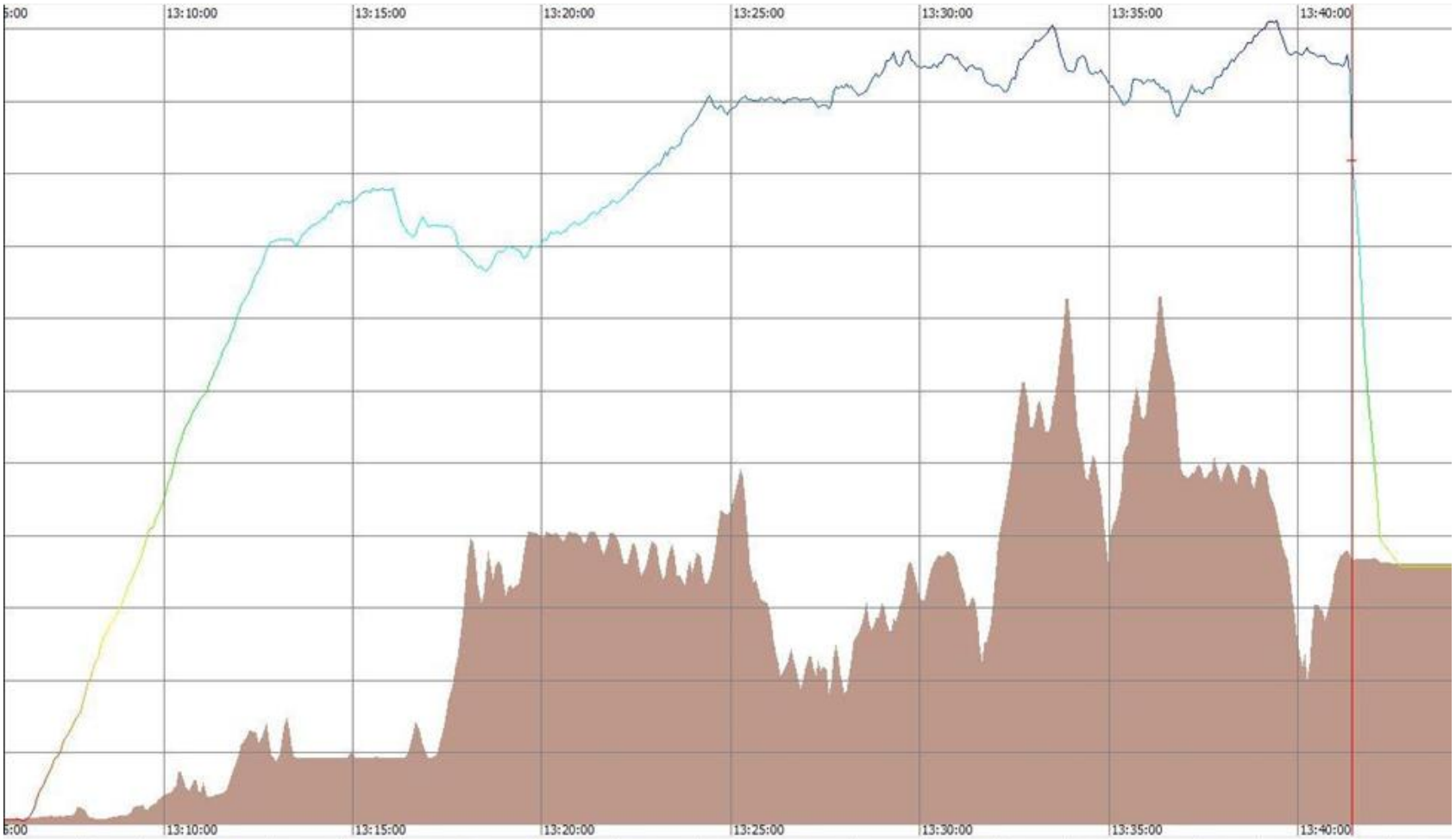
# FP

# MA

# Logger data analysis

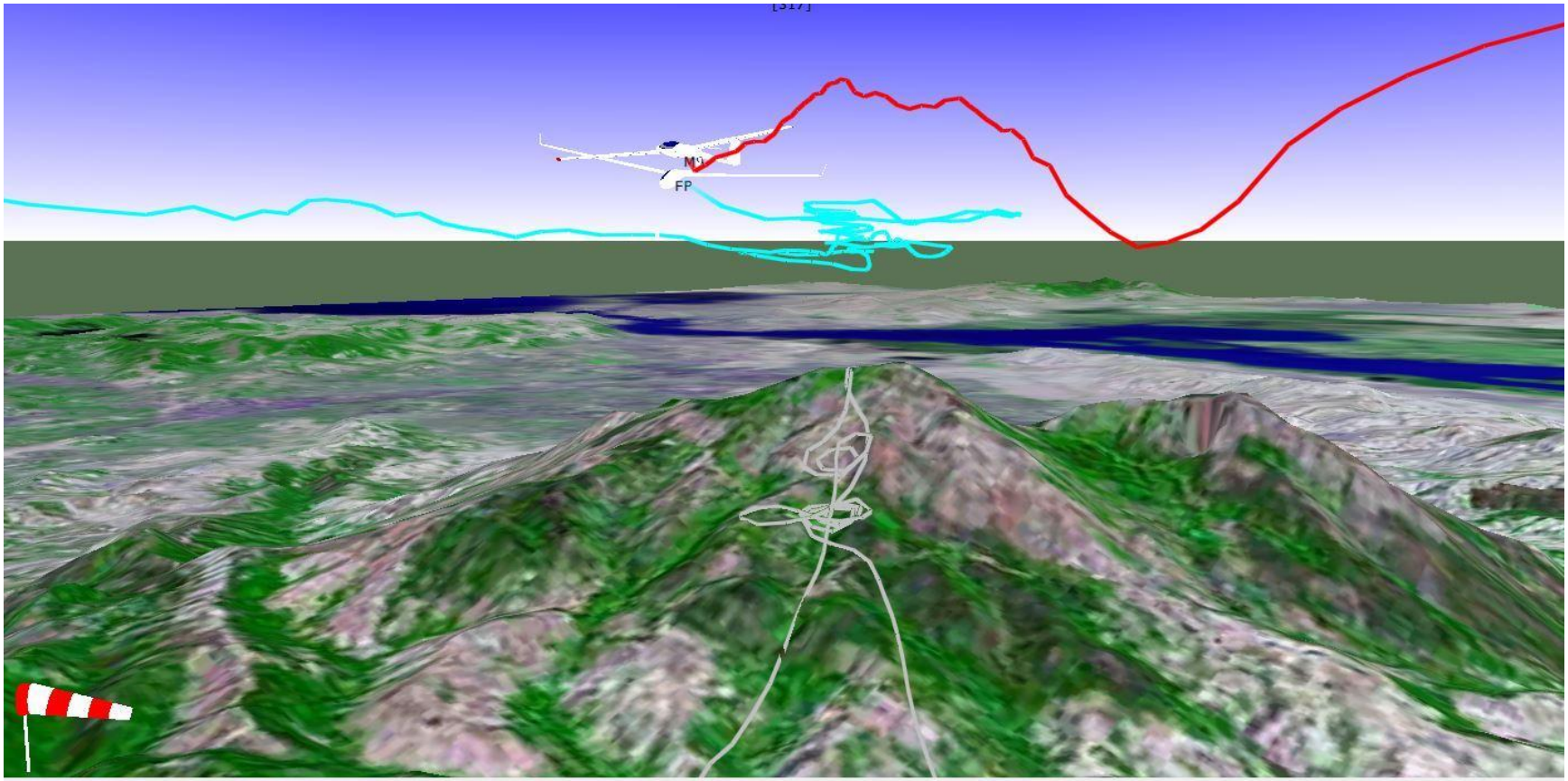
- FP Maximum sink rate recorded  was around 75 knots vertical dive (7000 fpm about half of free fall speed)
- FP lost the 1st 1000 feet in 10 sec (6000 fpm), the next 1000 feet in 15 sec, the 3rd in 20 seconds.
- FP sink rate slowed down significantly to only 400 fpm for the last 200 ft and it took another 30 sec to hit the ground for a total of 1:20 minute from collision to ground.
- MA Initial rate of descent 72kt for about 11 seconds, reducing to 30kt (presumably after bailout). Remarkably similar to FP.

# FP Altitude Trace



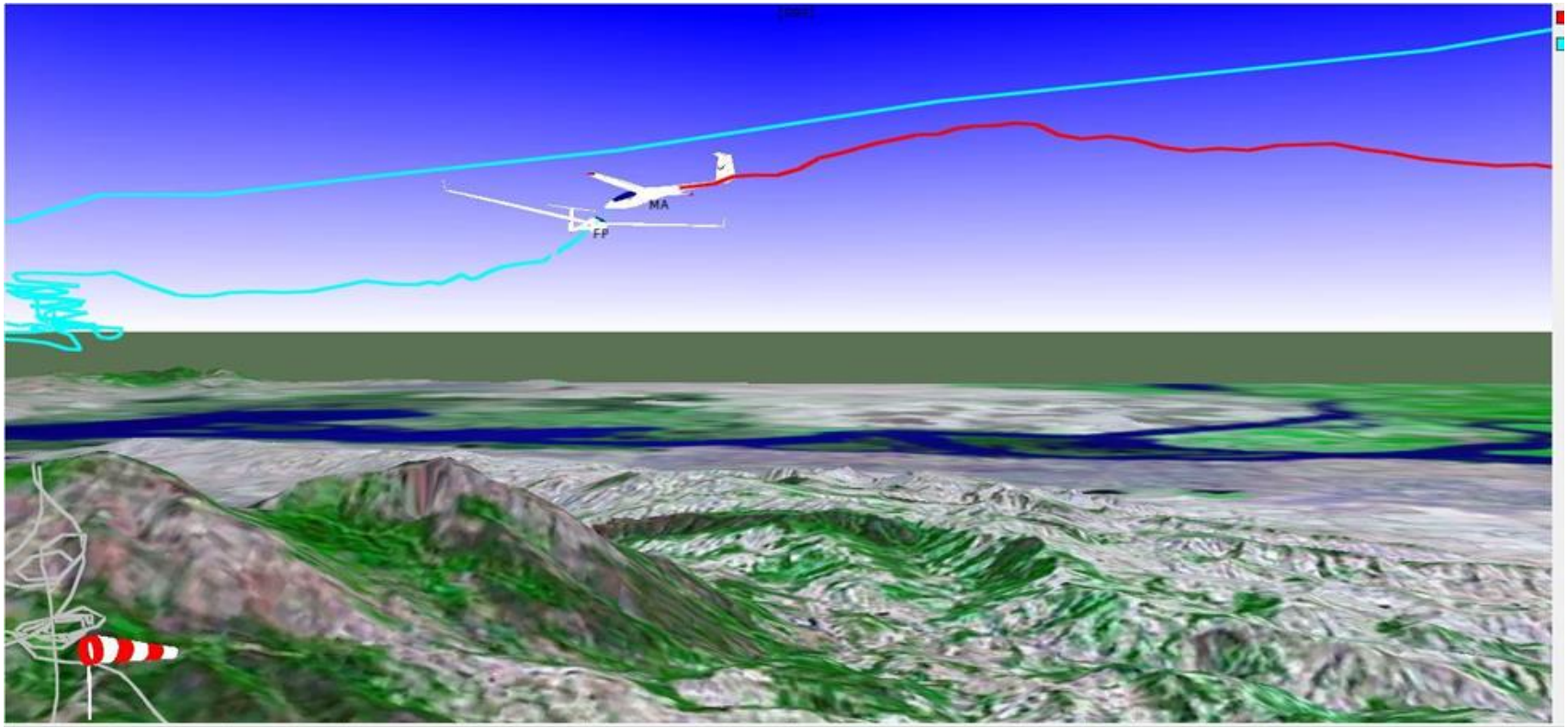

| Time | Alt. | Vario | Gsp. | dt | dH | AVario | AGsp | Dis.Done | L/D | Dis.Task | Vt | Vavg. | L/D Finish | Wind | AGL | IAS | TAS | Trk | GPS Alt. | Netto |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13:41:27 | 4586ft | -75.2kts | 11kts | 00:02:32 | -2500ft | -9.7kts | 60kts | 4.7km | 6.1 | | | | | 211°/5kts | 2757ft | 65.4kts | 70.1kts | 72° | 4623ft | -73.7kts |

# SeeYou 3D simulation



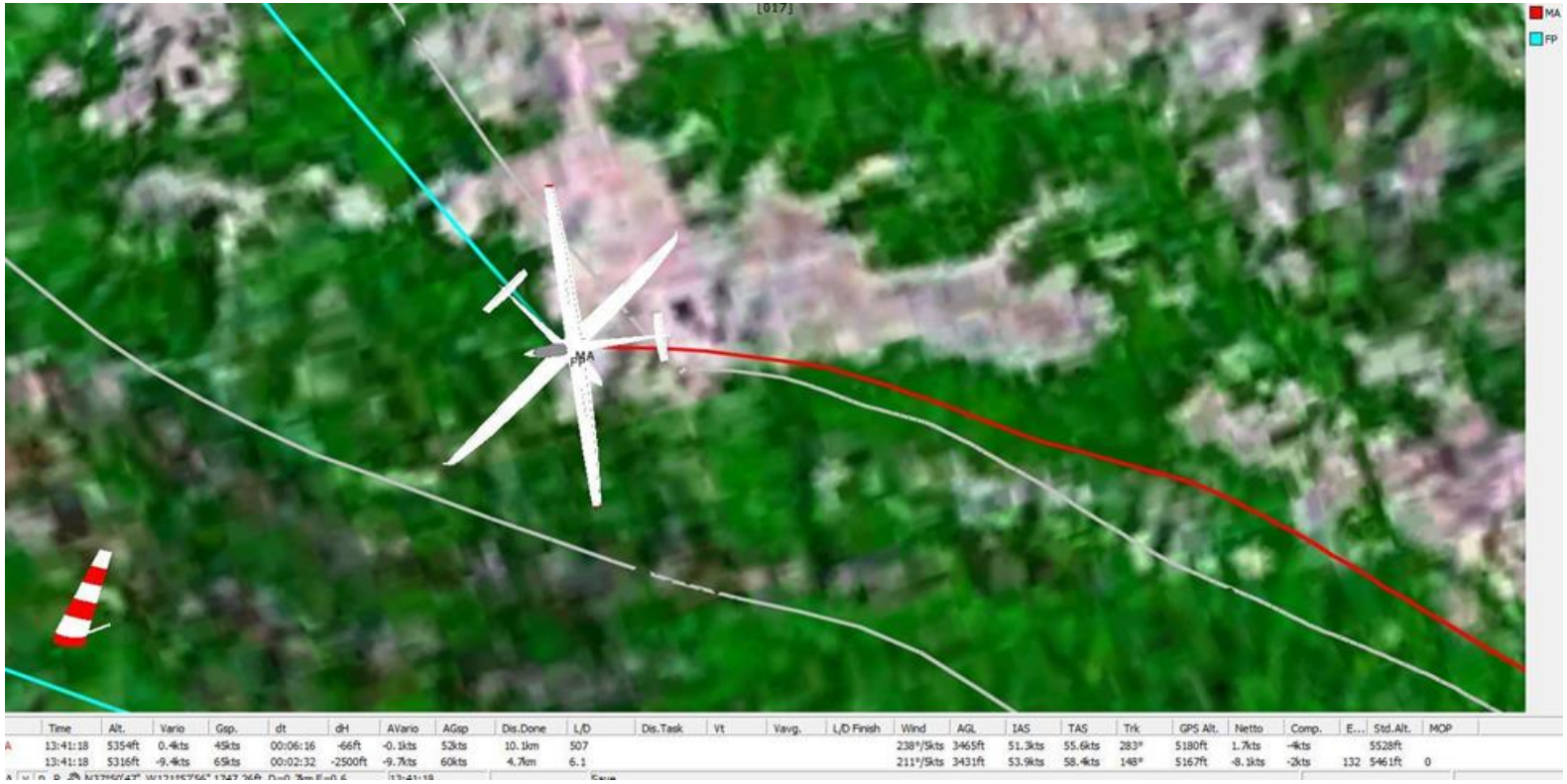

| ime | Alt. | Vario | Gsp. | dt | dH | AVario | AGsp | Dis.Done | L/D | Dis.Task | Vt | Vavg. | L/D Finish | Wind | AGL | IAS | TAS | Trk | GPS Alt. | Netto | Comp. | E... | Std.Alt. | MOP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| :41:19 | 5380ft | 2.9kts | 42kts | 00:06:16 | -66ft | -0.1kts | 52kts | 10.1km | 507 | | | | | 238°/5kts | 3479ft | 51.3kts | 55.6kts | 278° | 5174ft | 4.2kts | -4kts | | 5554ft | |
| :41:19 | 5324ft | -10.8kts | 64kts | 00:02:32 | -2500ft | -9.7kts | 60kts | 4.7km | 6.1 | | | | | 211°/5kts | 3422ft | 51.4kts | 55.6kts | 147° | 5203ft | -9.6kts | -2kts | 148 | 5469ft | 0 |

# SeeYou 3D Simulation




| CN | Time | Alt. | Vario | Gsp. | dt | dH | AVario | AGsp | Dis.Done | L/D | Dis.Task | Vt | Vavg. | L/D Finish | Wind | AGL | IAS | TAS | Trk | GPS Alt. | Netto | Comp. | E... | Std.Alt. | MOP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| •MA | 13:41:17 | 5348ft | -3.9kts | 45kts | 00:06:16 | -66ft | -0.1kts | 52kts | 10.1km | 507 | | | | | 238°/5kts | 3472ft | 48.3kts | 52.3kts | 287° | 5194ft | -2.6kts | -3kts | | 5522ft | |
| | 13:41:17 | 5296ft | -6.1kts | 68kts | 00:02:32 | -2500ft | -9.7kts | 60kts | 4.7km | 6.1 | | | | | 211°/5kts | 3411ft | 59.8kts | 64.7kts | 150° | 5167ft | -4.6kts | -2kts | 94 | 5441ft | 0 |

# SeeYou simulation



# Observations

- See and Avoid did not work (converging traffic under cloud street with closing speed of 120 knots)
- The pilots were not in radio communication with each other (and possibly on different frequencies)
- Both gliders had transponders.
- MA had operating Powerflarm and ADS-B out. FP Powerflarm was inoperative due to expired firmware.
- Without Powerflarm or ADS-B out in FP, both gliders could not get collision alarms.
- MA did not notice transponder alerts. Powerflarm is able to detect transponder signal and show approximate distance and altitude difference but no direction nor heading.

# Observations (continue)

- FP Powerflarm was inoperative due to expired firmware. Powerflarm requires upgrading to latest firmware every year (due to frequent protocol changes) or they stop operating once the firmware expires.
- Larry reported that he attempted to upgrade the powerflarm firmware multiple times last April and we exchanged emails but unfortunately the upgrade was unsuccessful from unknown reasons. With all the distractions this year he unfortunately did not get around to resolve it on time.

# Lessons Learned

- Mid Airs happen and are not so rare.
  - After stall/spin, midair collision is roughly tied for second as a source of fatalities from accidents involving gliders.
- Powerflarm and ADSB go long way in reducing the risk of mid air not only between gliders but also with power plane.
  - Before powerflarm was introduced, there used to be an average of 1 midair per year in the US with 50% fatality rate.
  - Since flarm was introduced over 10 years ago, nearly all midair's were between gliders which at least one did not have an operative powerflarm. The Canadian midair couple of years ago was also involved and inop powerflarm.
- Powerflarm would have given 10-20 seconds alarm, and would have likely given traffic advisory earlier.

# See and Avoid

- See and avoid works poorly outside the traffic pattern or gaggles, especially for gliders cruising under cloud street
- Big Sky Theory – not working well for gliders

# Where’s the danger?


‘... the physical limitations of the human eye are such that even the most careful search does not guarantee that traffic will be sighted.’
Australian Transport Safety Bureau

# NCSA Safety Board Recommendations

- Always fly with a parachute and practice bail out mentally.
- Always scan for traffic.
- When multiple gliders are soaring we recommend pilots to switch to the glider air to air frequency of 123.30 and provide frequent short position reports.
- We recommend to always fly with tracking device such as Spot or Garmin Inreach  when flying cross country and even if you fly locally.
- The NCSA board is requesting all gliders flying out of Byron to have operating Flarm.

# Powerflarm Recommendations

- All club gliders are getting equipped with powerflarms.
  - When powerlfarm is installed it must be ON all the time!
  - Notify powerflarm crew chief of any issue!
- Powerflarm firmware MUST be upgraded every year during annual to latest firmware or they will stop working
- We recommend that pilots will make a logbook entry when they upgrade the firmware so the IA can verify before signing off the annual.
- We made recommendations to Flarm to increase the grace period, increase the warning time, and to not fully disable the device
- It is the pilot responsibility to ensure their powerflarm is configured properly and the range is acceptable.
- The club powerflarm crew chief (Ramy) and other knowledgeable members can assist with configuration, upgrade and testing. We can use workdays for powerflarm maintenance and seminars for training.
- RTFM! Although Powerflarms are working well once they are configured and working properly, they are not plug and play!