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Iridium location quality: is it good enough for drifters?

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Problems with bad locations

- Meteorologists:
  - Obs appear to come from a different place
- Oceanographers, glaciologists:
  - Obs appear to come from a different place
  - Velocities are noisy

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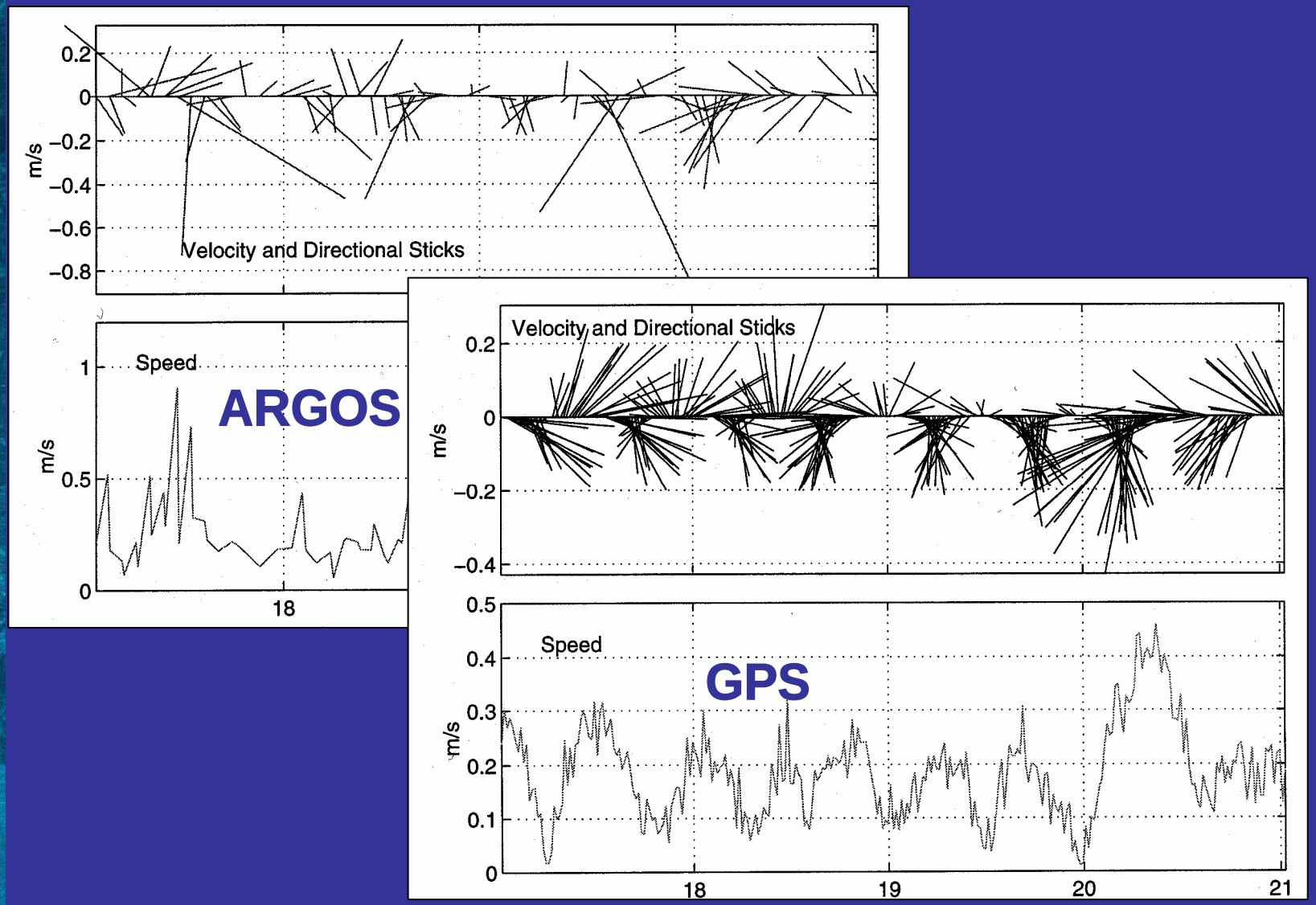
Problems with bad locations



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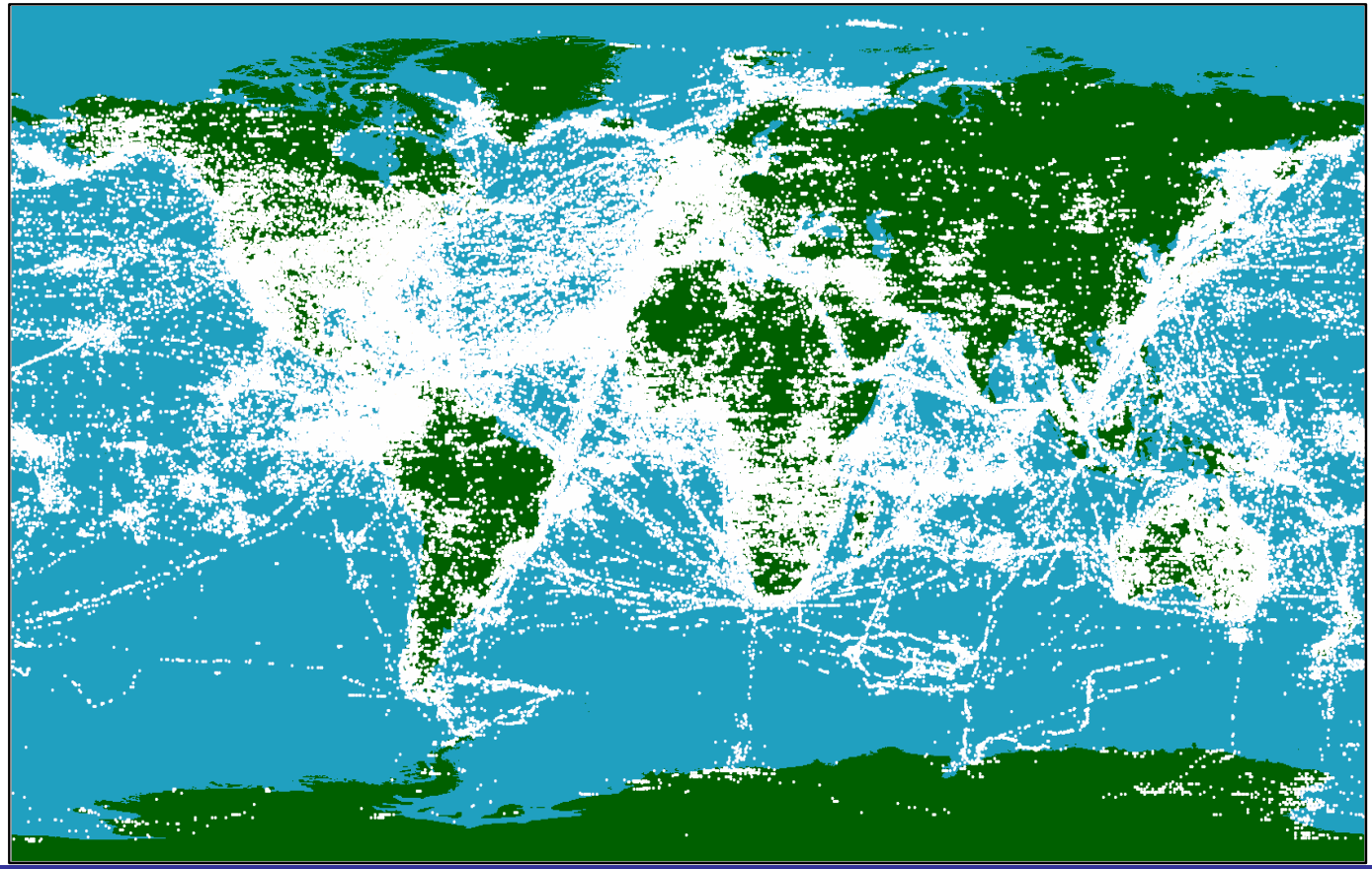
Iridium locations

- Appear in text of Short Burst Data (SBD) message
- Computed by system for every Iridium connection
  - For billing
  - For service denial in non-licensed areas

Iridium traffic

May 2006

130,000 commercial users
30,000 DoD users



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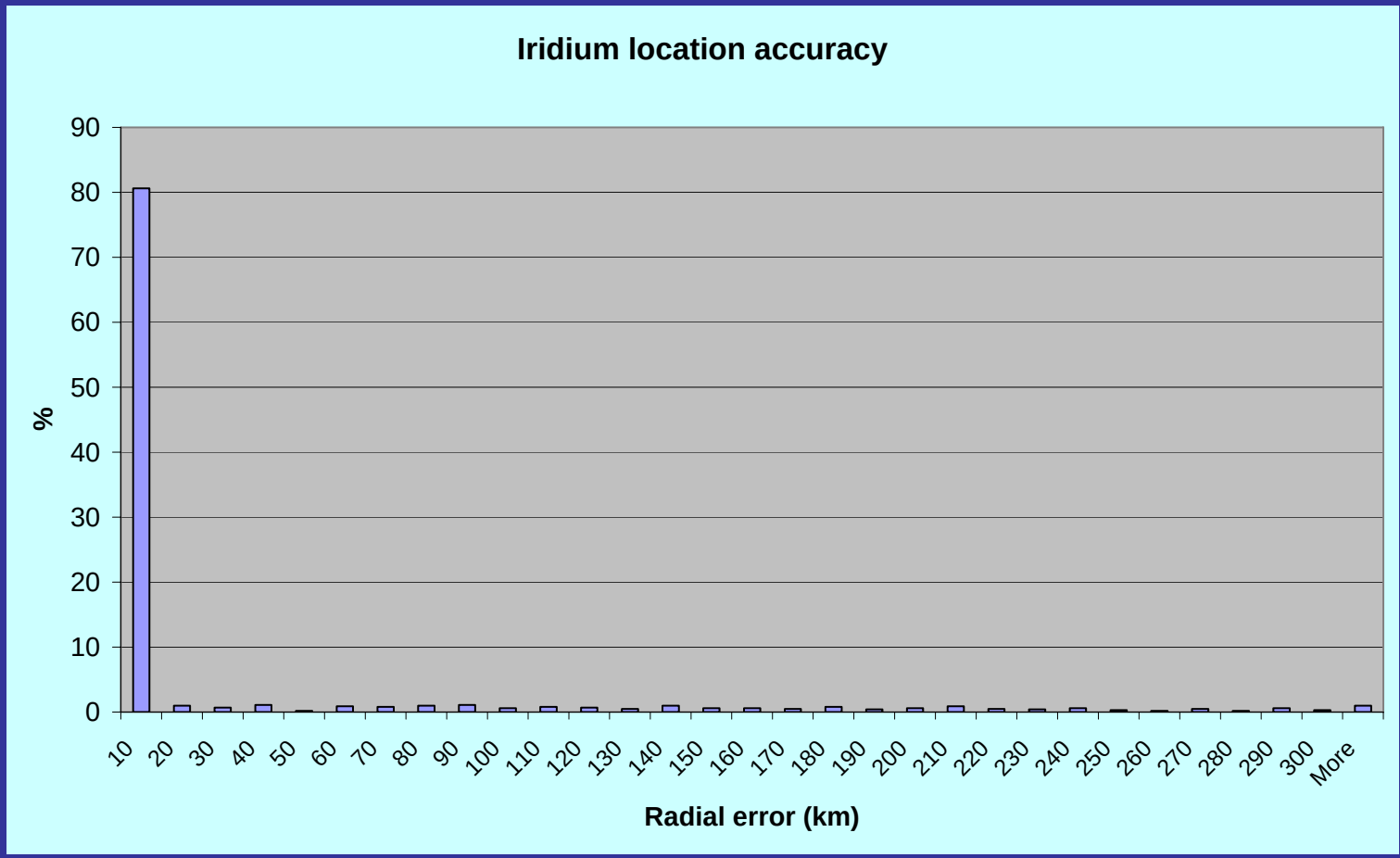
SBD message

```
From: <Iridium SBD Service (Tempe, AZ)>
Sent: Tue, 23 Sep 2003 22:02:24
Subject: SBD Msg From Unit: 300090807080903

MOMSN:152
MTMSN:0
Session Status: TRANSFER OK
Message Size (bytes): 1960
Unit Location: Lat = 56.457321 Long = -5.458788
CEPradius = 2

Message is attached.
```

Iridium locations – first look



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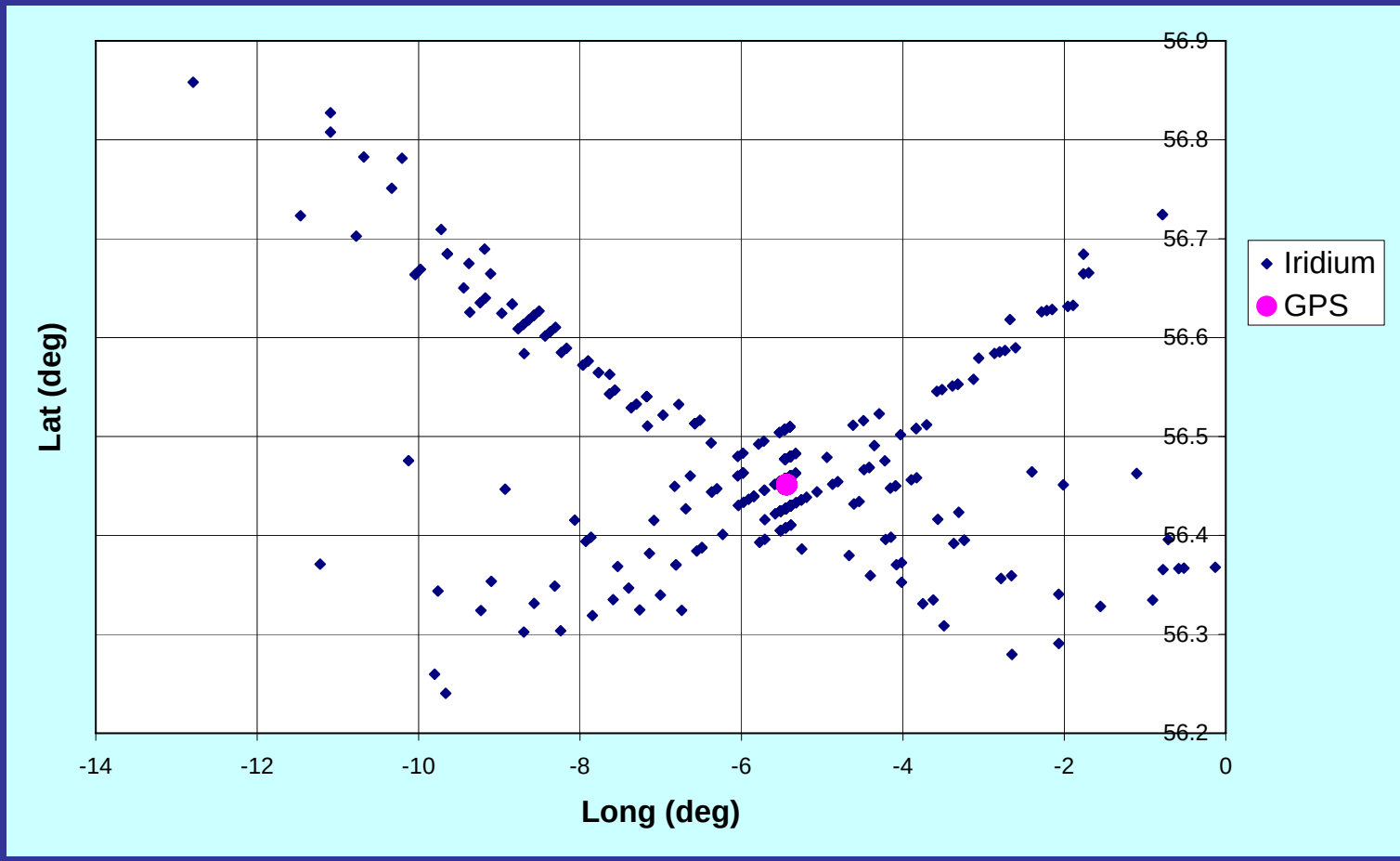
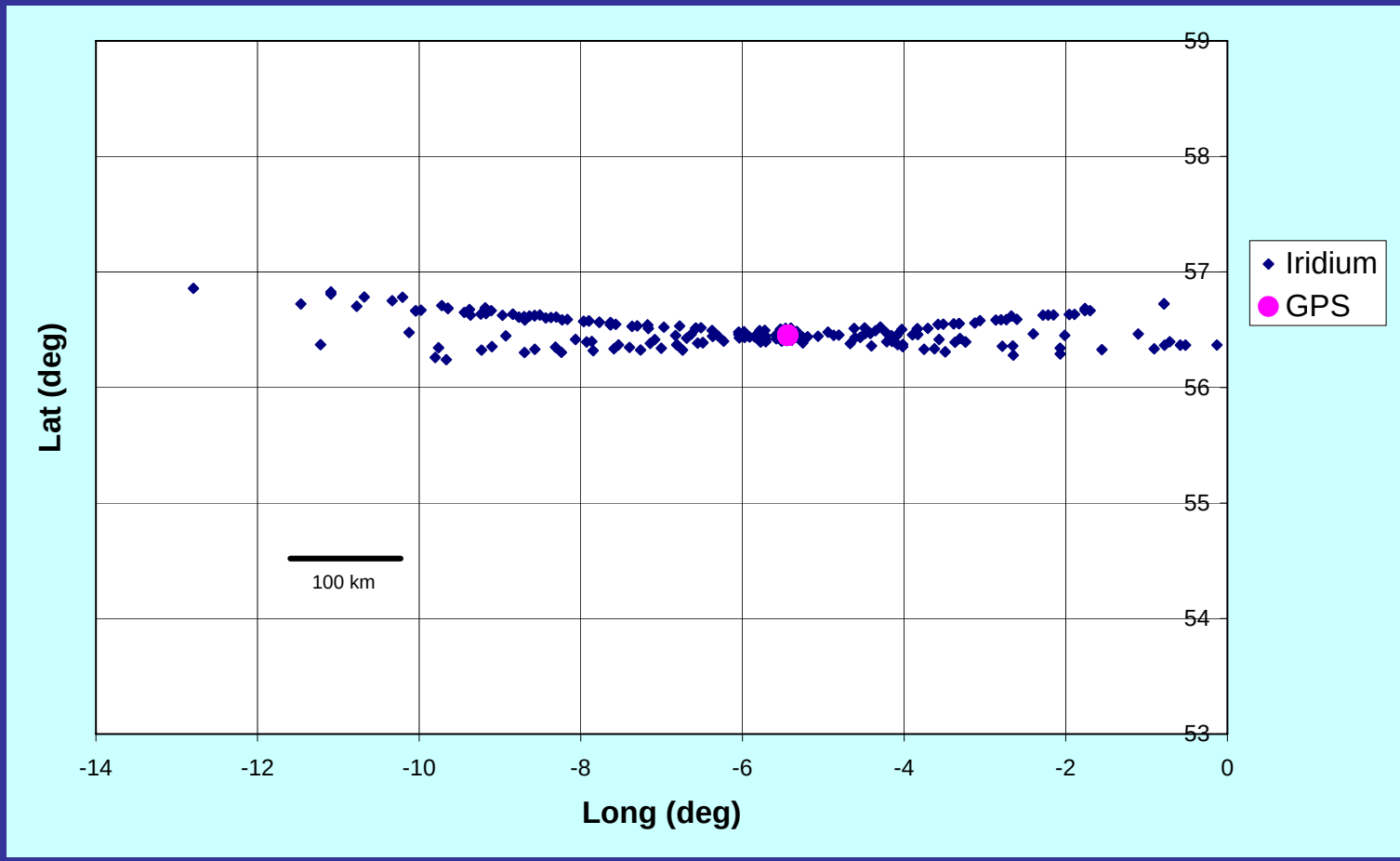
Iridium locations – first look



Iridium locations – uniform scale



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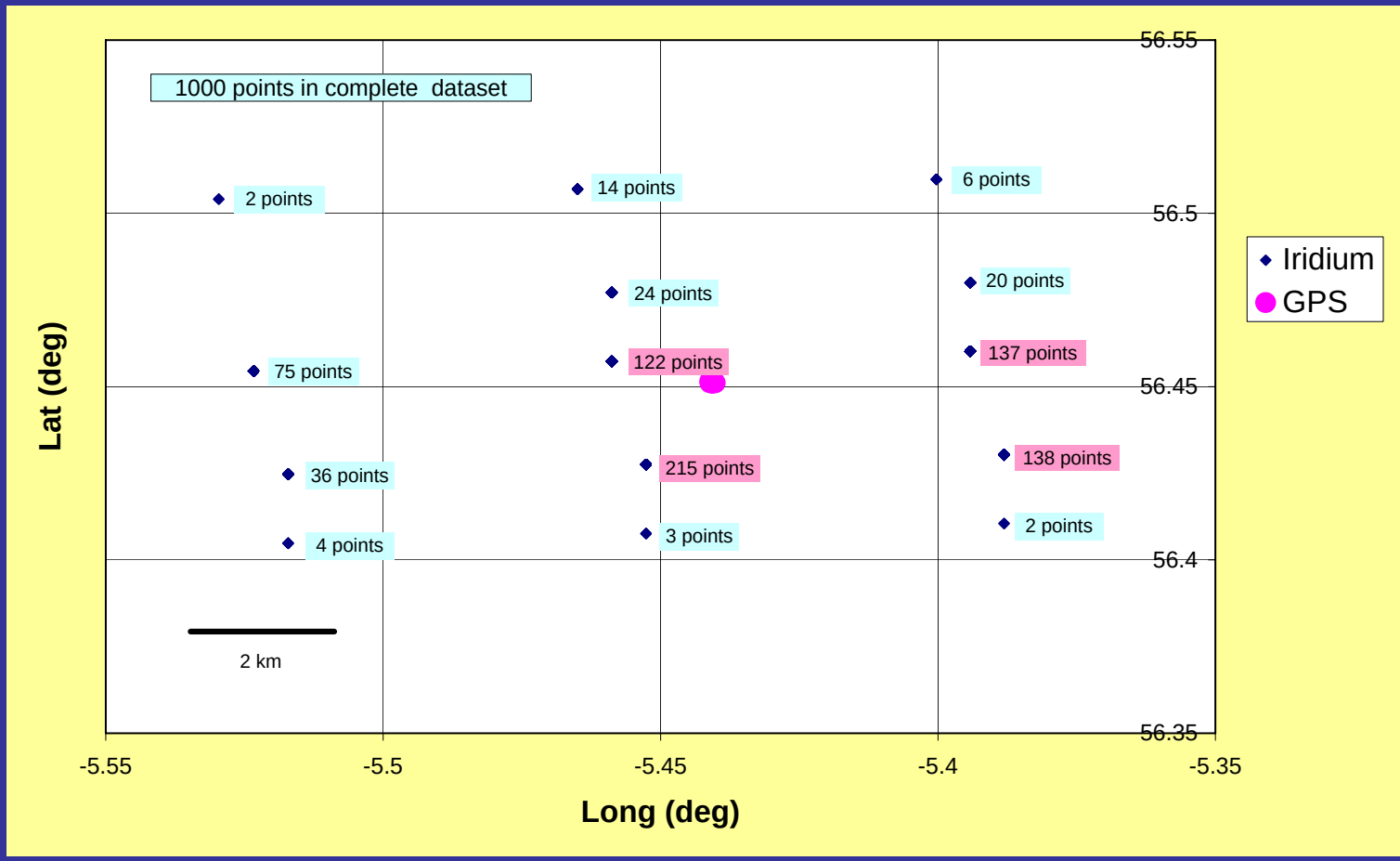
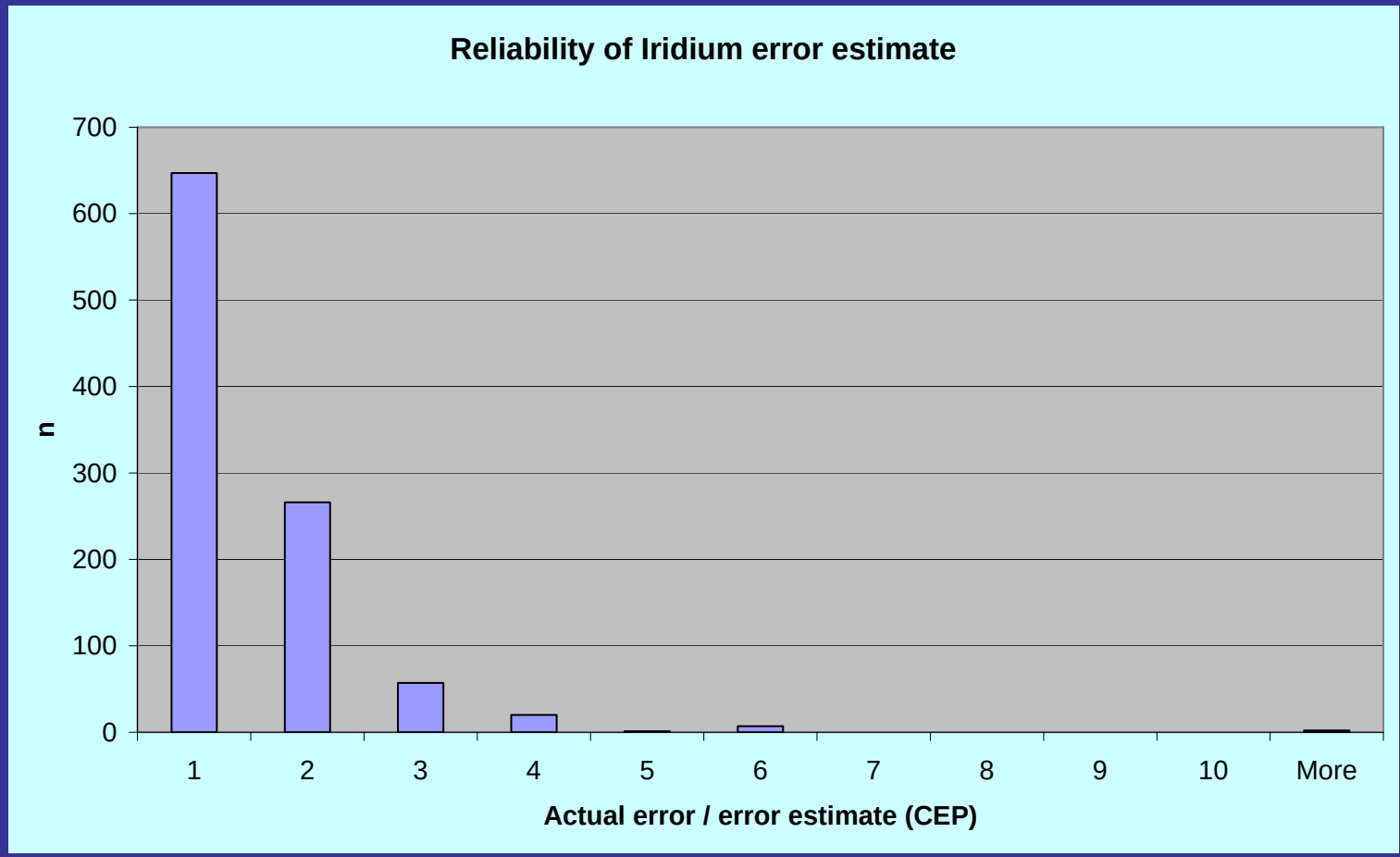
How do satellites perform locations?

- Argos (1-way)
  - Doppler estimates of platform transmissions
  - Collected over entire pass (~10 mins)
- Iridium (2-way)
  - Doppler estimates by both platform and satellite
  - Time delay estimates by both platform and satellite
  - Collected at start of message (few sec)
  - Process may be repeated if system defined error bound not met
- Both systems
  - Location quality poorer in longitude than in latitude

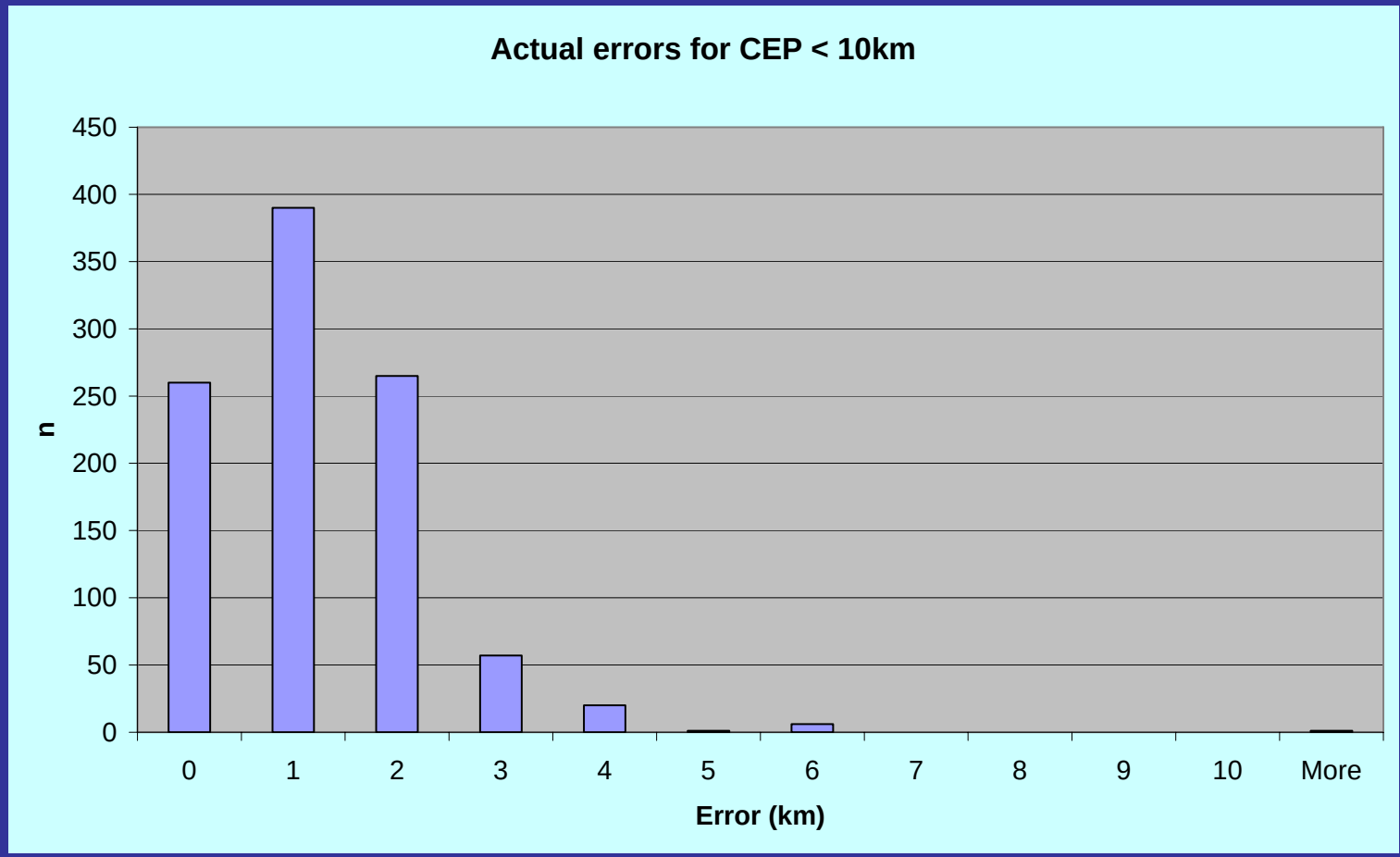
Iridium locations – closer look



How good is the Iridium error estimate?



What if we reject locs with CEP > 10?



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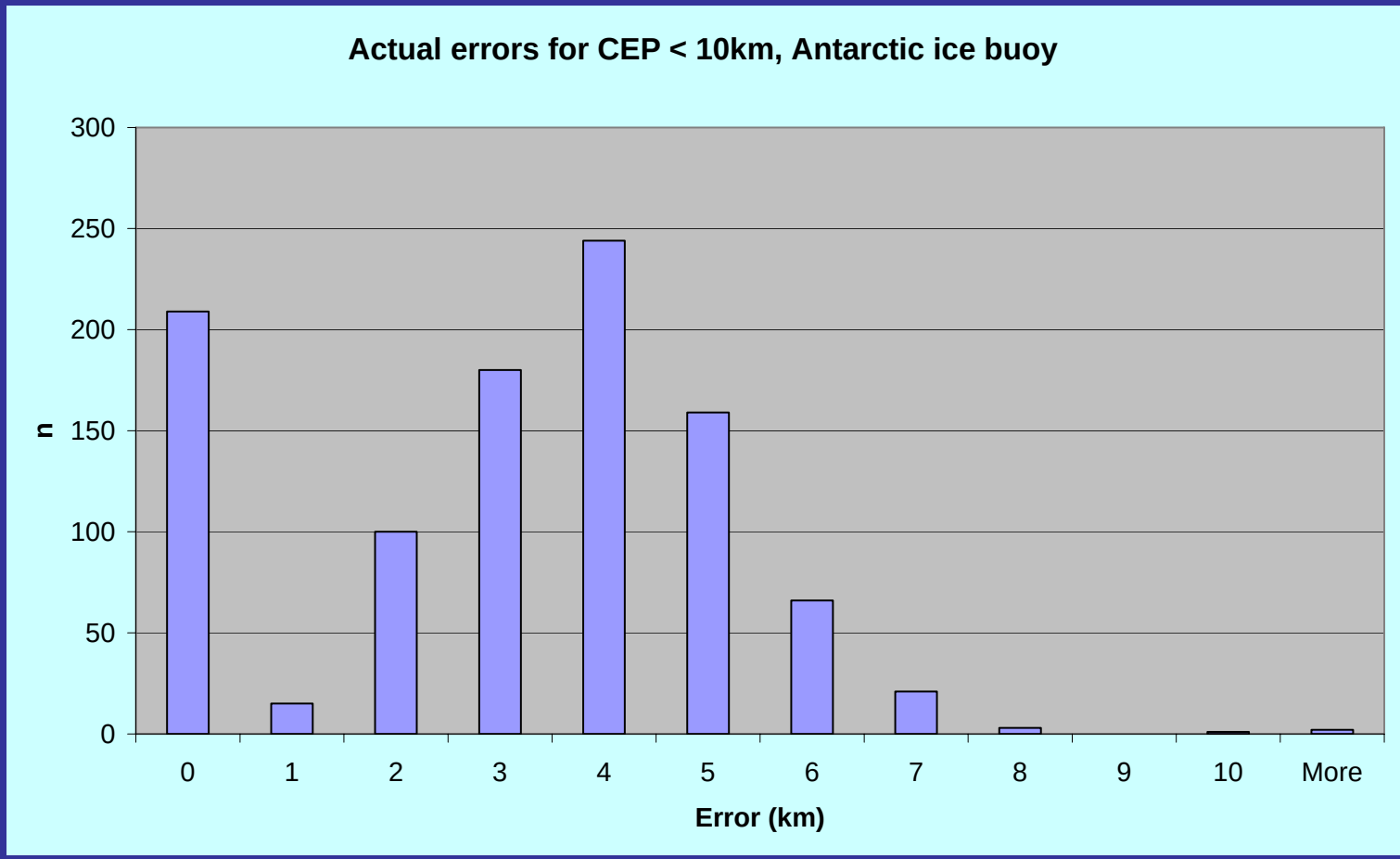
Same again, Antarctic platform



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Summary

- Reliable fixes with km-scale accuracies may be obtained – how?
- Need to use quoted CEP as a means of filtering out bad locations
  - 10-20% of all locs have errors >10km
  - Some CEP estimates are over-optimistic, especially for best locs
- Reject all locs for which CEP>10
  - Vast majority of remaining locs are accurate to within 10km
  - <<1% are bad, sometimes > 100km in error

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Conclusions

- Km-scale accuracies are readily obtained from SBD location datasets
  - May be of use to save energy or as a backup to GPS
  - May be sufficient for many applications
- User can select time interval between locations
- Location requires only a few seconds of transmission

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