

Cryospheric monitoring with new low power RTK dGPS systems

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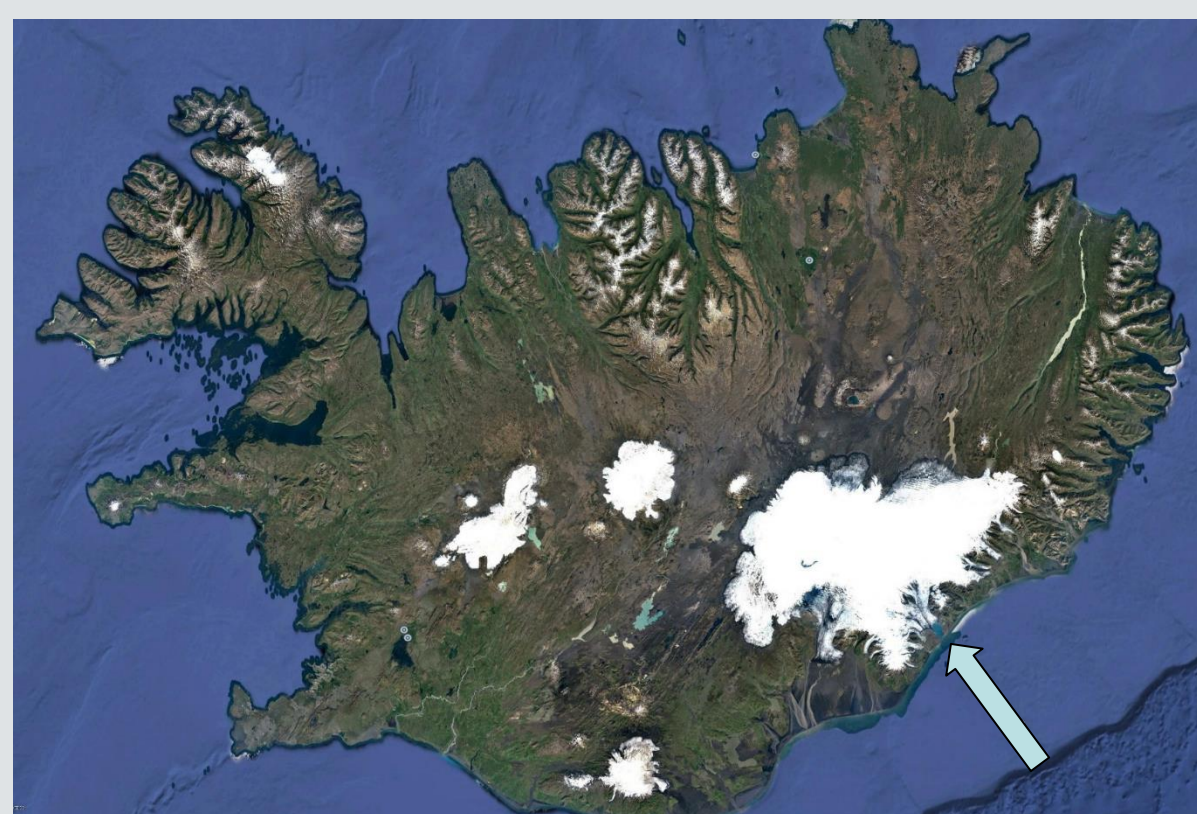


The problem:

- dGPS movement tracking is limited by high cost equipment
- dGPS recording has high power use.
- Transmission of the data is normally difficult from glaciers so “live” data is rarely possible.

Our experiment:

- Test new dGPS hardware
- Use Real-Time Kinematic mode
- Transmit data via Iridium satellite
- Design for year-long lifespan



Field site in Iceland

dGPS: Piksi Multi

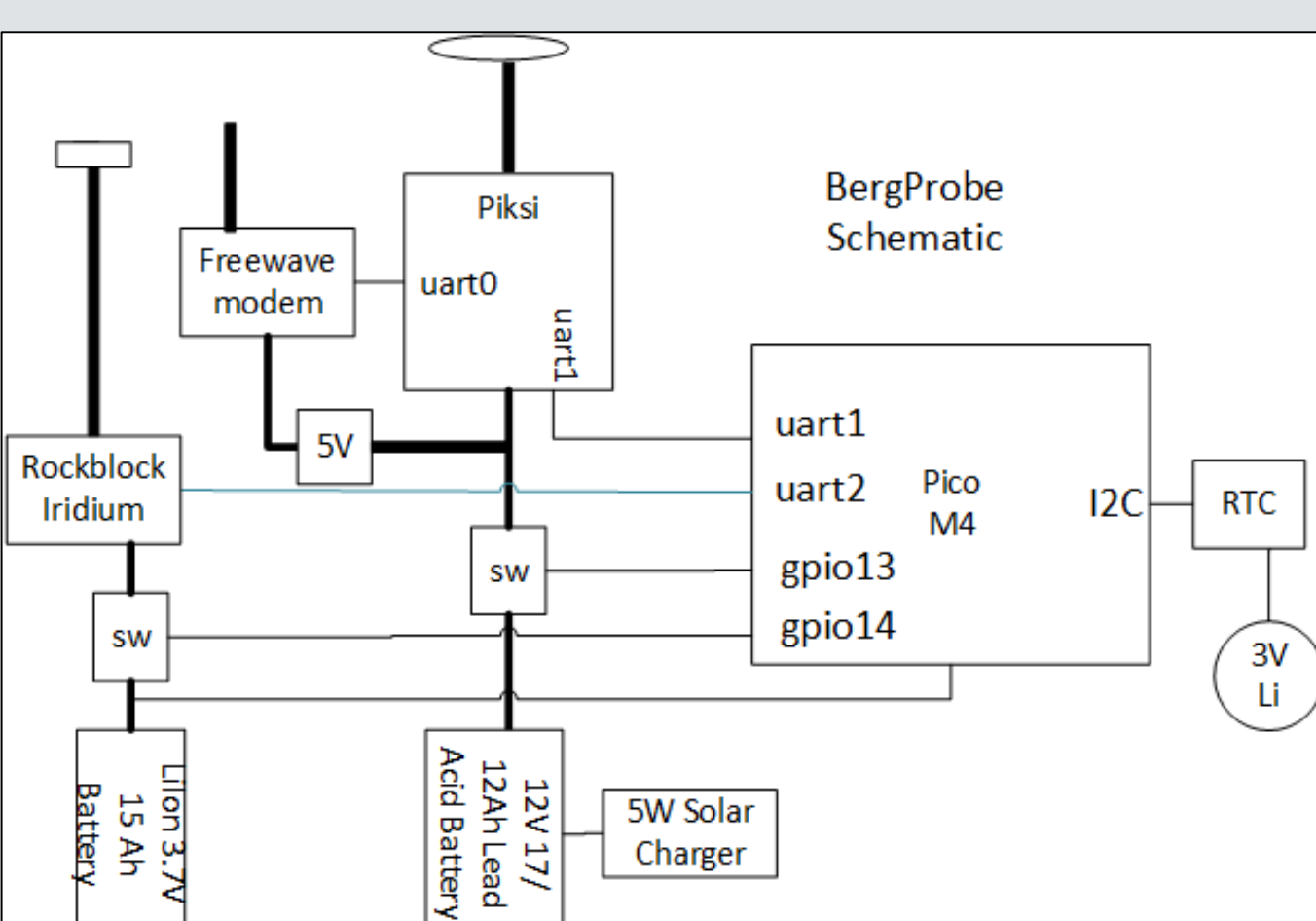
- L1 L2 dGPS from Swift Navigation
- Small and lower cost
- 3 W when in use
- 2 cm accuracy typical
- Approx. 40 s to a fix

MicroPython

- Runs on the ARM Cortex M4
- Pico has 96 kB RAM, 384 kB flash
- Simplifies development
- Sleep current 6 μ A

Iridium

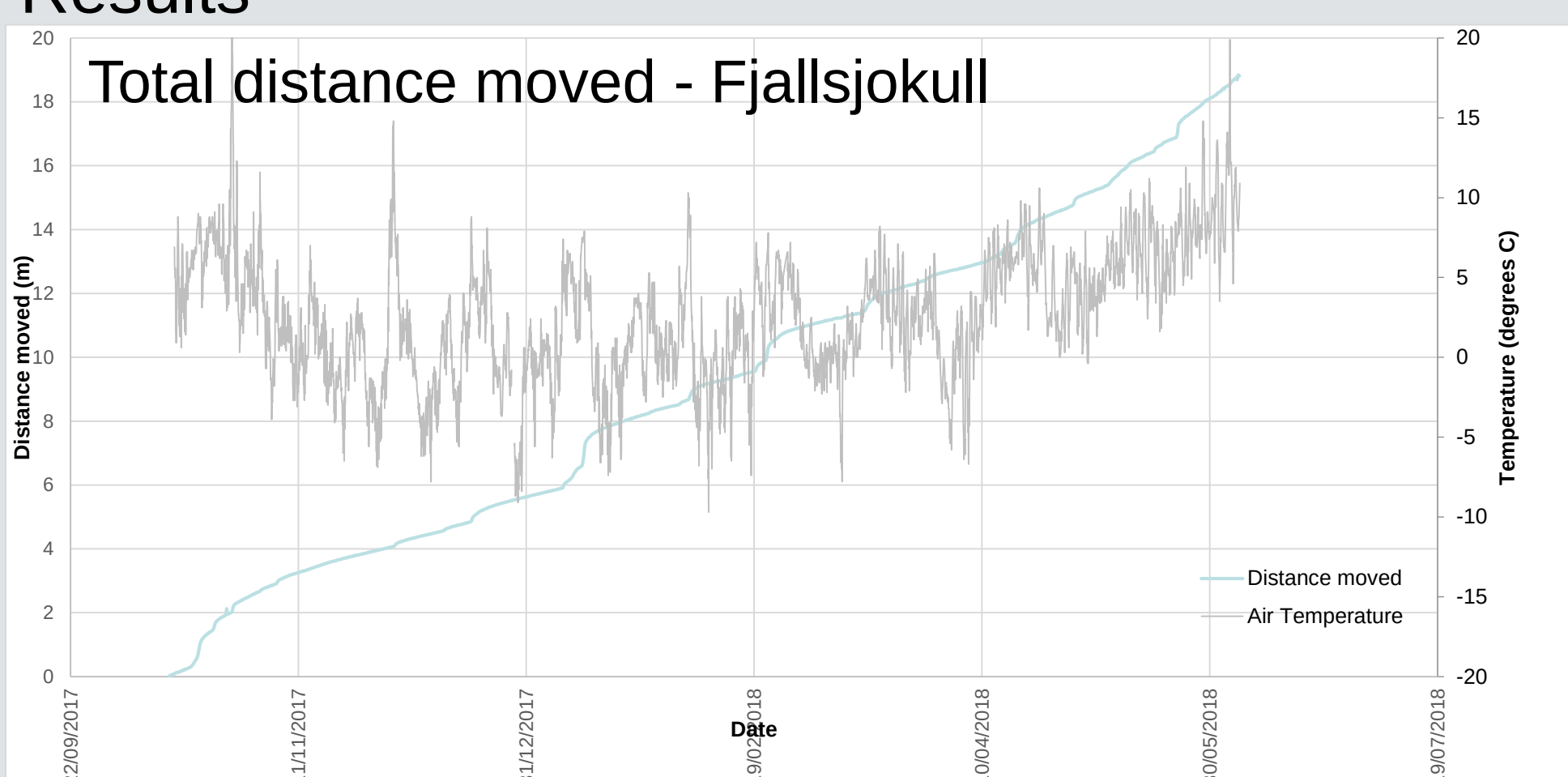
- Use Rockblock unit
- 330 bytes per message
- Once per day
- Posts data to our database



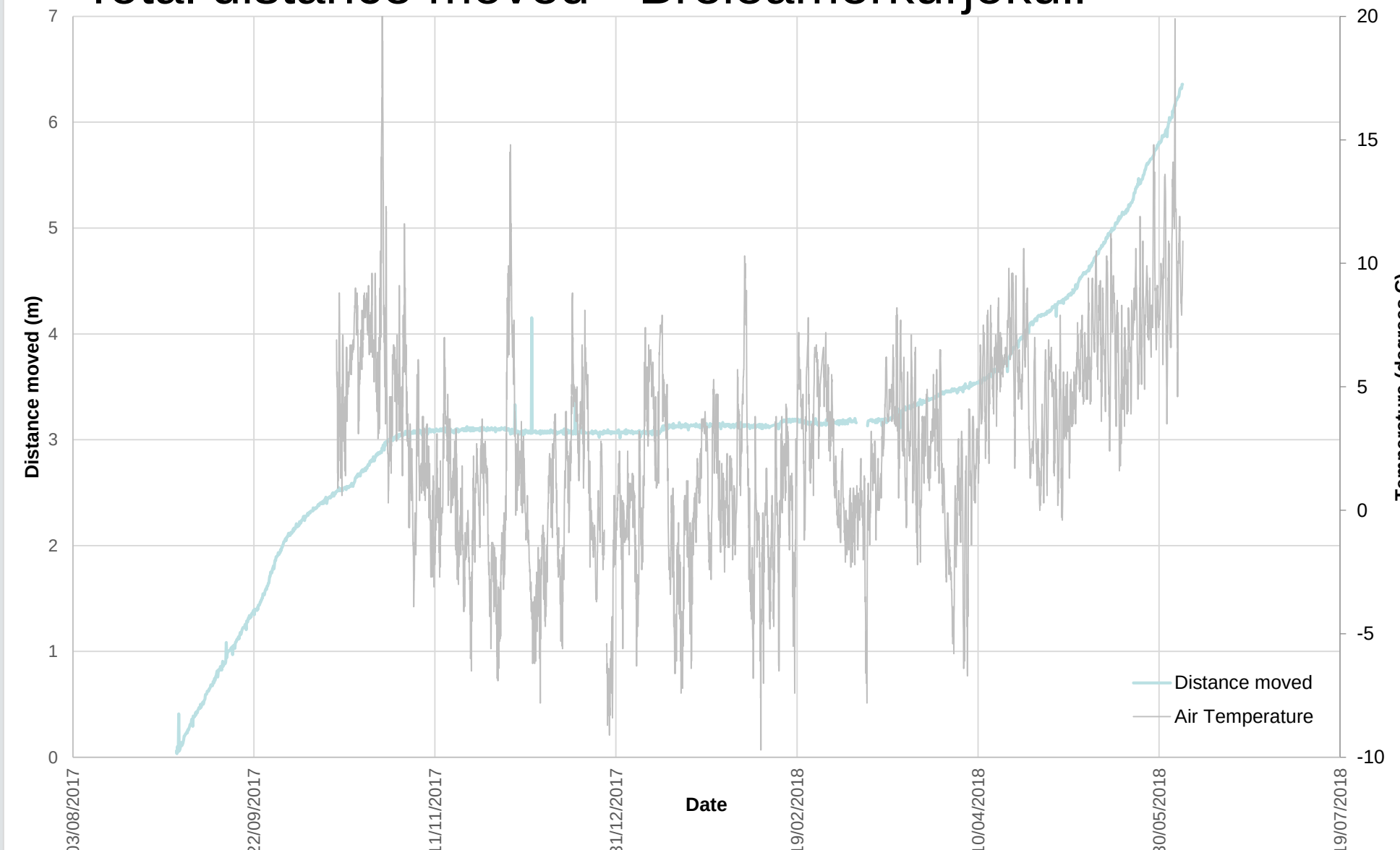
Schematic of the electronics, showing the separate power supplies, FET power switching and microcontroller. The system records a dGPS fix every 3hrs and transmits them at 13:00 every day. Separate batteries allowed us to scale-up the lifetime to survive winter.

Results

Total distance moved - Fjallsjokull



Total distance moved - Breiðamerkurjökull



Our results show that trading some accuracy for cost, while gaining a live data feed works well and could be used in a range of monitoring deployments. Initially funded by Formula E, now National Geographic.

