Mass Deployment of Miniature Temperature Loggers with iButton Assist for Android Smartphones

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Deploying Hundreds of Single Channel Temperature Loggers

The aim of this project is to collect temperature trace data using simple, single channel data loggers (iButtons) at great spatial scale, e.g. to investigate ground surface temperatures (GST) in high mountain areas. Based on a first laptop-based implementation we have gained significant experience with thousands of measurement missions. This poster presents a smartphone-based implementation of the software used for the efficient deployment of hundreds of data loggers.

Investigating the Spatial Variability of GST

• Which topographic parameters are most significant in determining GST variability?
• Do these parameters change with scale of study (i.e. 10 m x 10 m vs. 5 km x 5 km)?
• How is snow cover duration related to topographic parameters?
• How does the surface material affect the GST?
• How do we explain these variations (e.g. radiation, snow covered ground)?
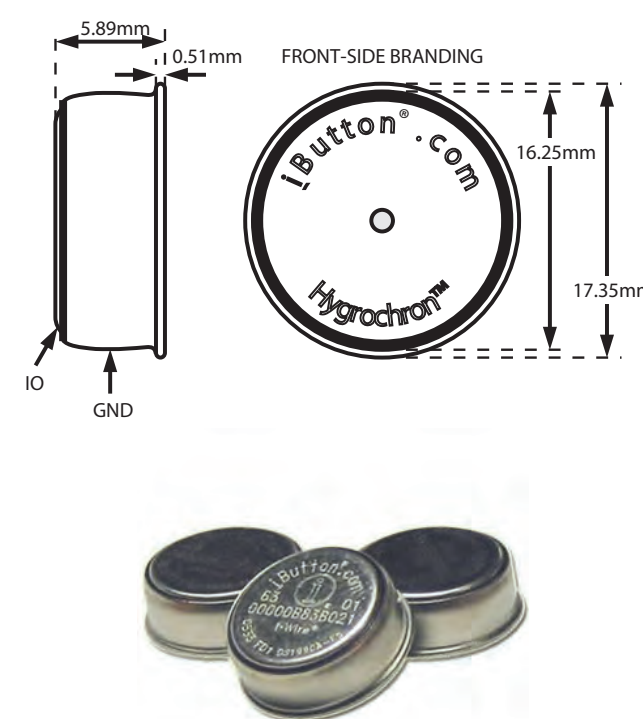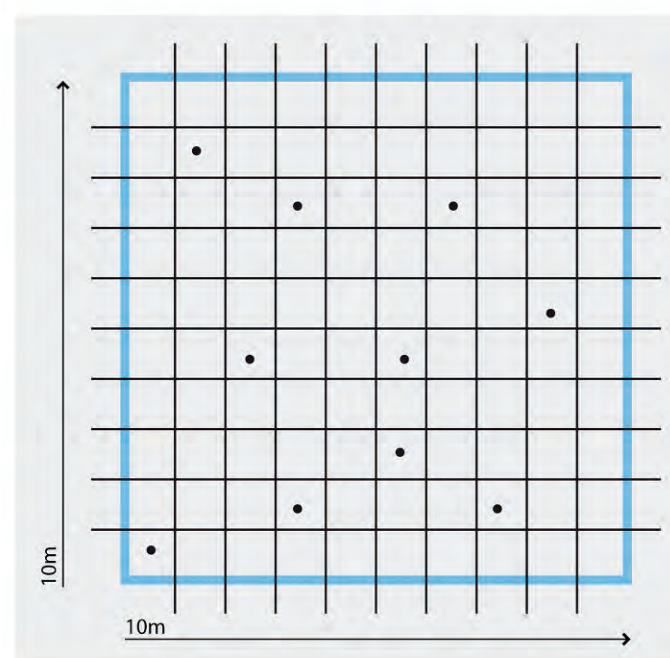
Temperature Logger: Maxim iButton DS1922L

• 8 KByte data-log memory for up to 8192 sensor readings
• Operating range: -20°C to +85°C; 0 to 100%RH
• Digital thermometer measures temperature with 8-Bit (0.5°C) or 11-Bit (0.0625°C) resolution
• Temperature accuracy better than ±0.5°C from -10°C to +65°C
• Individually calibrated in an NIST-traceable chamber

How can we efficiently deploy hundreds of loggers?
iButton Assist for Android

• Touch user interface with haptic and acoustic feedback
• Automated recording of accurate time and location information (GPS)
• Over-the-air synchronisation between multiple phones and GSN servers
• Recorded data can also be sent by email, uploaded to Dropbox etc.

Figure: Distribution of 10 iButton loggers over 10 m x 10 m area (left). Dimensions of Maxim DS1922L iButton (right).

Smartphone-Assisted Logger Deployment Workflow

1 - Select Deployment
2 - Set Mission Parameters
3 - Record GPS Position
4 - Download Data/Reprogram
5 - Take Picture of Location
6 - View Data/Sync DB

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