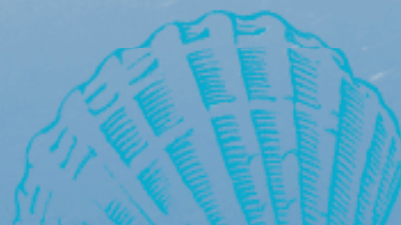
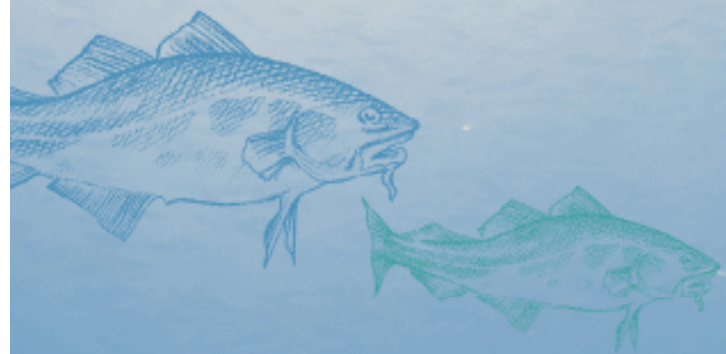


**INSTITUTE OF MARINE RESEARCH**  
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# Safety aspects for high energy density batteries

Hans Petter Knudsen

Incident i 2009:

Batterypack on acoustic  
lander blew up during  
recovery



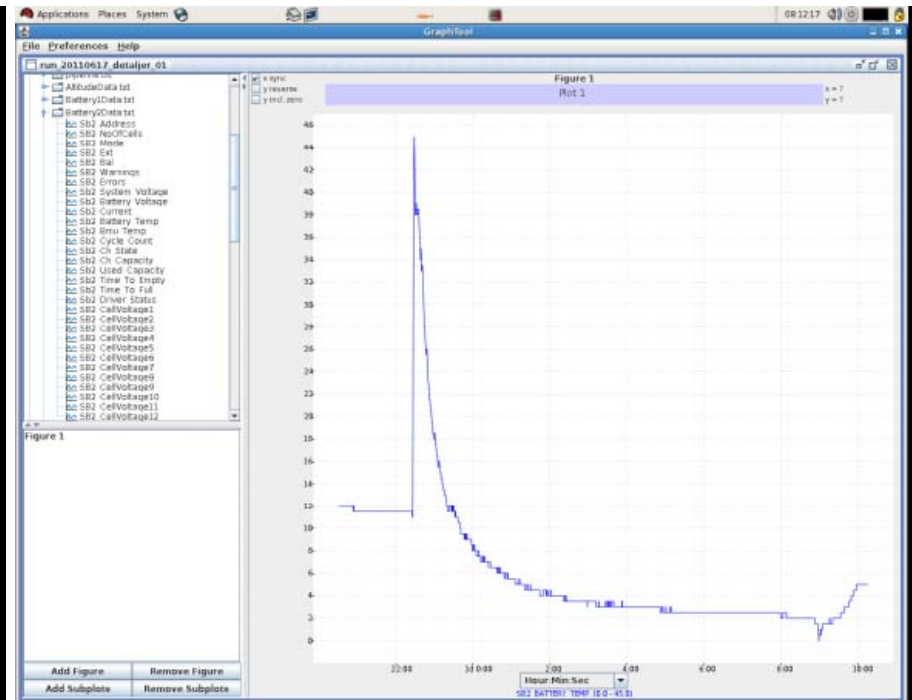
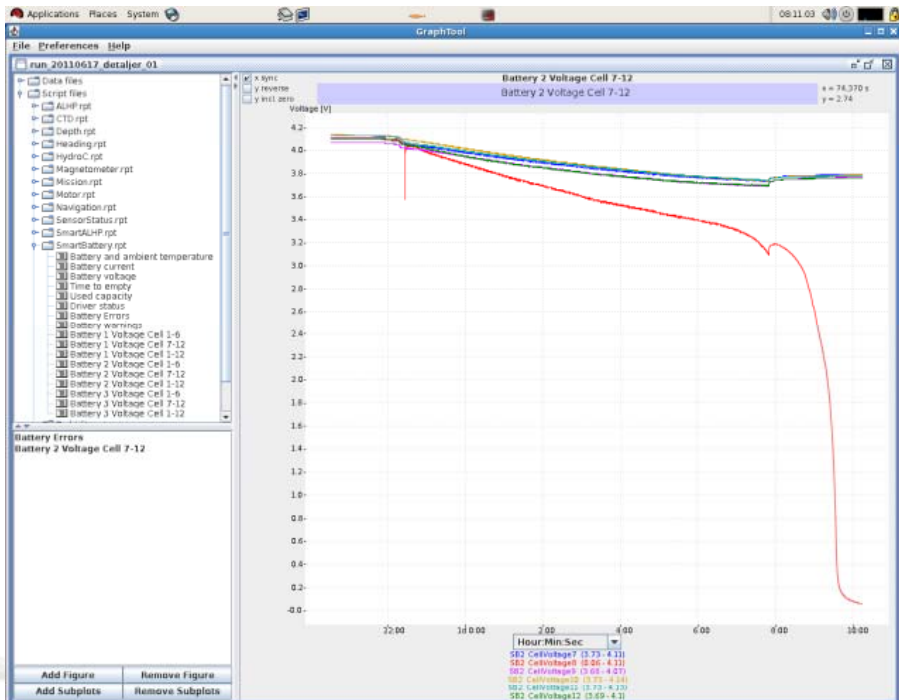


Top of lander: steel plates bended



## Hugin mission in 2011





The message "Low battery cell voltage" came 04:22 UTC.

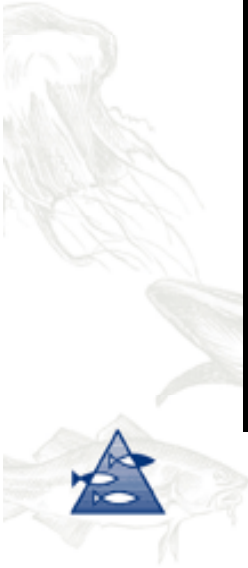
"Critically low cell voltage" came 07:50 UTC and battery no 2 turned itself off.





The battery cover buckled and dirty oil and gas came out when it was opened. I fire in the battery was limited to one cell.









10:22



The lithium ion polymer battery is electrical rechargeable and pressure tolerant. The battery is built up by commercial poached cell batteries gathered in battery blocks that are assembled into complete batteries for the HUGIN AUVs.

**Significant built in safety systems are implemented to avoid any hazards related to overcharging, discharging, and use in general.**



We (at RV Department) are obliged to establish **safety procedures for worst case incidents**. We are grateful for all good advices and comments.

