Combining Satellite and In Situ Observations to Improve the Historical XBT Dataset

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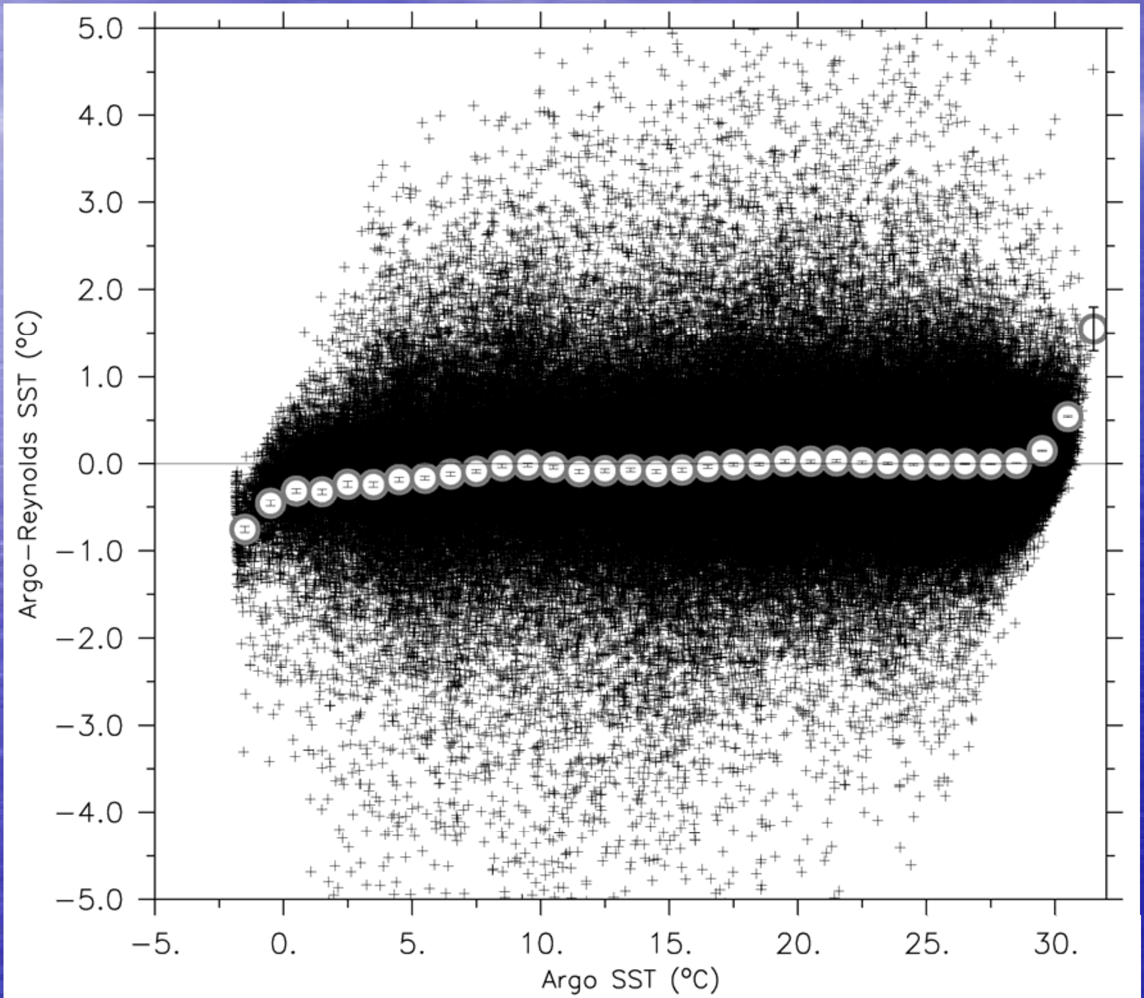
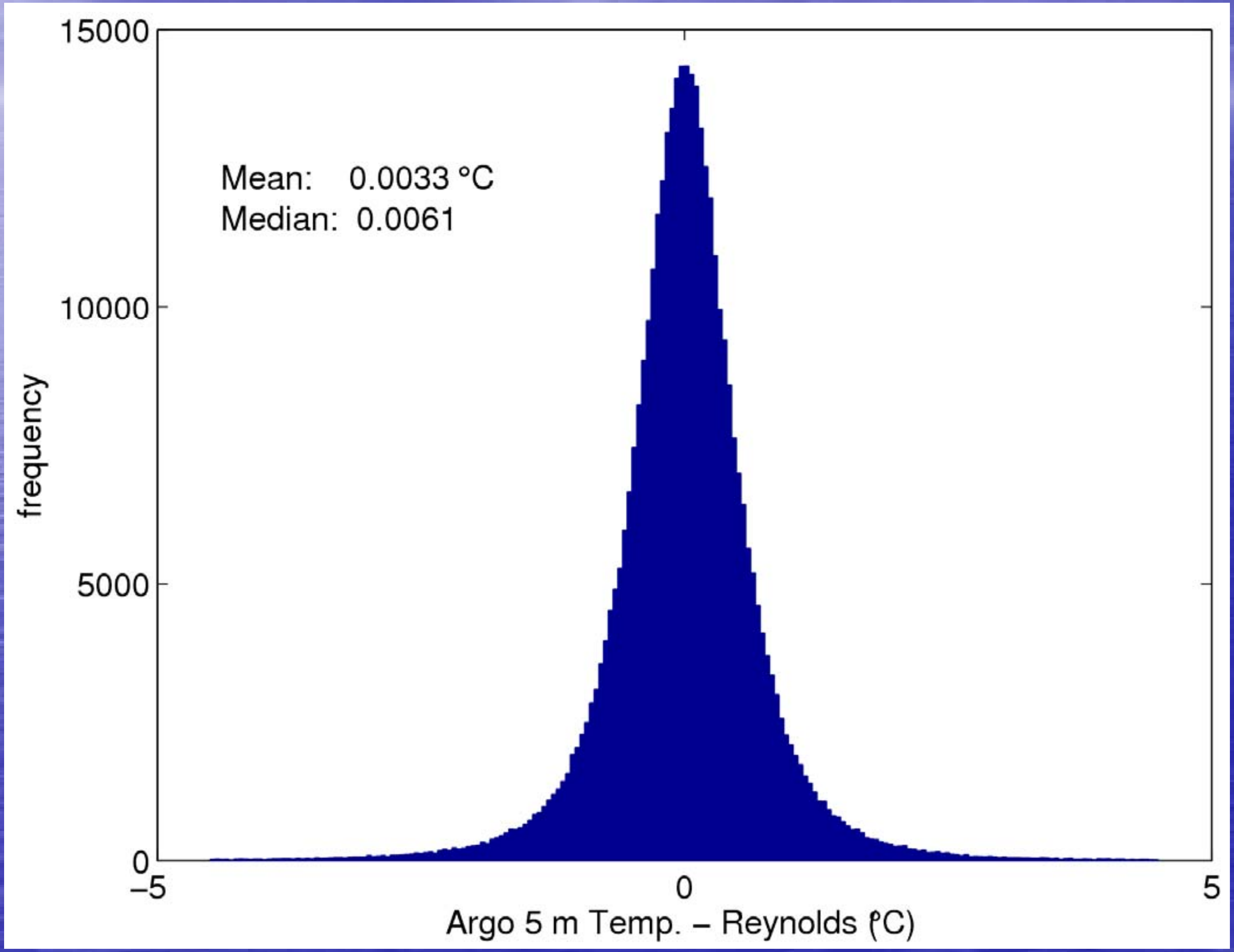
Satellite SST Observations

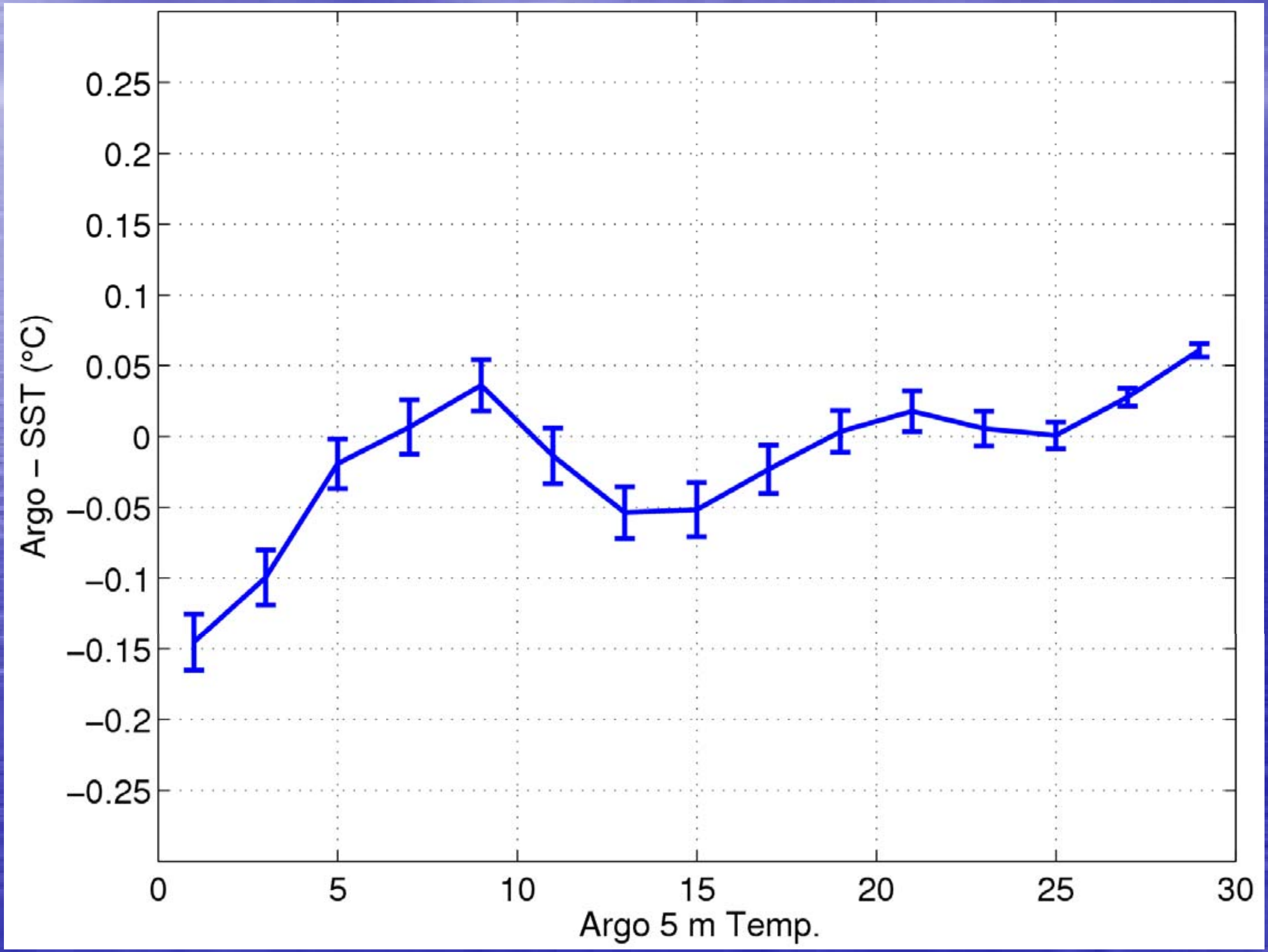


From *Roemmich and Gilson*, ***Progress in Oceaongraphy***, *2008*

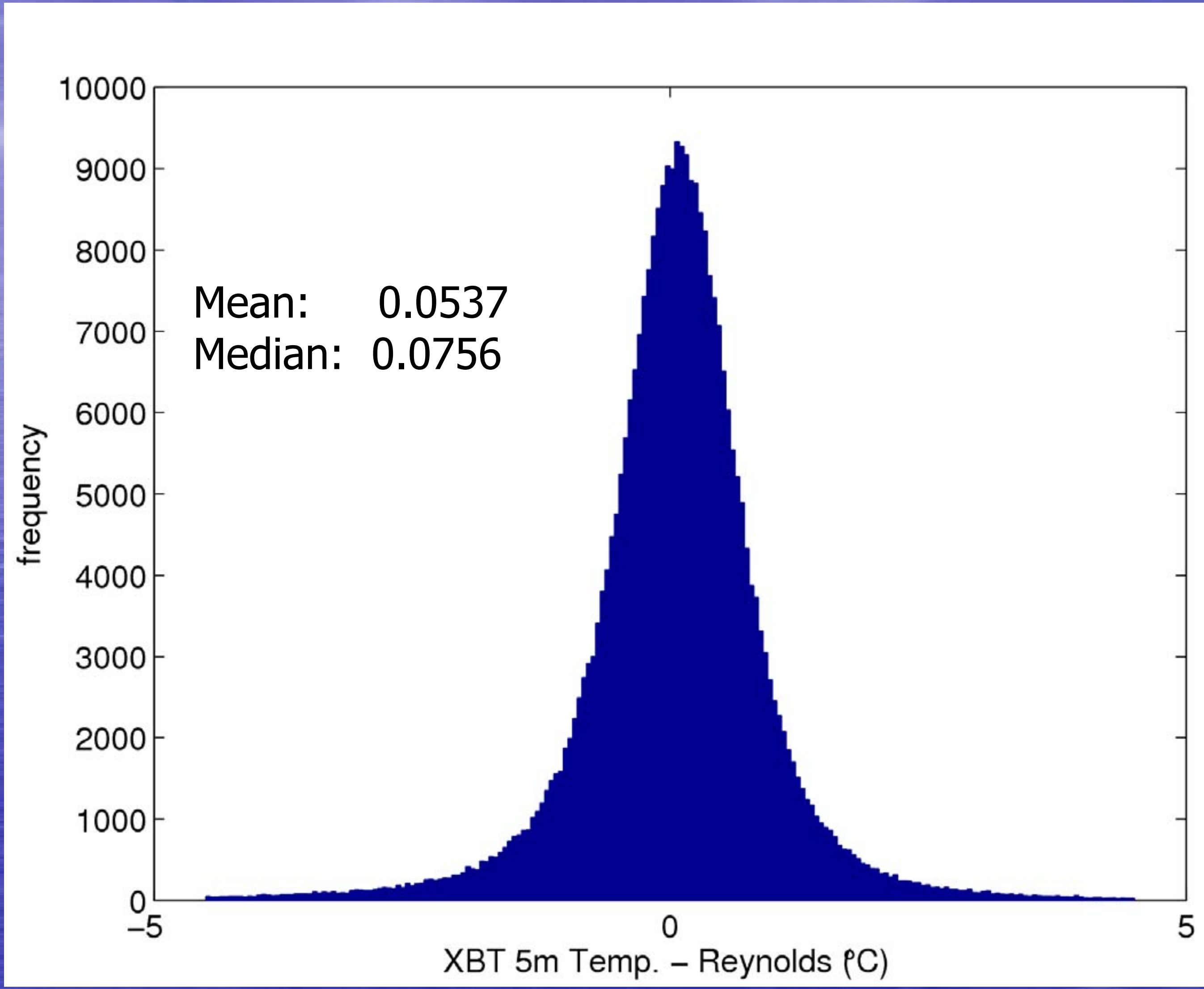
Argo - SST, all data



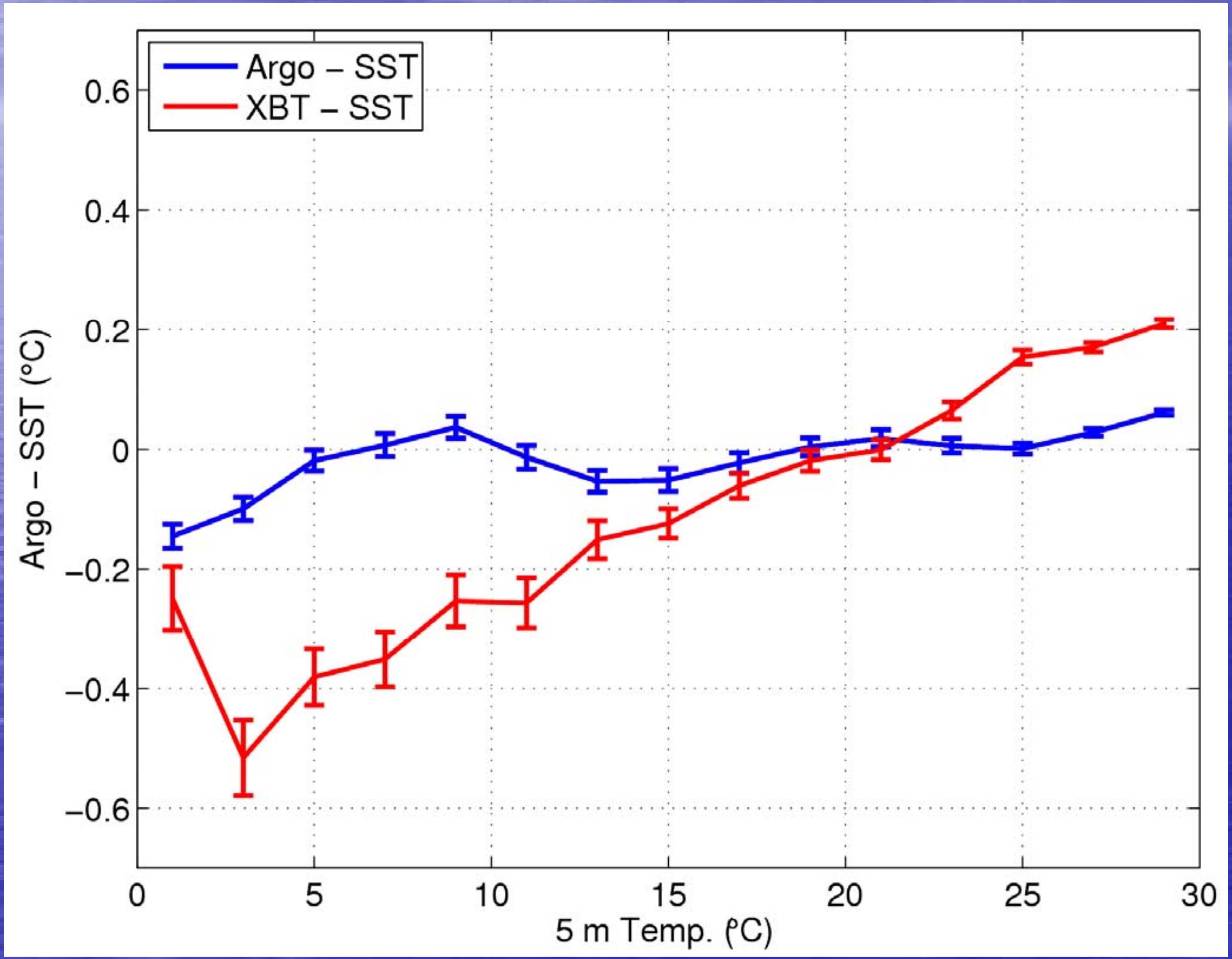
Argo – SST v. Temp



XBT- SST, all data

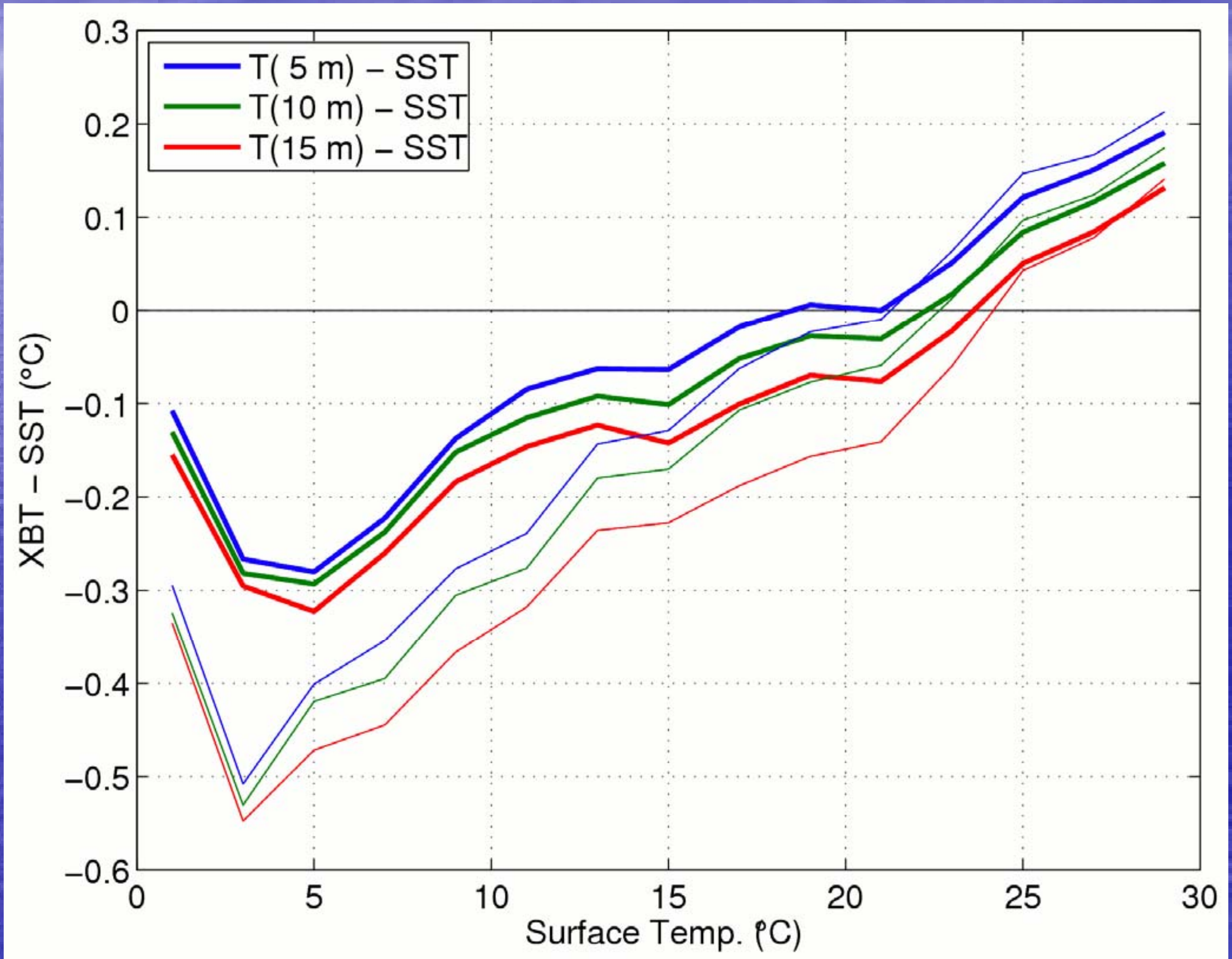


XBT – SST v. Temp.

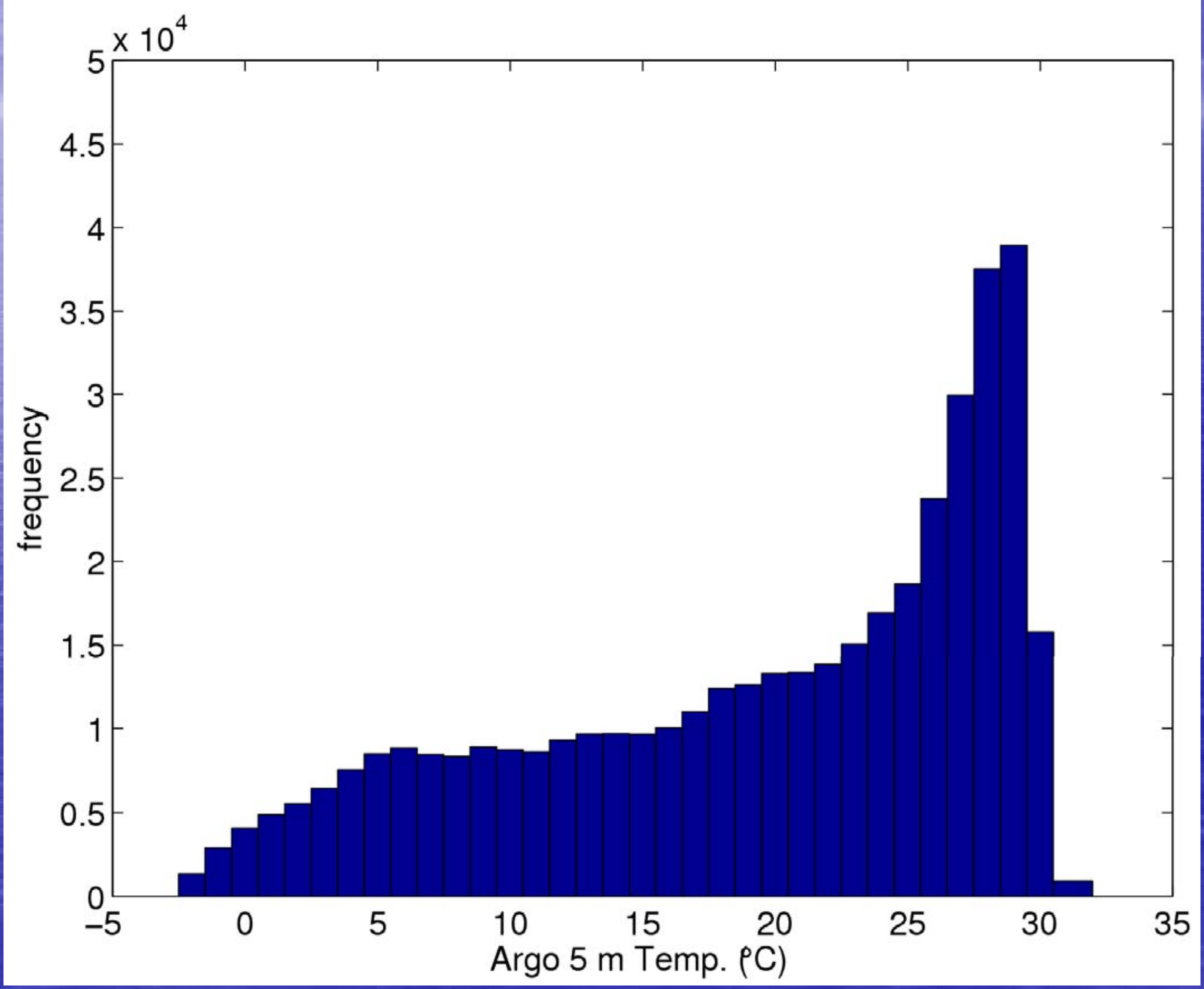


GHRSST NCDC Product – ¼ degree, daily

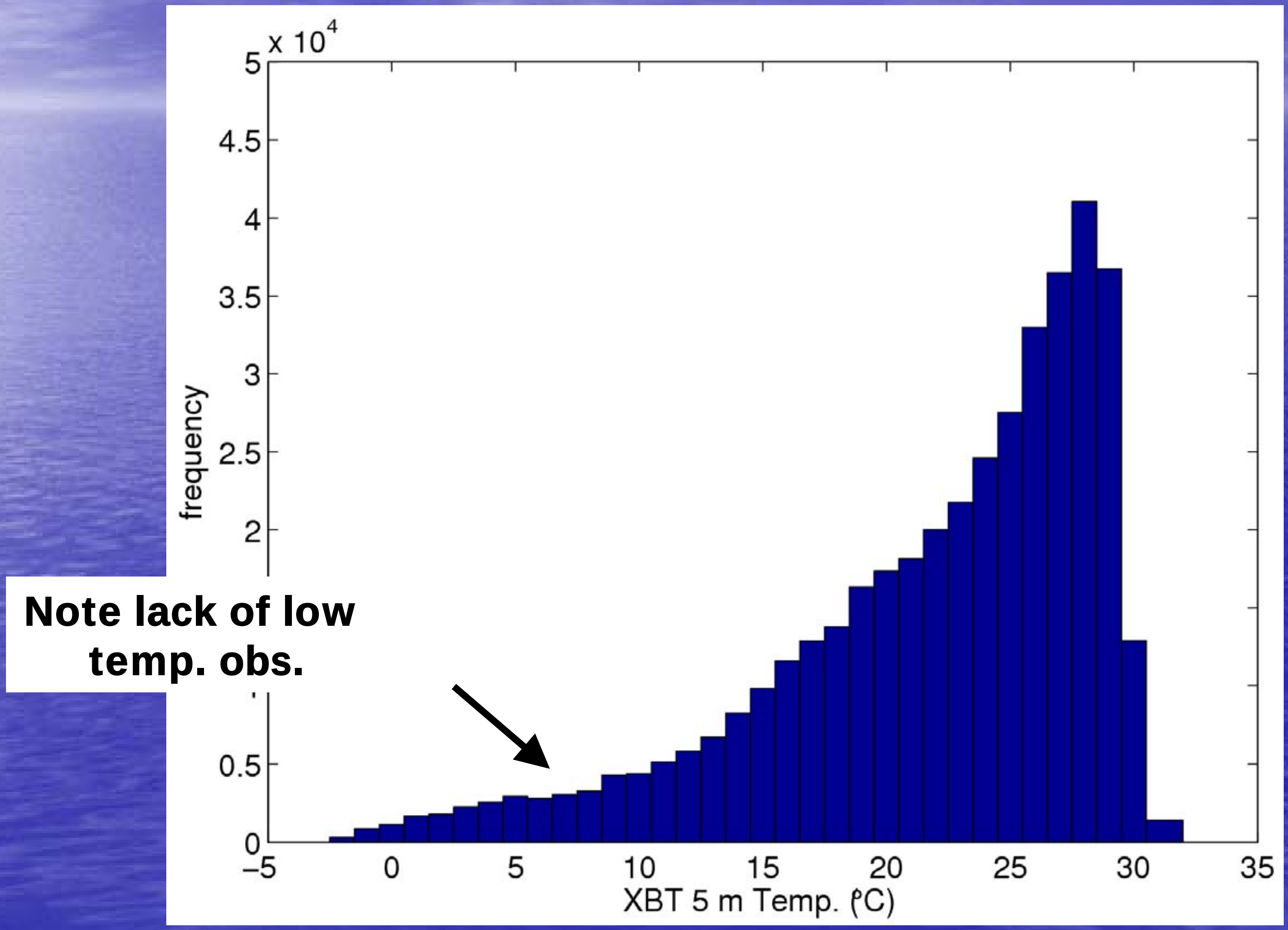
XBT bias v. depth



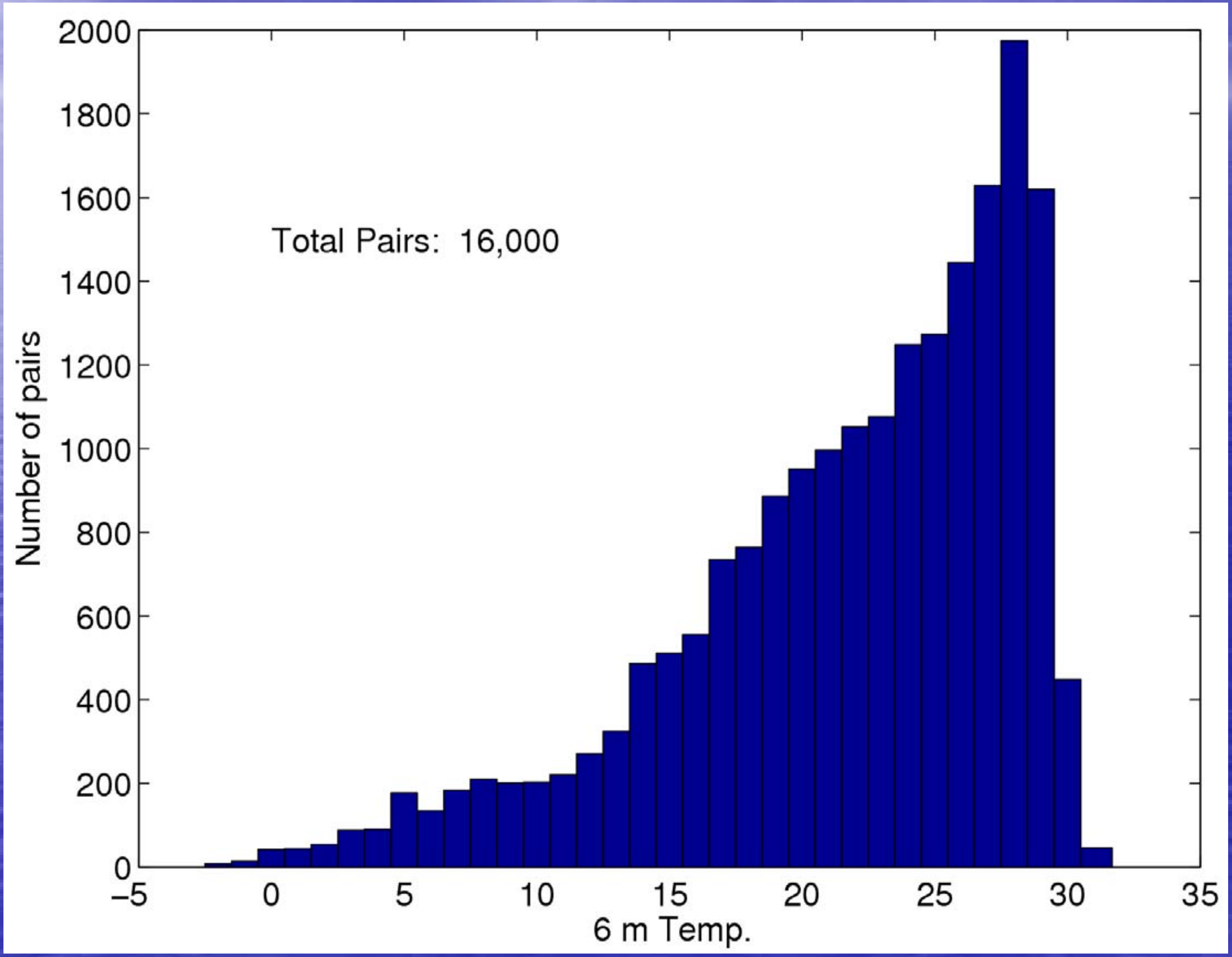
Number of Argo samples v. Temp.



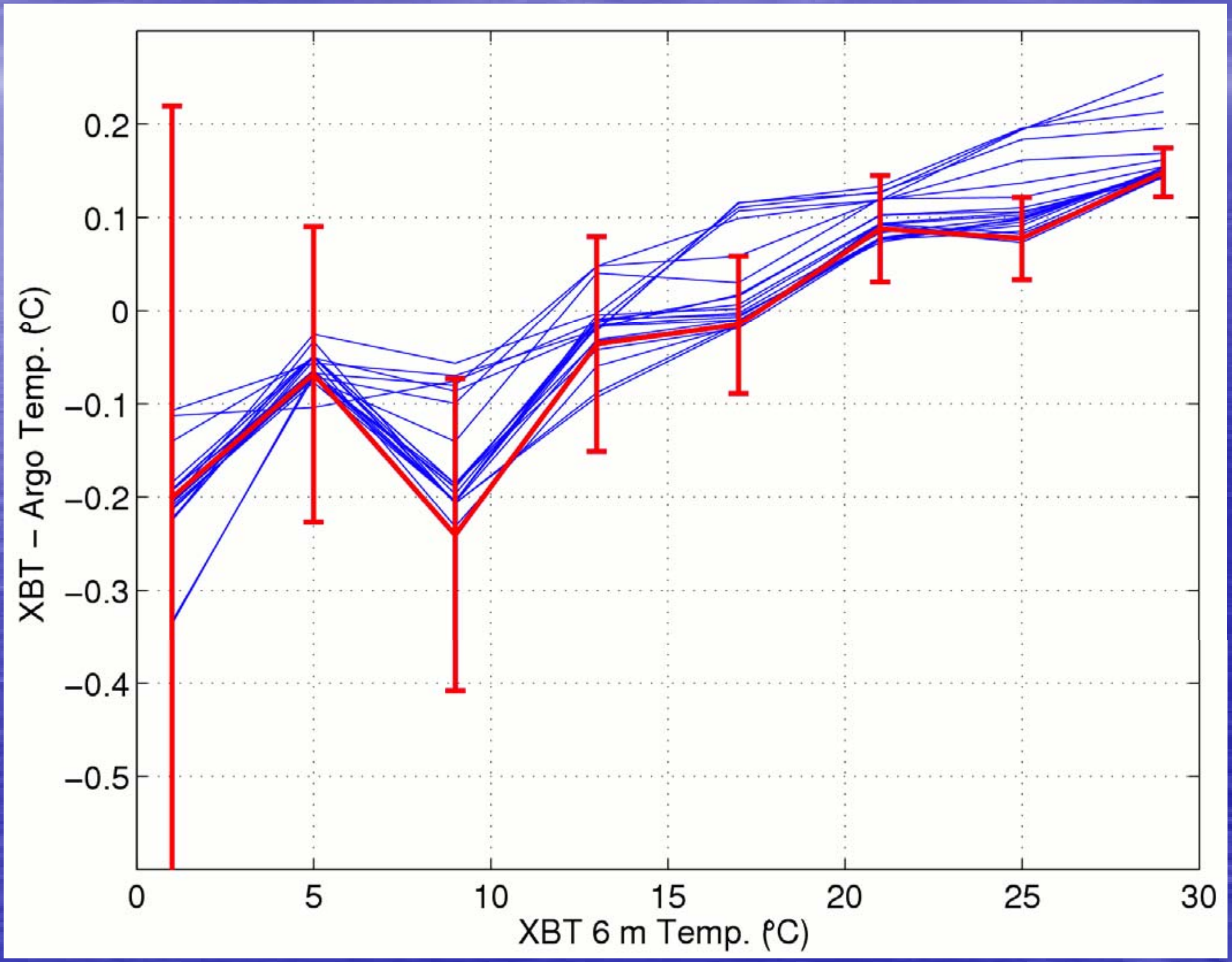
Number of XBT samples v. Temp.



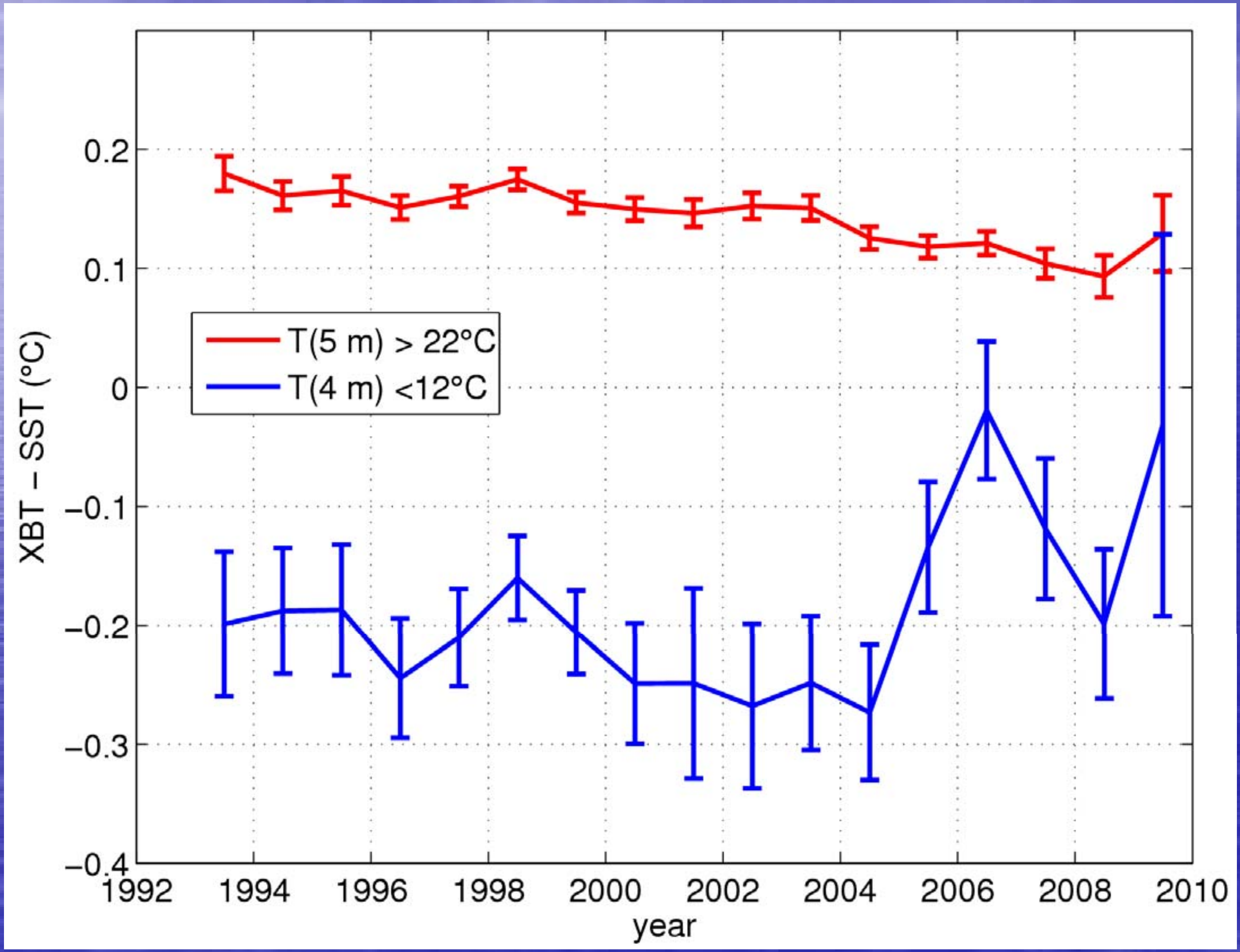
XBT/Argo pairs v. Temp.



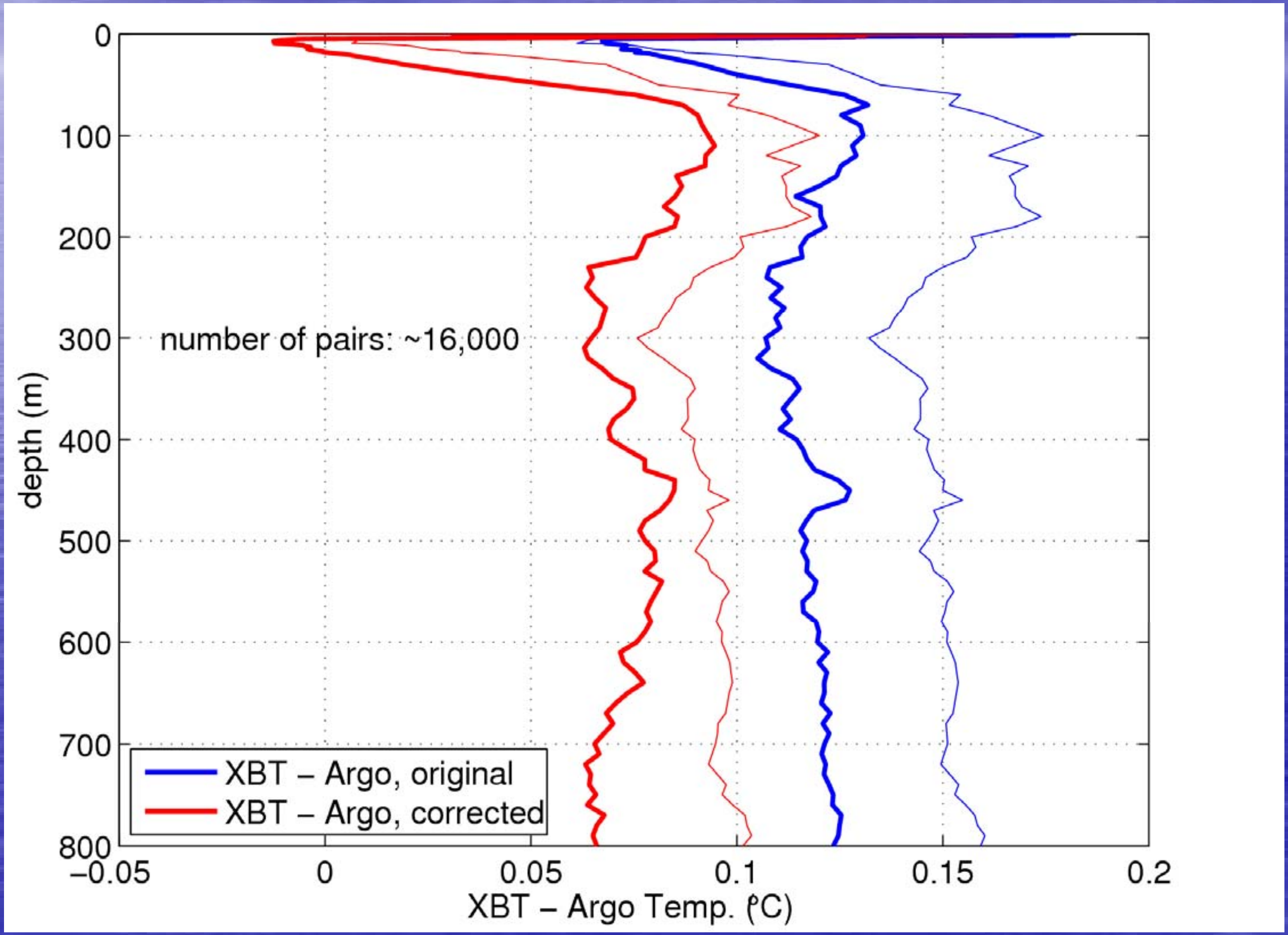
XBT bias v. T from XBT/Argo pairs



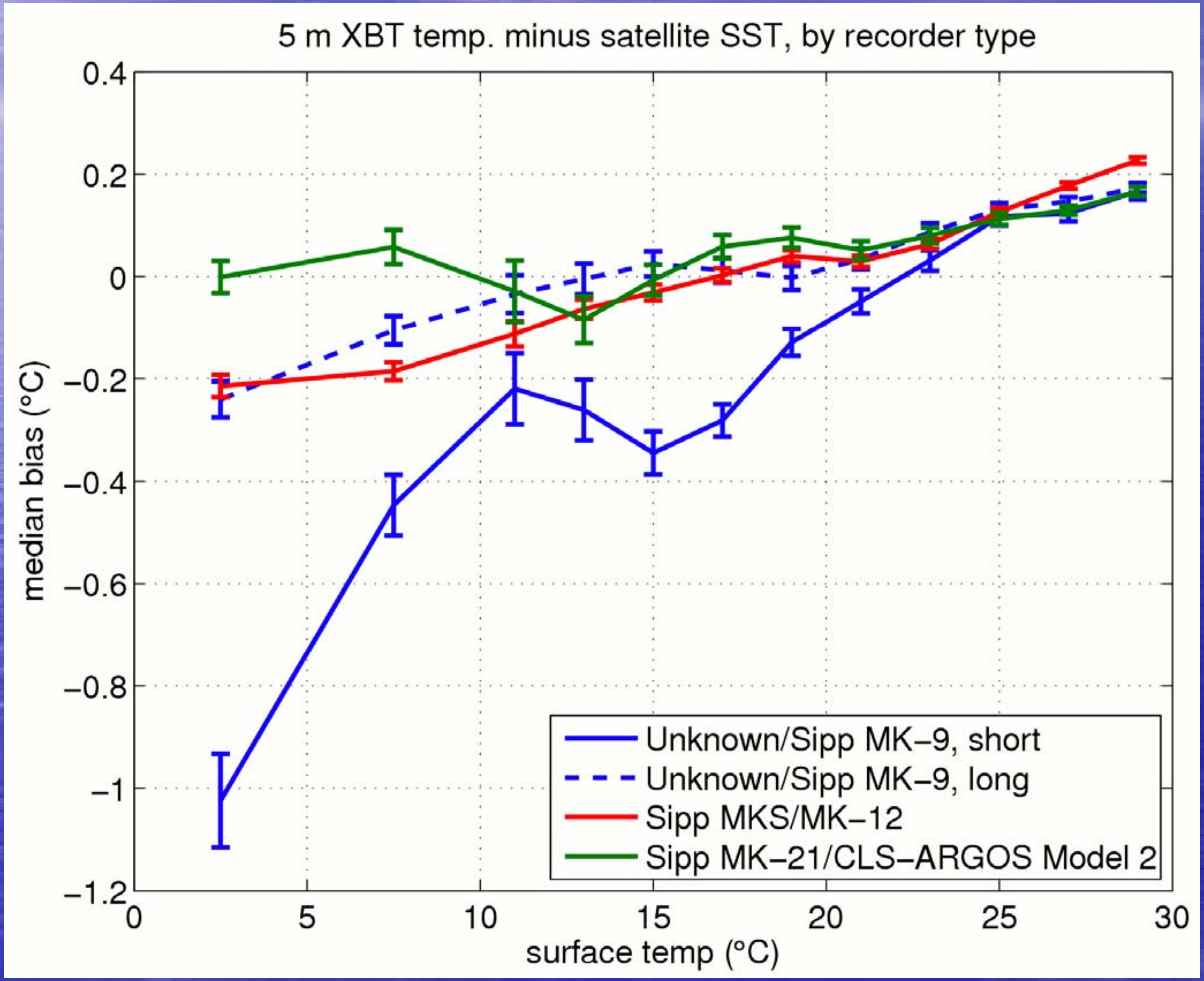
Time dependence of XBT bias



XBT – Argo after T_{bias} subtraction



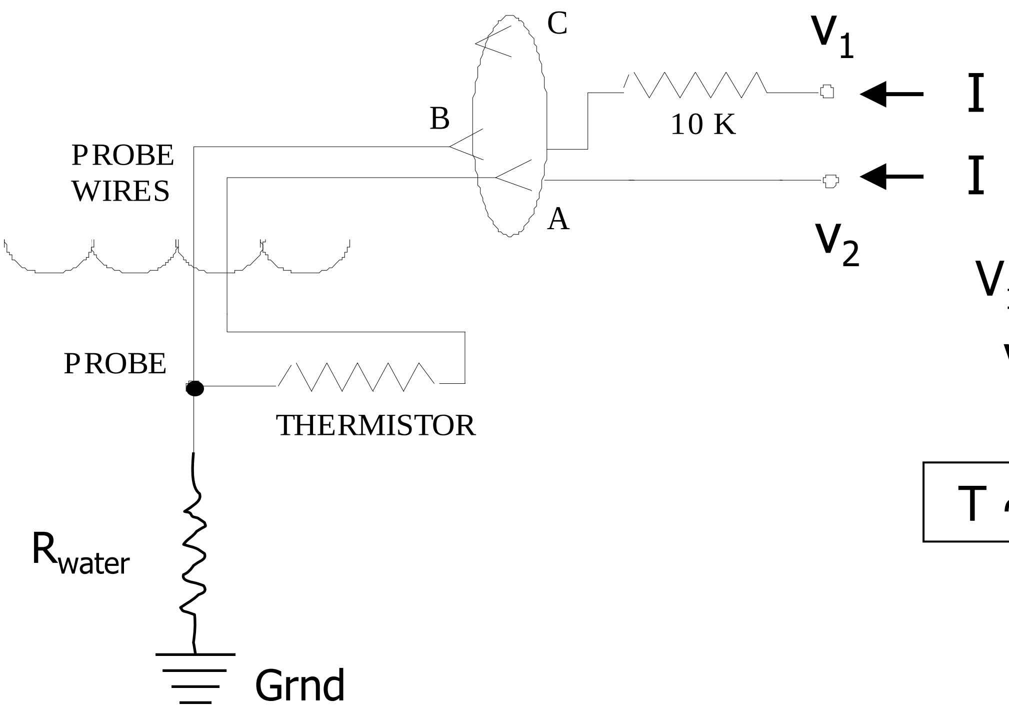
XBT Bias for different recorders



Conclusions

!?

XBT Circuit Diagram

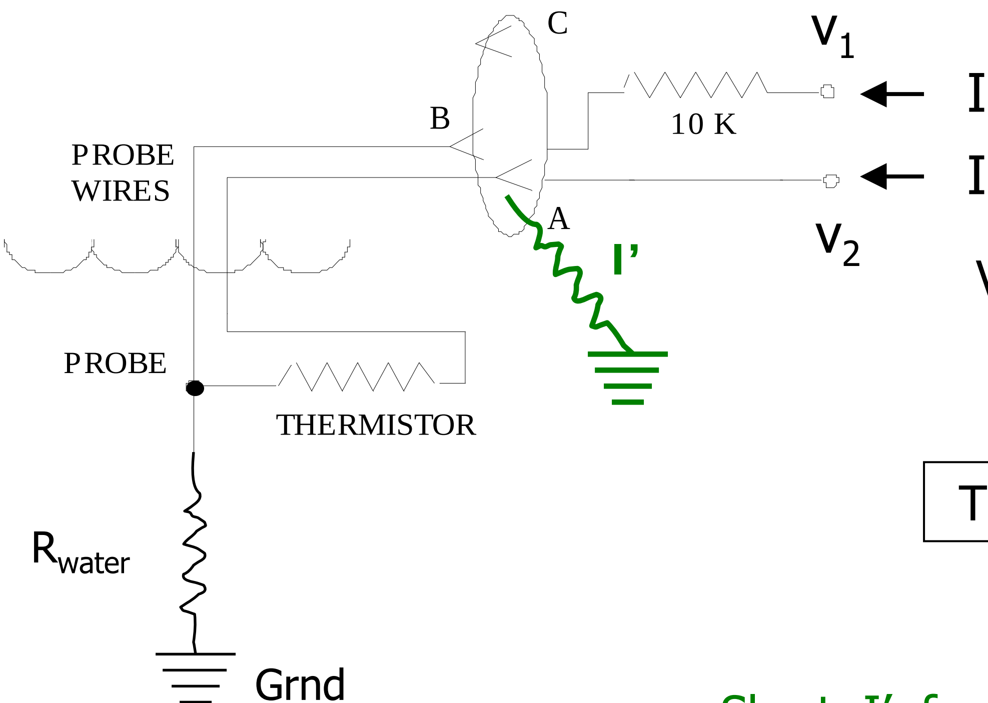


$$V_1 = I - (R_{thermistor} + R_{wire} + R_{water})$$

$$V_2 = I - (10^4\ \Omega + R_{wire} + R^{water})$$

$$T \sim - R_{thermistor} = (V_2 – V_1) / I - 10^4\ \Omega$$

XBT Circuit Diagram



$$V_1 = I - (R_{thermistor} + R_{wire} + R_{water})$$

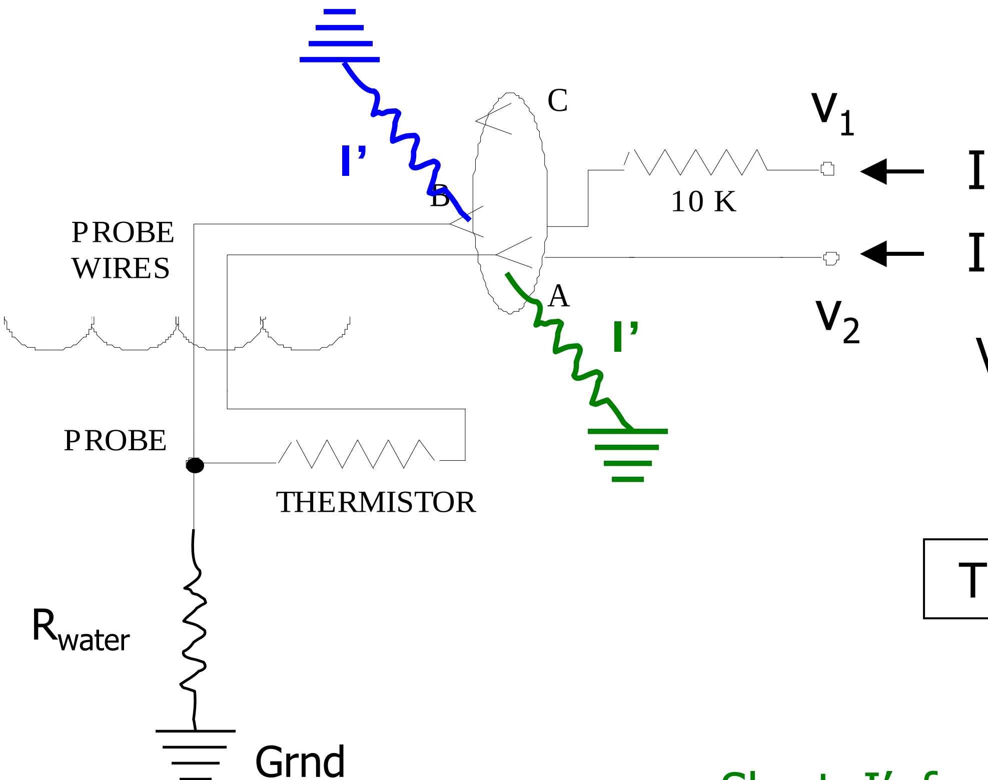
$$V_2 = I - (10^4\ \Omega + R_{wire} + R^{water})$$

$$T \sim -R_{thermistor} = (V_2 - V_1) / I - 10^4\ \Omega$$

<u>Short, I', from A</u>

$$T \sim -R_{thermistor} = (V_2 - V_1 + I' R_{wire} + I' R_{water}) / (I - I') - 10^4\ \Omega$$

XBT Circuit Diagram



$$V_1 = I - (R_{thermistor} + R_{wire} + R_{water})$$

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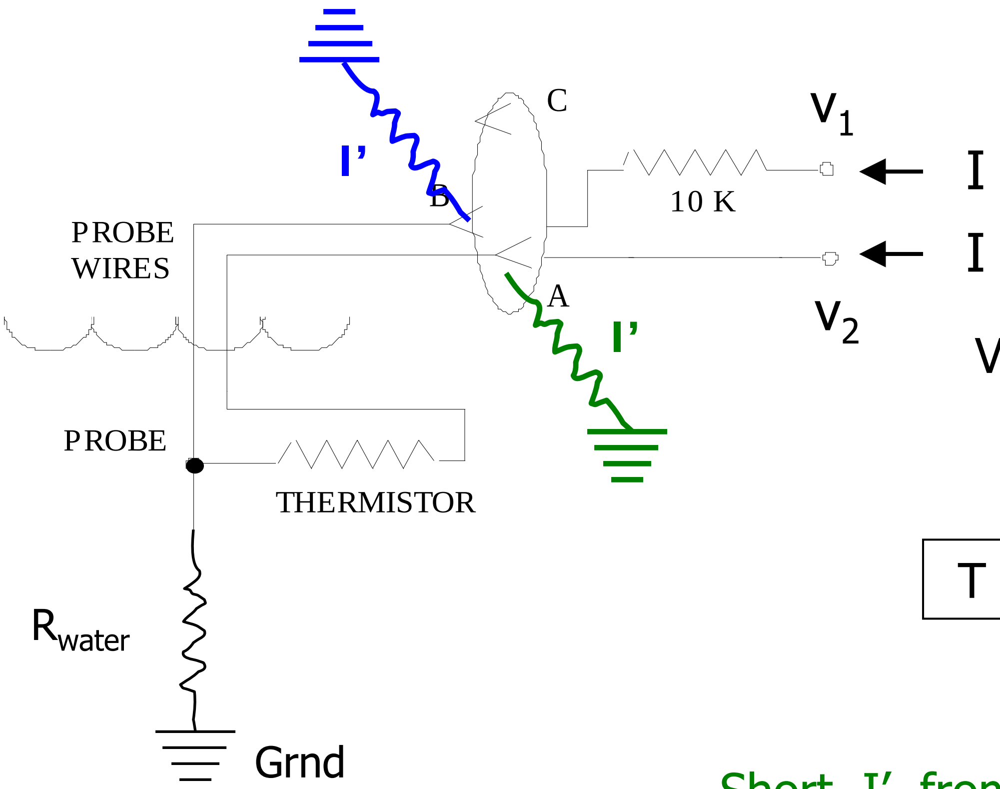
Short, I', from A

$$T \sim - R_{thermistor} = (V_2 - V_1 + I' R_{wire} + I' R_{water}) / (I - I') - 10^4\ \Omega$$

Short, I', from B

$$T \sim - R_{thermistor} = (V_2 - V_1 - I' R_{wire} - I' R_{water}) / I - 10^4\ \Omega$$

XBT Circuit Diagram



$$V_1 = I - (R_{thermistor} + R_{wire} + R_{water})$$

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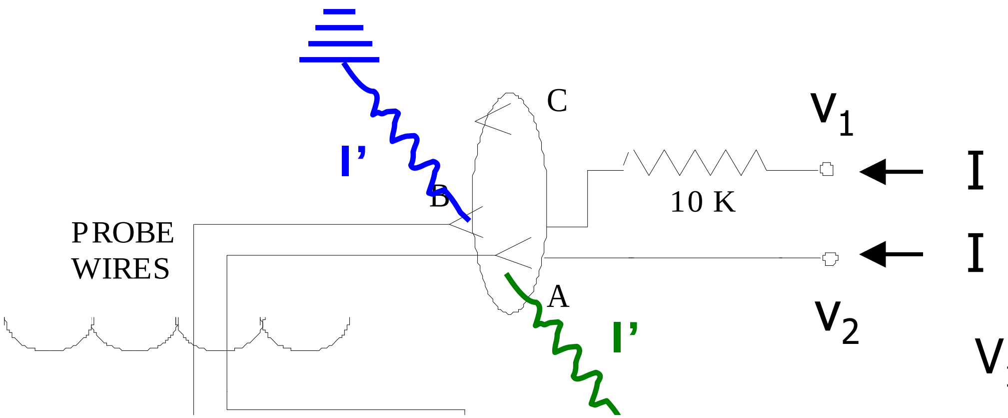
XBT Circuit Diagram



$V_1 = I - (R_{thermistor} + R_{wire} + R_{water})$

But: Is R_{water} a strong function of distance than water temperature?

Grnd

<u>Short, I′, from A</u>

$T \sim - R_{thermistor} = (V_2 - V_1 + I' R_{wire} + I' R_{water}) / (I - I') - 10^4\ \Omega$

<u>Short, I′, from B</u>

$T \sim - R_{thermistor} = (V_2 - V_1 - I' R_{wire} - I' R_{water}) / I - 10^4\ \Omega$