

Evaluation of Radiometer RFI Flagging Algorithm

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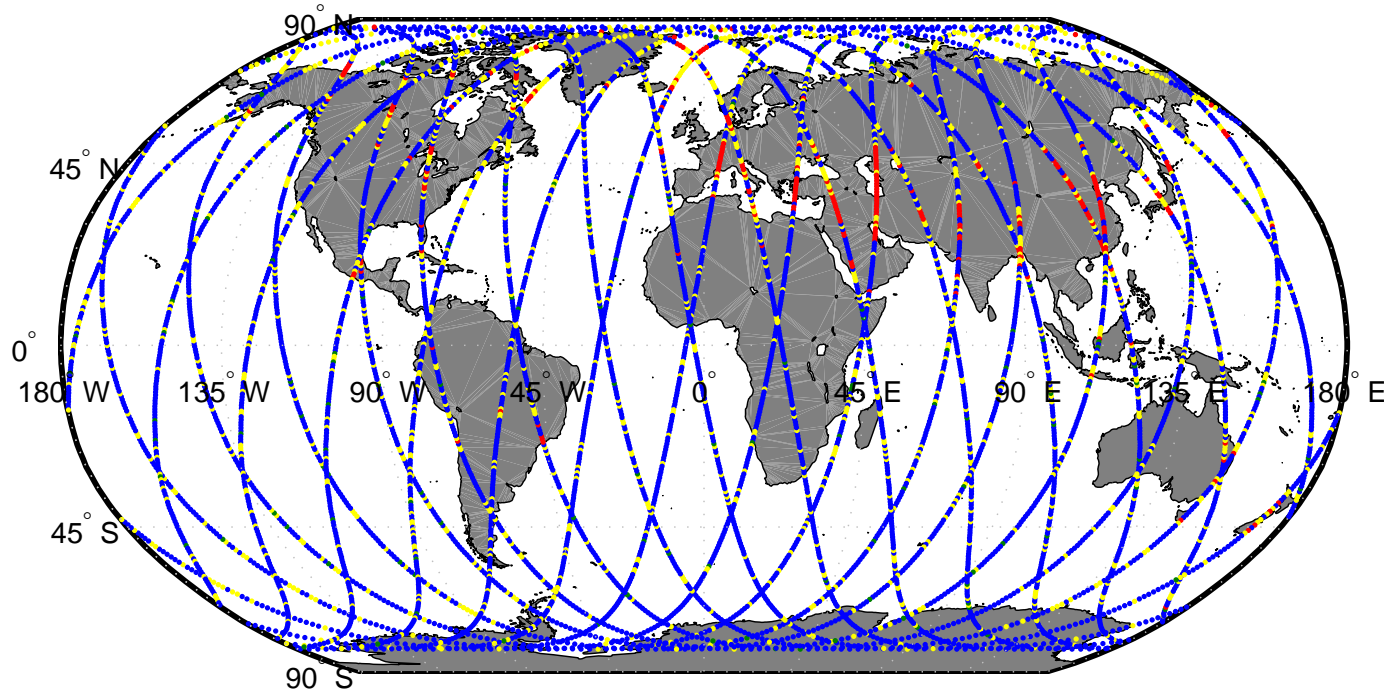
Aquarius Calibration/Validation Workshop

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Outline

- Identification of regions affected by RFI
- Analysis of RFI flagging algorithm
 - overview
 - examples and problems
- Conclusions

RFI Location

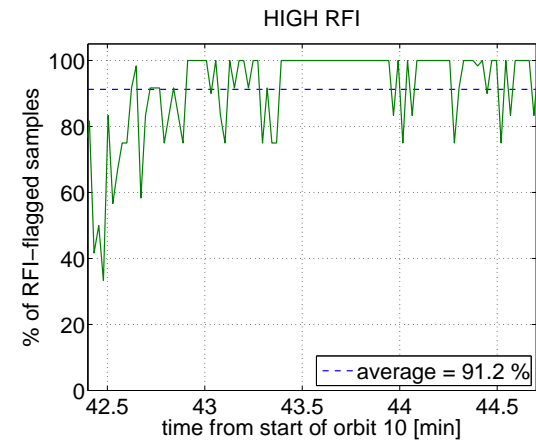
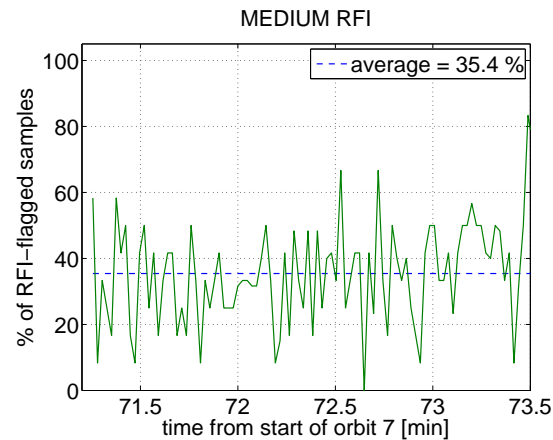
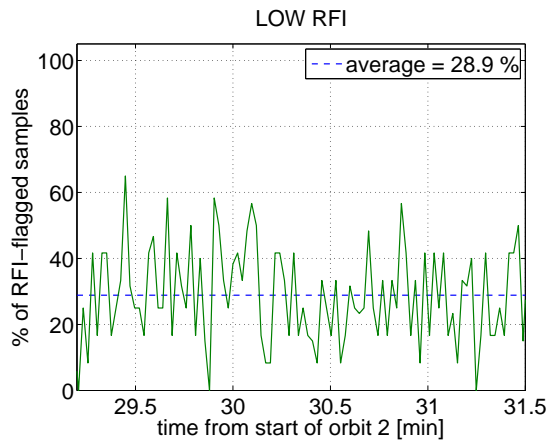


$$\Delta T_{AF}^{\%} = 100 \frac{T_A - T_F}{T_A}$$

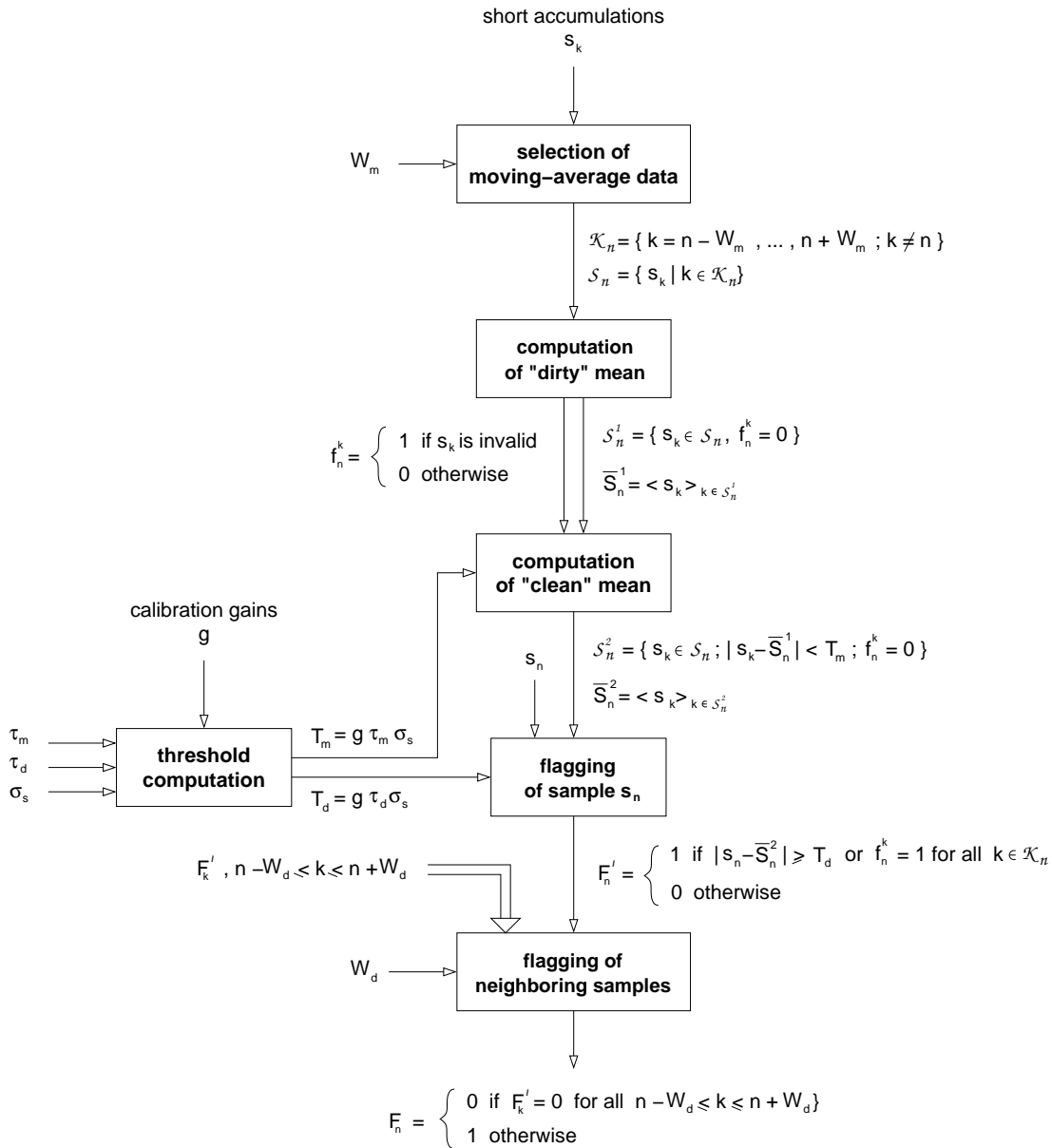
- $\Delta T_{AF}^{\%} = 0 \implies$ no RFI - green, 2%
- $0 < \Delta T_{AF}^{\%} \leq 0.1 \implies$ low RFI - blue, 73%
- $0.1 < \Delta T_{AF}^{\%} \leq 1 \implies$ medium RFI - yellow, 21%
- $\Delta T_{AF}^{\%} > 1 \implies$ high RFI - red, 4%

RFI flag

- three regions considered:
 - open ocean \implies low RFI
 - coastal ocean \implies medium RFI
 - land \implies high RFI
- over open ocean: too many samples are flagged as corrupted by RFI
- by the coast and over land: percentage of RFI flags is reasonable

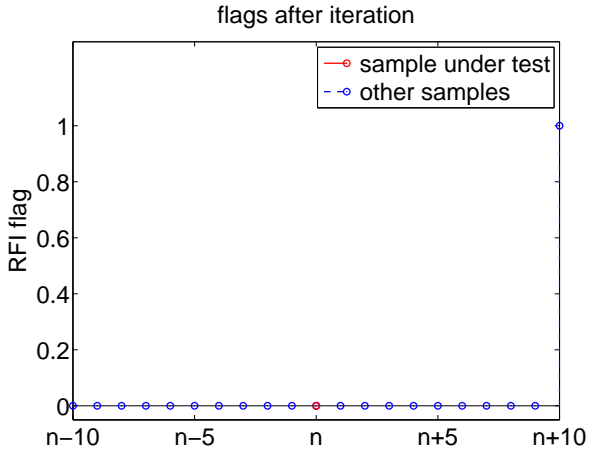
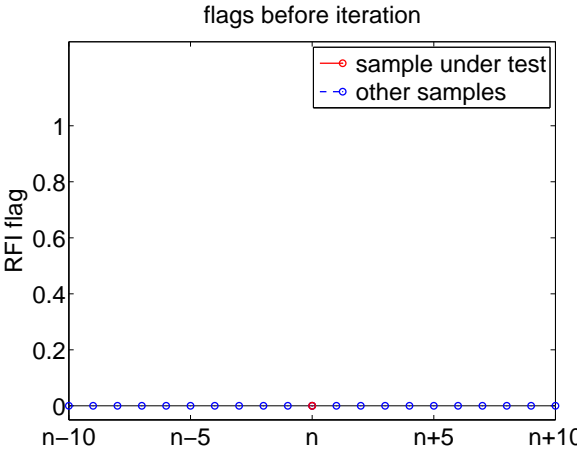
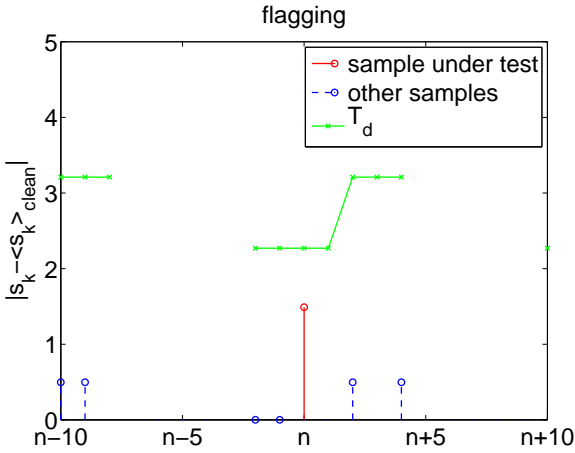
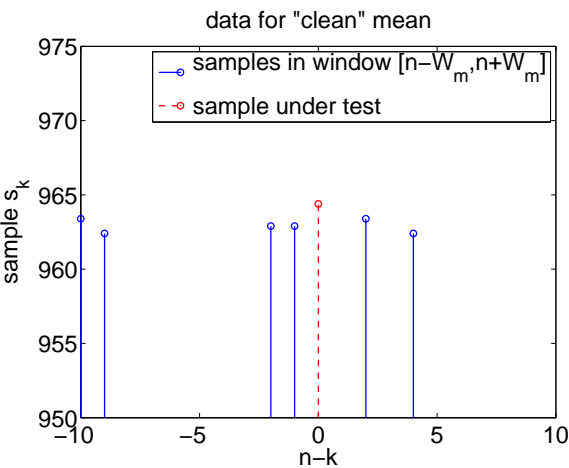
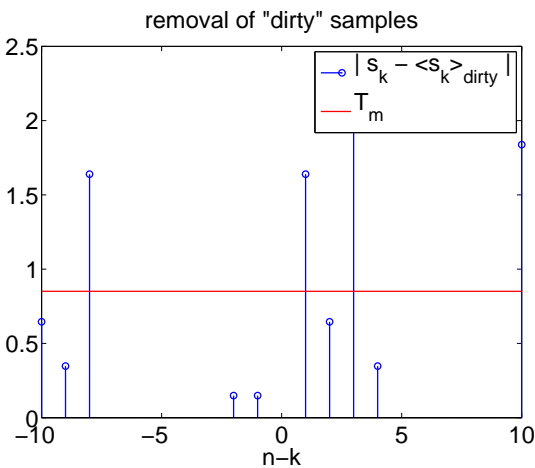
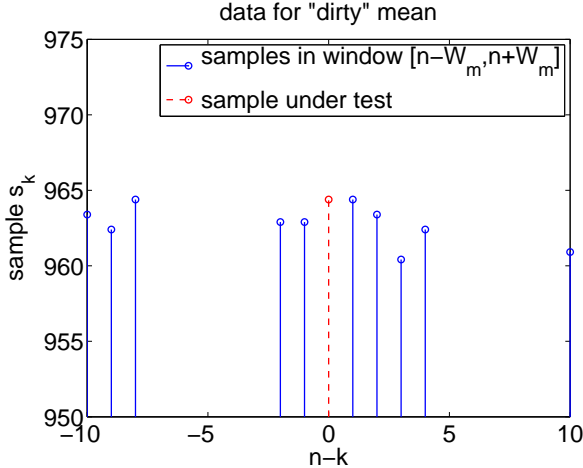


RFI flagging algorithm

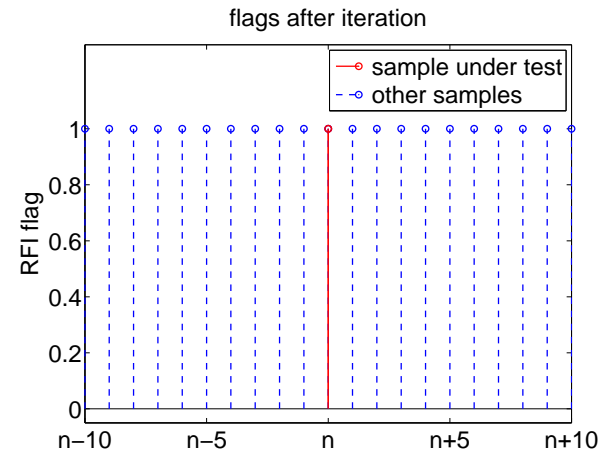
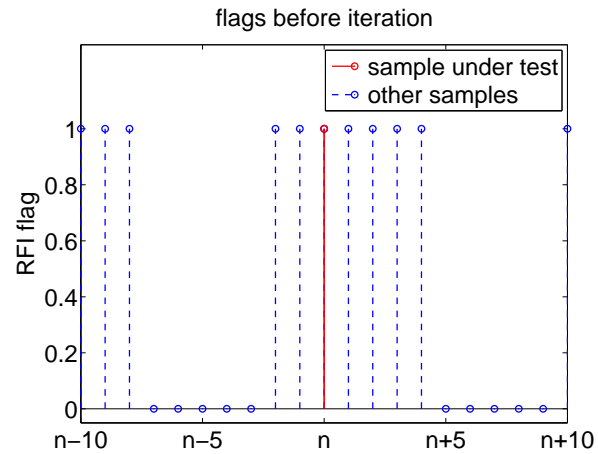
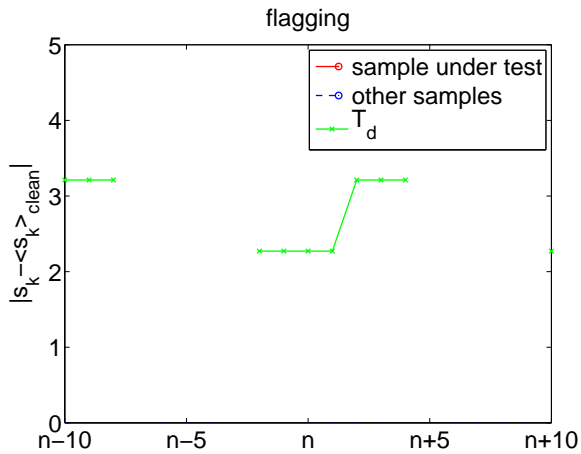
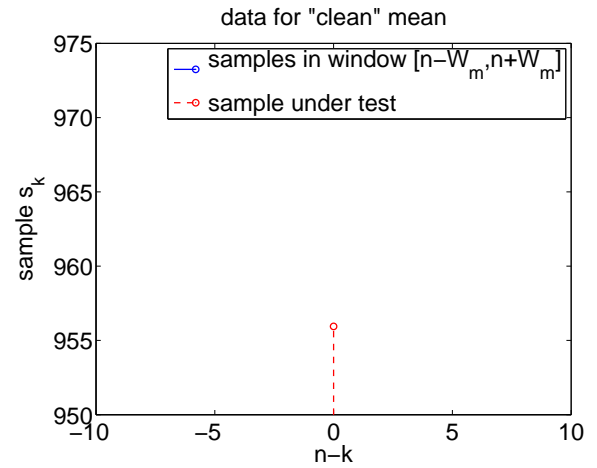
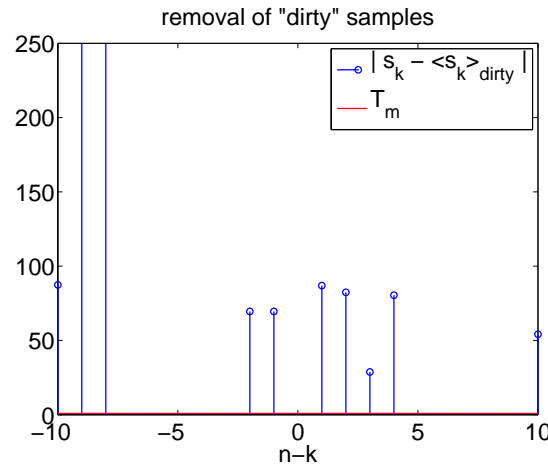
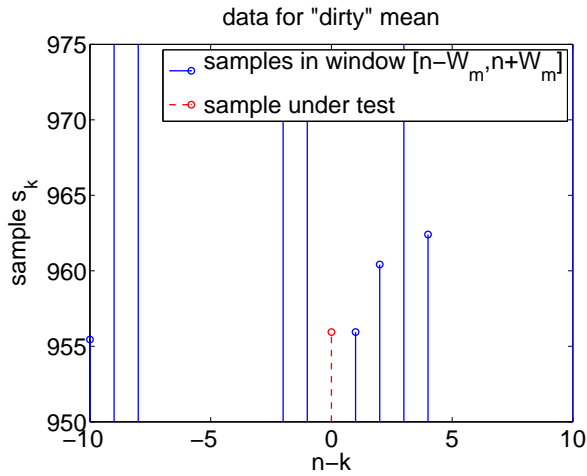


W_m	10
W_d	5
σ	~ 0.5
g	0.8-1.6
τ_m	1.5
τ_d	4.0

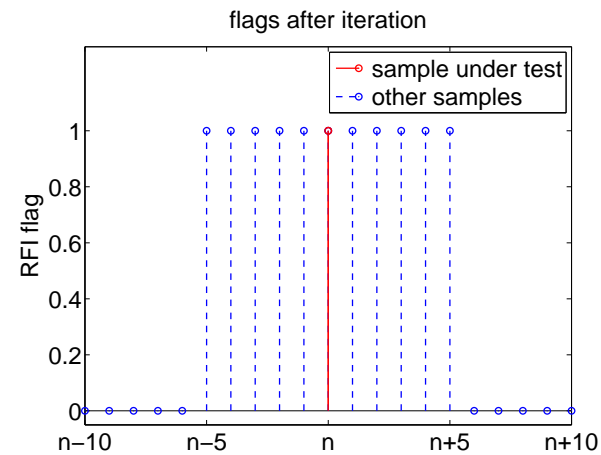
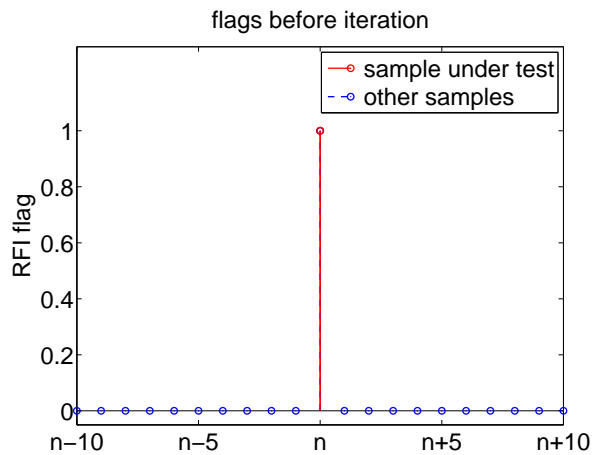
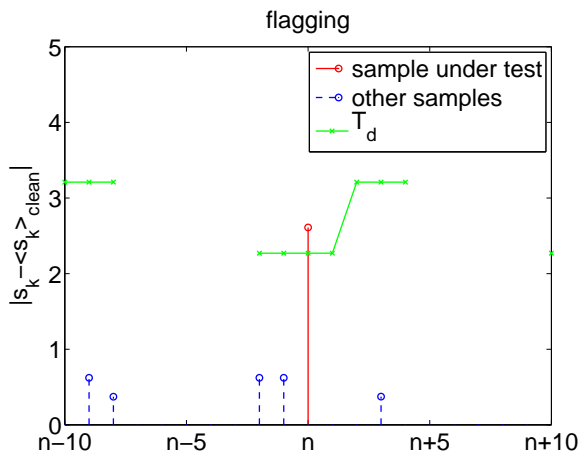
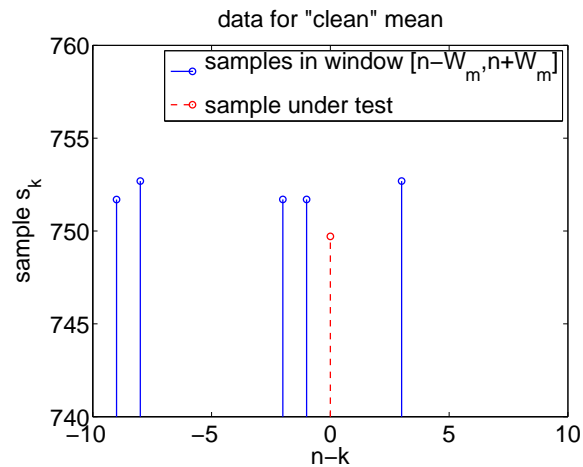
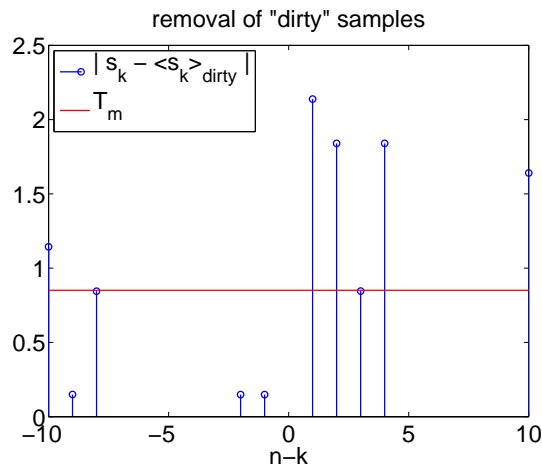
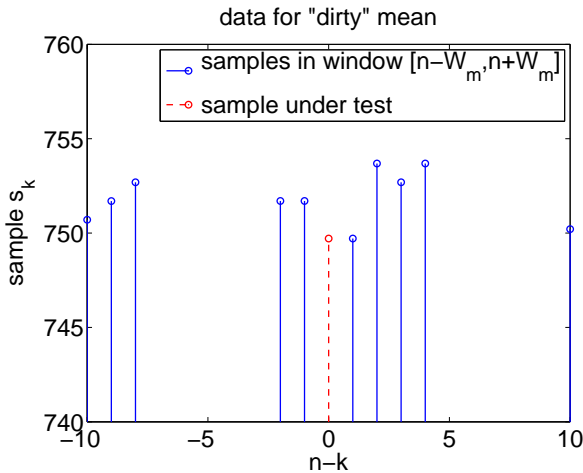
RFI detection: high RFI, flag = 0



RFI detection: high RFI, flag = 1



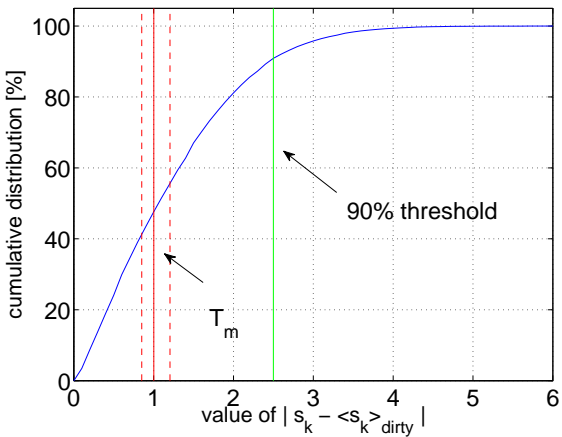
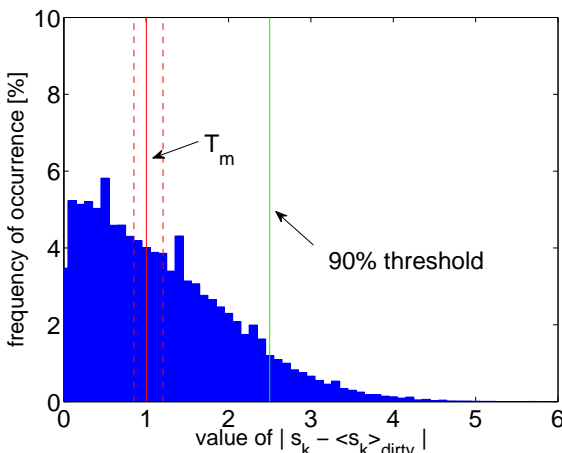
RFI detection: low RFI, flag = 1



Statistics in the RFI detection algorithm

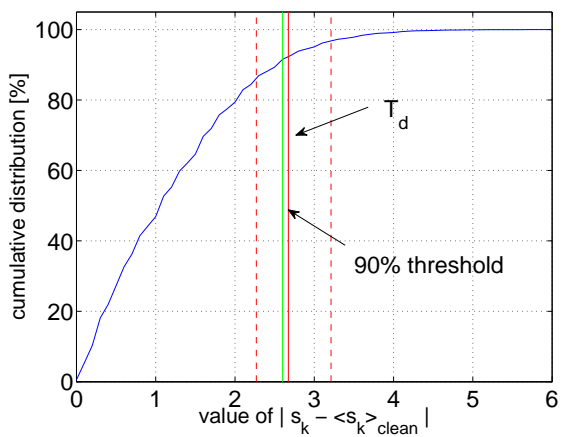
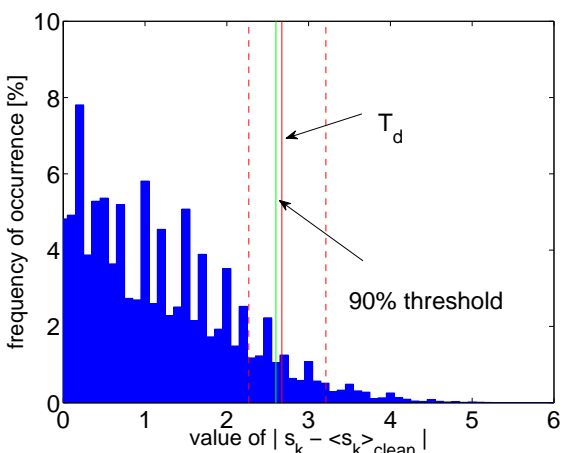
removal of “dirty samples”

$$|s_n - \langle s_n \rangle_{dirty}| < T_m$$



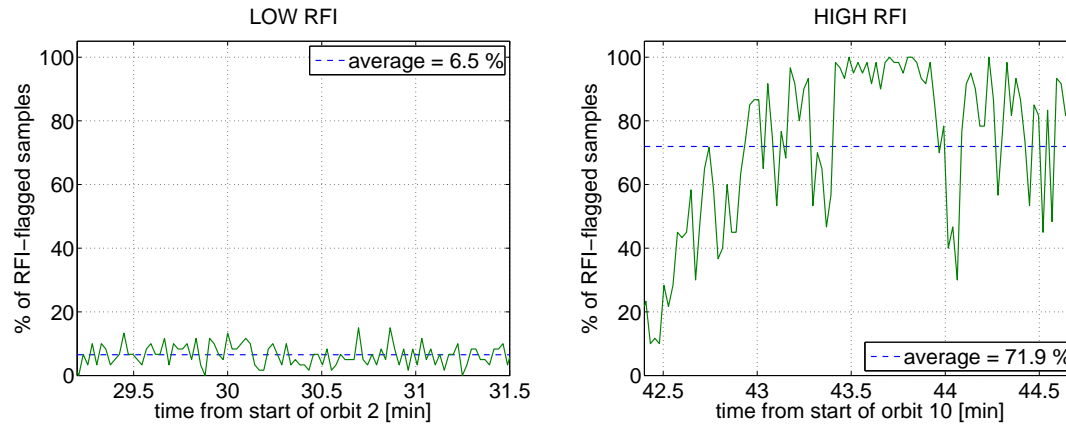
RFI flagging

$$|s_n - \langle s_n \rangle_{clean}| < T_d$$

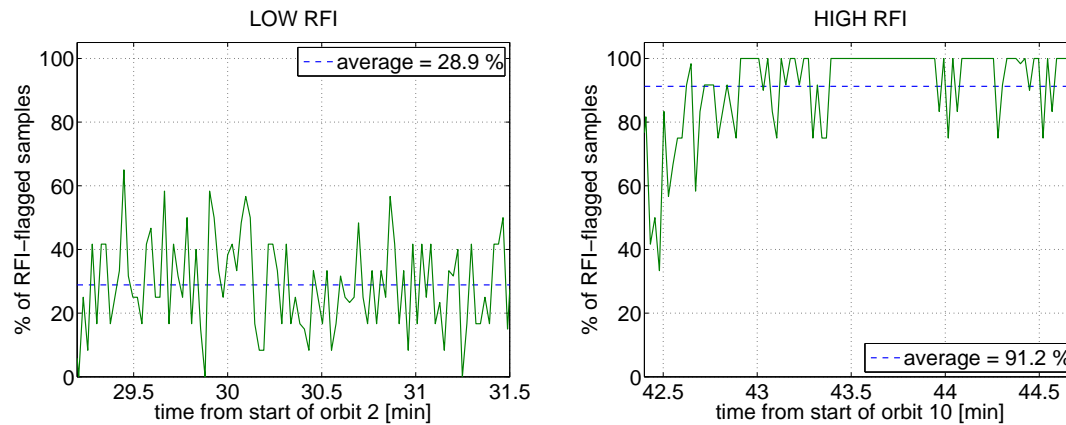


RFI flagging of RFI neighboring samples

after initial RFI flagging



after considering flags of neighboring samples



Conclusions

- RFI mostly over land and on coastal areas
- too many samples discarded in clean mean computation
⇒ increase T_m over ocean?
- too many samples flagged as corrupted by RFI in low RFI conditions
⇒ decrease W_d over ocean?