Field quality issues of MQTL quadrupoles

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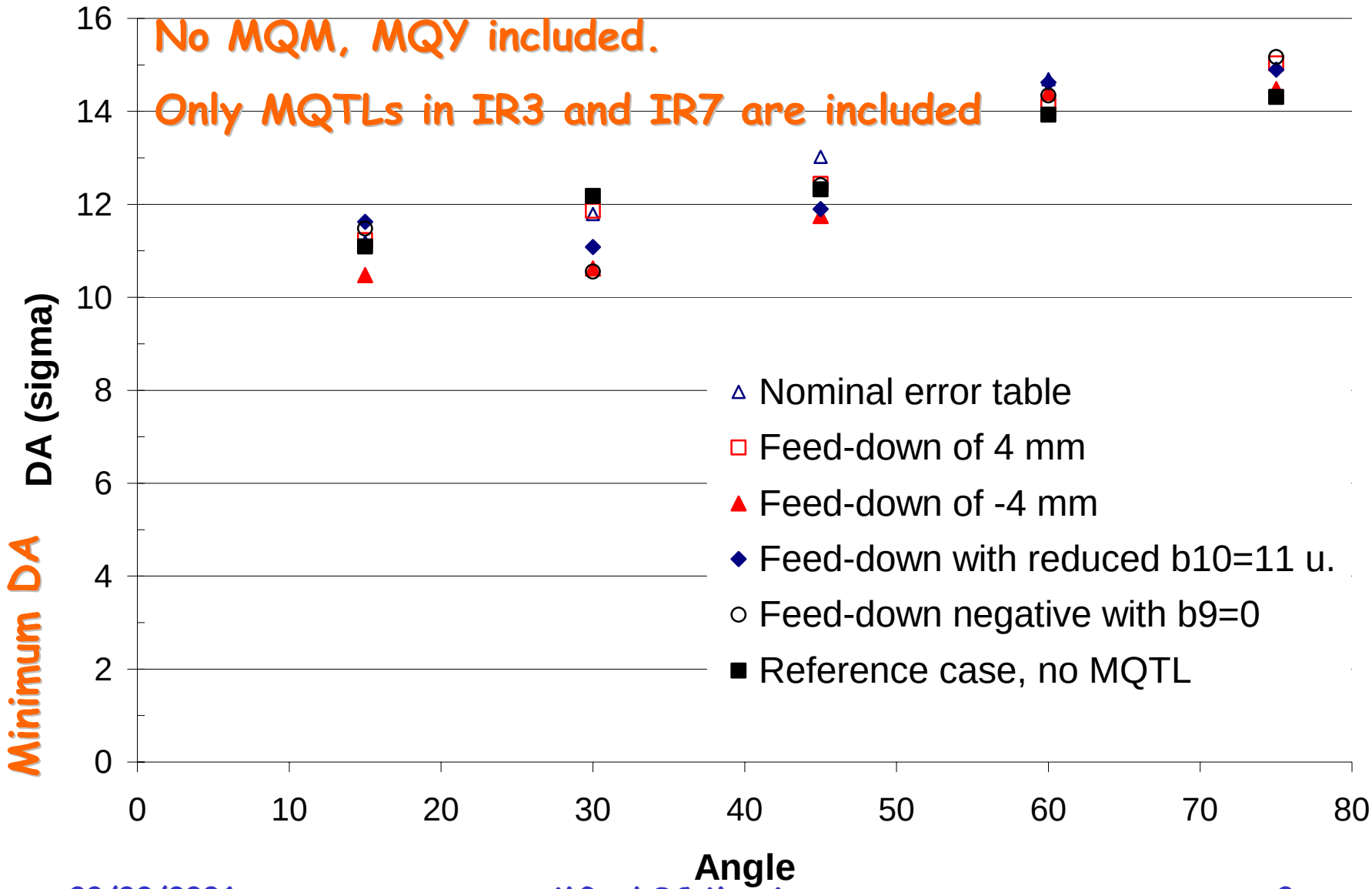
- Situation of MQTLs: performance and field quality
- Error tables
- Tracking results
- Conclusions

Acknowledgements: S. Fartoukh, M. Karppinen, R. Wolf

Situation of MQTLs: performance and field quality

- MQTLs suffered from a number of issues:
  - Quench performance: already dealt with. A list of slot less demanding in terms of strength were prepared and given to AT-MEL. Coordination between AT-MEL and AT-MAS is required to define the correct assembly, i.e. appropriate MQTLs in the appropriate slot.
  - Field quality: already dealt with. An error table was provided by R. Wolf (based on mechanical tolerances) and tracking simulations were performed (see FQWG meeting held on 16/11/04).

Results of DA computation for FQWG on 16/11/04



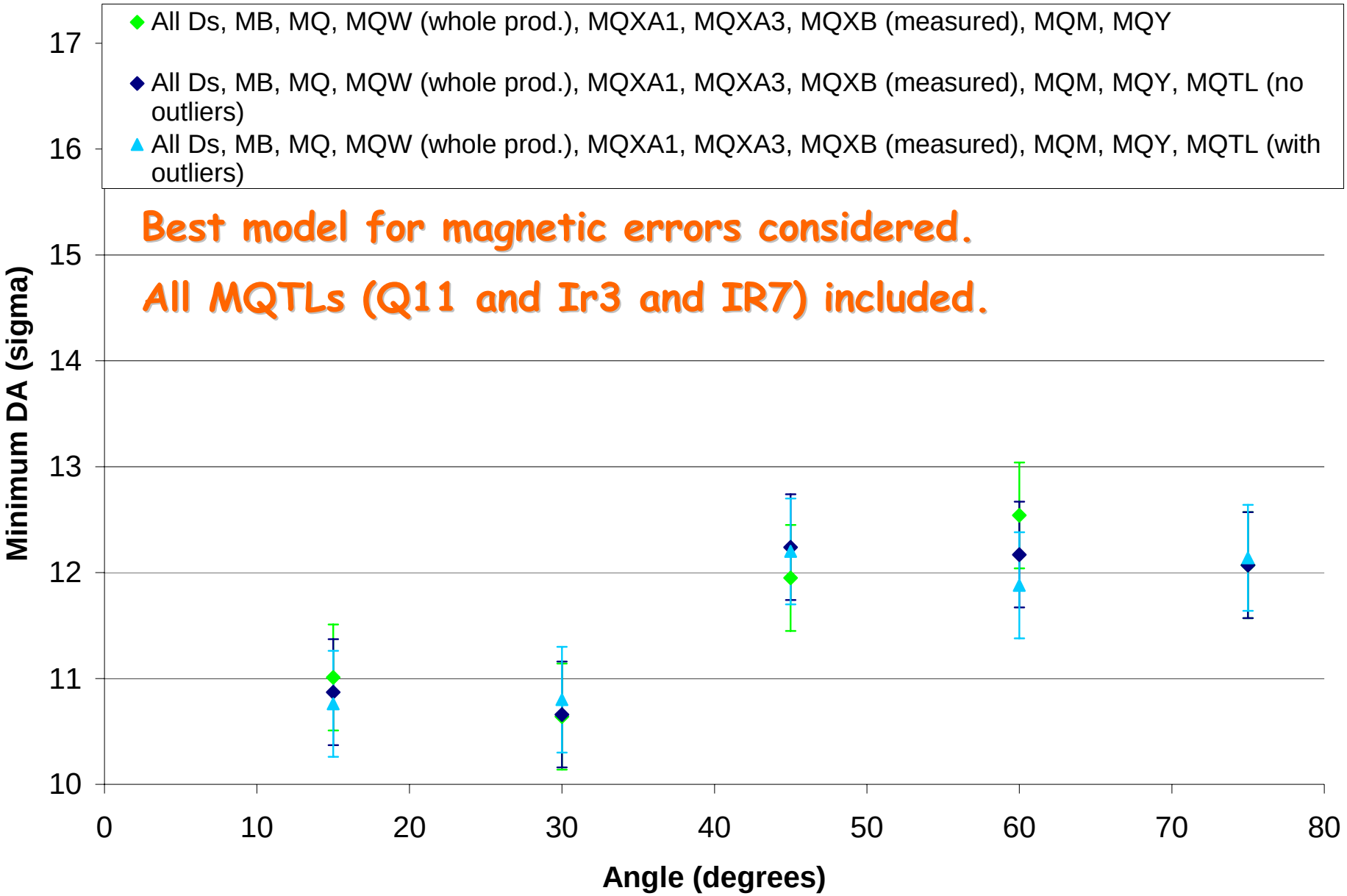
Recent news from the production

- The latest production showed some problematic modules in terms of field quality (b3, b4, a3, a4). A request was issued to analyse whether they can be accepted.
- Furthermore, it turned out that the target field quality used to qualify the magnets was the one specified for the MQTs.
- Following this finding a crash programme was launched to assess the impact of the actual field quality on the LHC DA.
- Two cases were considered:
  - FQ is deduced from the magnetic measurements at warm excluding the outliers.
  - FQ is deduced from the magnetic measurements at warm including also the outliers.

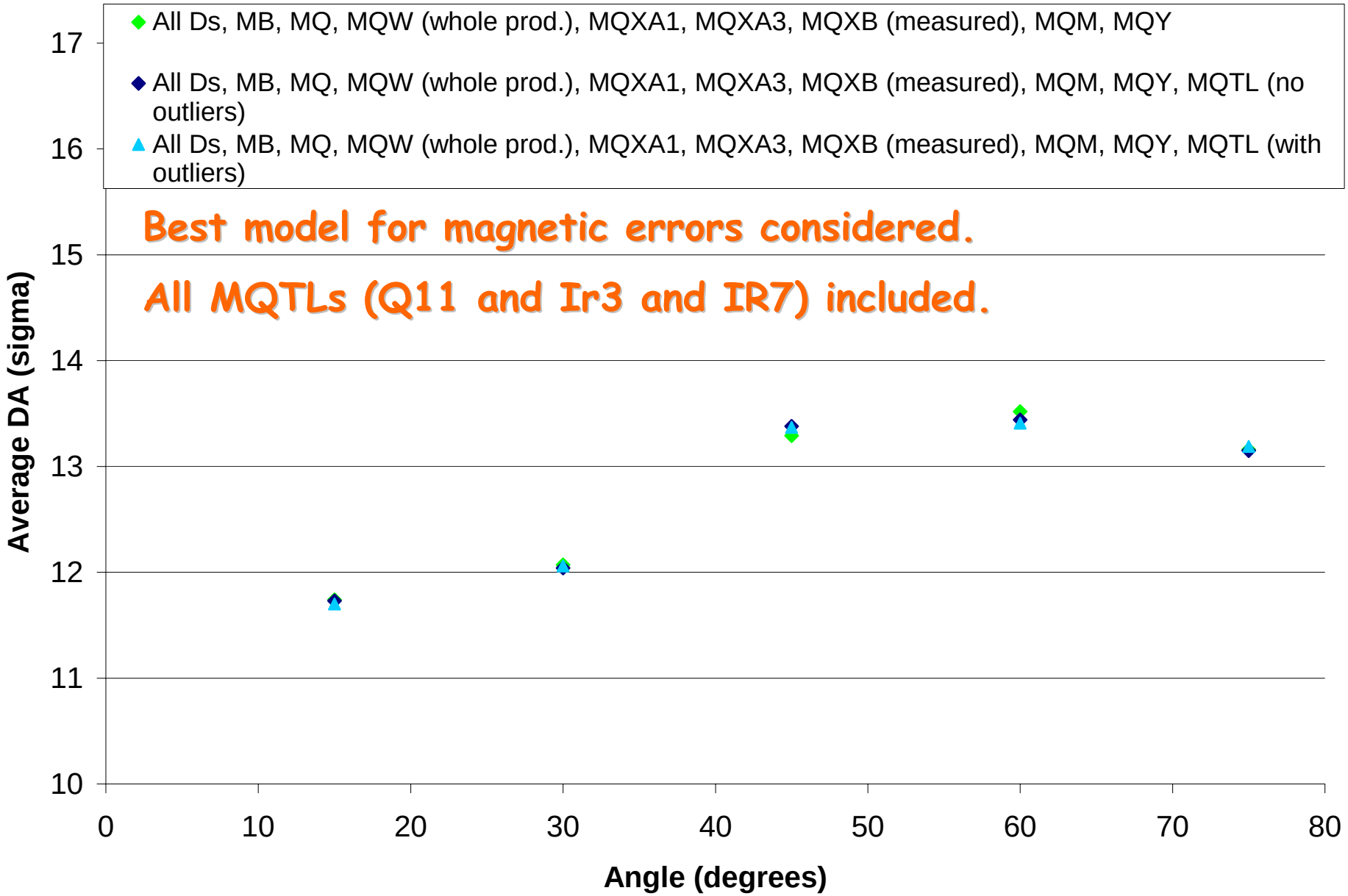
Field quality of MQTLs in DA computations

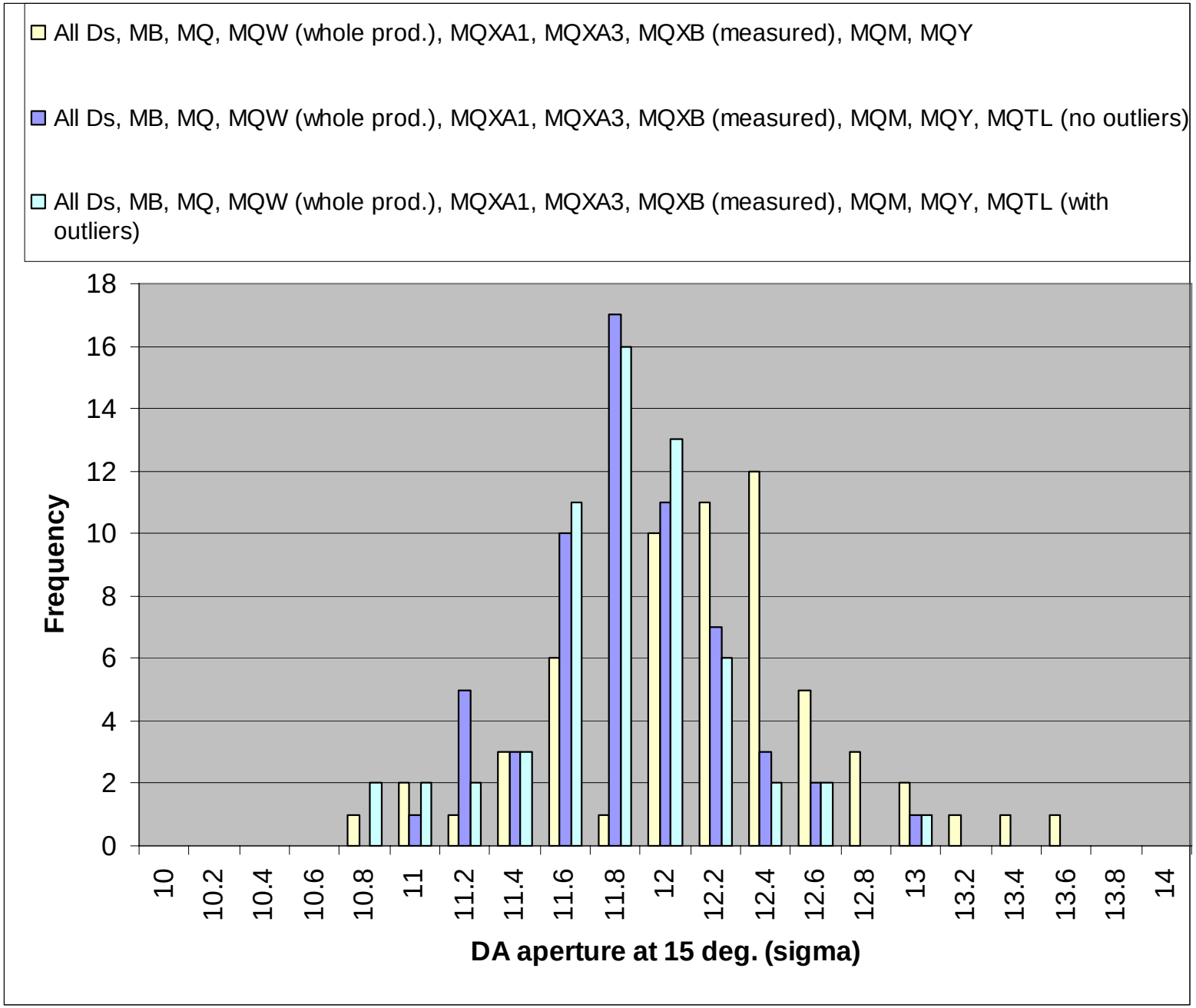
	sed for FQWG of 16/11/0		Measured w/o outlier		Measured w outliers	
	systematic	sigma	systematic	sigma	systematic	sigma
b3	0.000	7.300	-2.071	13.453	-1.349	15.312
b4	0.000	5.200	-0.139	4.457	-0.169	4.712
b5	0.000	1.600	0.040	2.406	0.091	2.327
b6	-8.700	1.000	7.297	4.478	7.373	4.343
b7	0.000	0.510	-0.010	0.763	0.007	0.786
b8	0.000	0.440	0.183	0.462	0.174	0.474
b9	0.000	0.220	0.105	0.300	0.067	0.286
b10	-14.600	0.070	-15.949	0.848	-15.937	0.789
b11	0.000	0.020	0.040	0.134	0.019	0.098
b12	0.000	0.010	-0.014	0.023	-0.014	0.023
b13	0.000	0.000	0.003	0.051	-0.002	0.037
b14	0.000	0.000	0.413	0.058	0.413	0.055
b15	0.000	0.000	-0.003	0.035	-0.002	0.030
a3	0.000	7.500	2.628	11.559	2.517	12.237
a4	0.000	2.700	0.007	5.144	0.084	4.974
a5	0.000	1.600	-0.179	1.975	-0.063	2.025
a6	0.000	0.320	-0.012	0.568	-0.021	0.552
a7	0.000	0.510	-0.097	0.666	-0.036	0.653
a8	0.000	0.360	-0.087	0.410	-0.064	0.404
a9	0.000	0.220	-0.102	0.240	-0.105	0.256
a10	0.000	0.090	-0.191	0.400	-0.239	0.372
a11	0.000	0.020	0.011	0.169	0.007	0.158
a12	0.000	0.000	0.006	0.050	0.003	0.045
a13	0.000	0.000	0.014	0.084	0.010	0.065
a14	0.000	0.000	0.010	0.028	0.012	0.025
a15	0.000	0.000	0.006	0.042	0.002	0.029

Results with measured field quality - I



Results with measured field quality - II




All Ds, MB, MQ, MQW (whole prod.), MQXA1, MQXA3, MQXB (measured), MQM, MQY
All Ds, MB, MQ, MQW (whole prod.), MQXA1, MQXA3, MQXB (measured), MQM, MQY, MQTL (no outliers)
All Ds, MB, MQ, MQW (whole prod.), MQXA1, MQXA3, MQXB (measured), MQM, MQY, MQTL (with outliers)
Frequency
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11.2
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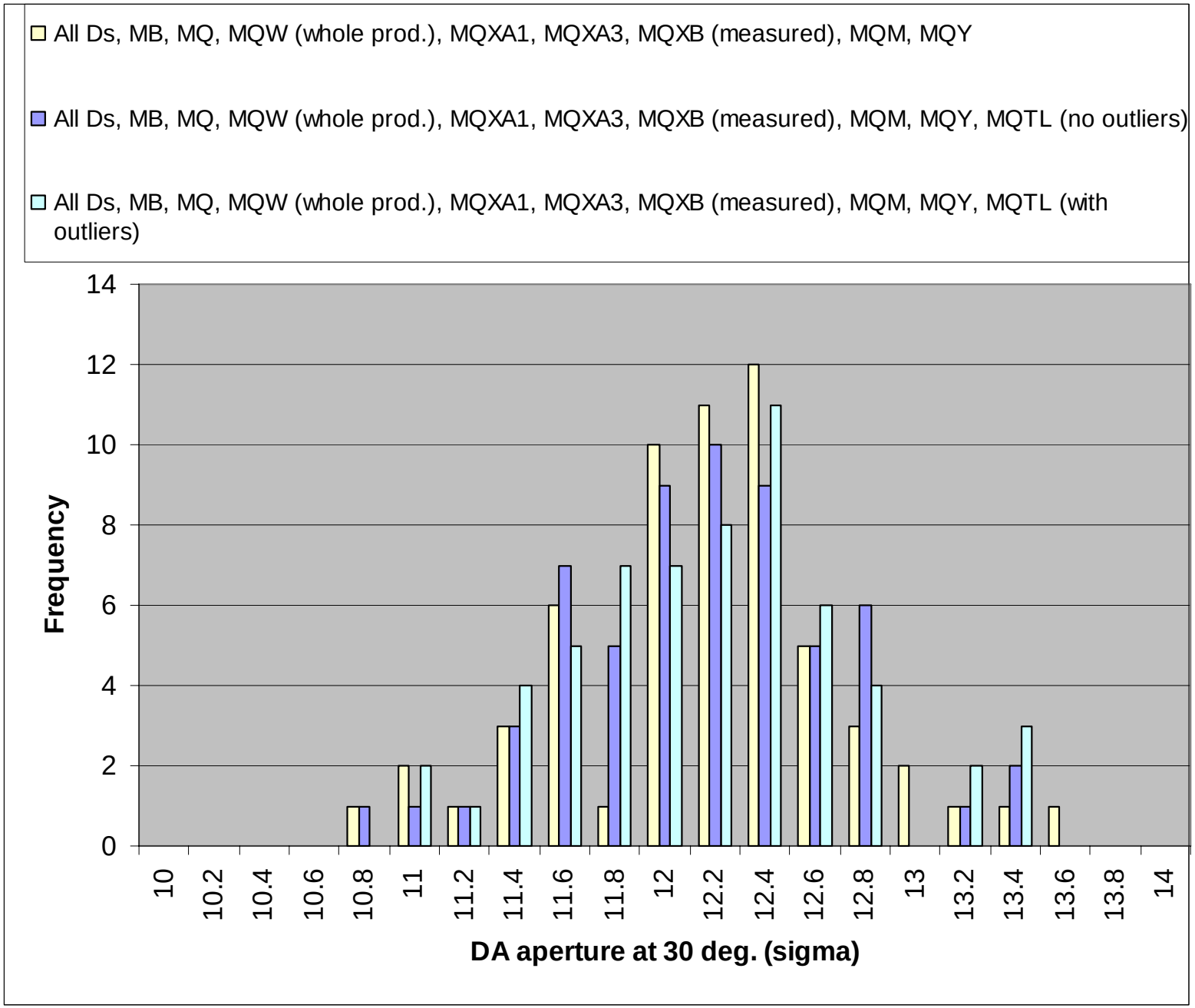
DA aperture at 15 deg. (sigma)


All Ds, MB, MQ, MQW (whole prod.), MQXA1, MQXA3, MQXB (measured), MQM, MQY
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DA aperture at 30 deg. (sigma)

Conclusions

- Results of preliminary DA computations indicates that the measured field quality of the MQTLs has a marginal impact.
- The outliers will be considered on a one-by-one basis.
- Additional studies are required to assess the impact of closed orbit (feed-down).