Physikalisch-Meteorologisches Observatorium Davos
World Radiation Center

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L2 of PREMOS-TSI & The future of PMOD/WRC TSI measurements

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PMOD/WRC – Switzerland

PICARD workshop
CNES Paris, September 25-26, 2013

Overview

- Level 2 of PREMOS/PICARD
- Future PMOD/WRC
  TSI measurements

TSI calibration

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It is still true and deserves a statement:

PREMOS A is the first and only radiometer in space with a SI-traceable irradiance calibration in vacuum

Traceable to the irradiance calibration facility at LASP in Boulder (TRF)

Paper is published

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Total Solar Irradiance Measurements with PREMOS/PICARD

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First Light TSI on 27. July 2010

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PREMOS(TRF)/PICARD	**1360.9 +- 0.4 W/m²**
TIM/SORCE	1361.3 W/m²
VIRGO/SOHO (WRR-calibrated)	1365.4 W/m²
PREMOS(WRR-calibrated)/PICARD	1365.5 W/m²

- PREMOS(TRF) measures 0.4 W/m²
  lower than TIM → TIM and PREMOS are consistant *!*

→ Offset of WRR-scale: 0.34 % (= 4.6 W/m²)
(A. Fehlmann et al., Metrologia 2012)

Correction to Level 2 data

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There are 2 radiometers:

$\mathcal{A}$ – exposed operationally

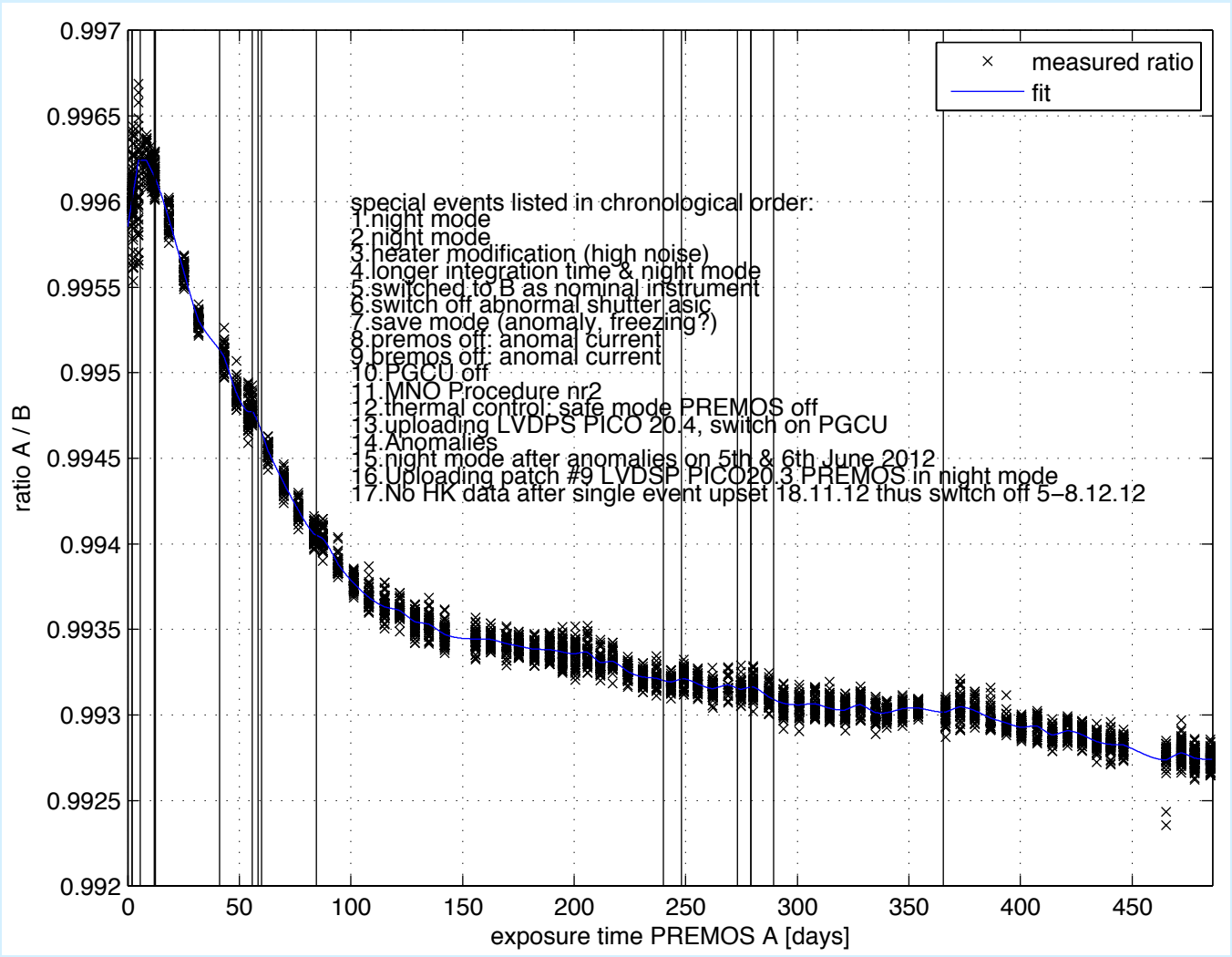
$\mathcal{B}$ – exposed rarely for calibration only

Hypothesis: $\mathcal{B}$ has the same degradation as $\mathcal{A}$ as a function of the exposure time

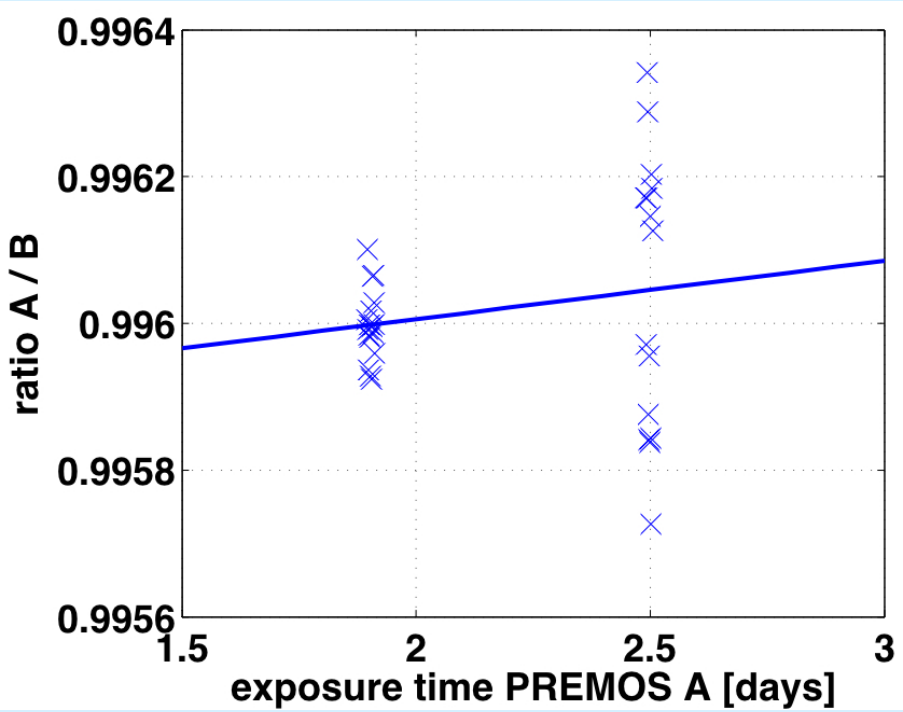
Until September 2013: $\mathcal{A}$ total exposure: 480 days

$\mathcal{B}$ total exposure: 3.3 days

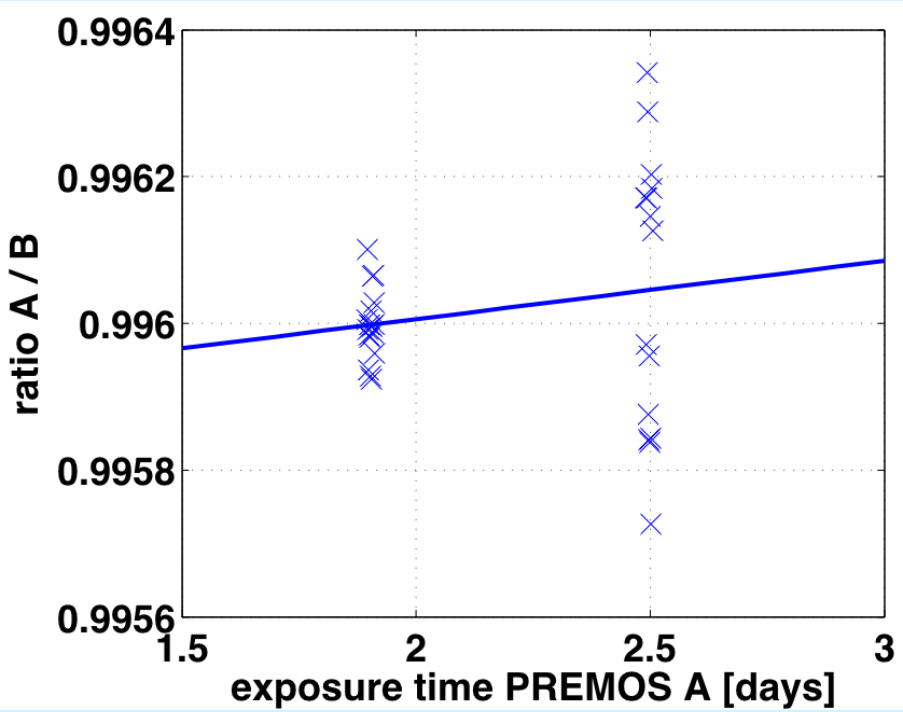
Sensitivity change of $\mathcal{A}$ relative to $\mathcal{B}$

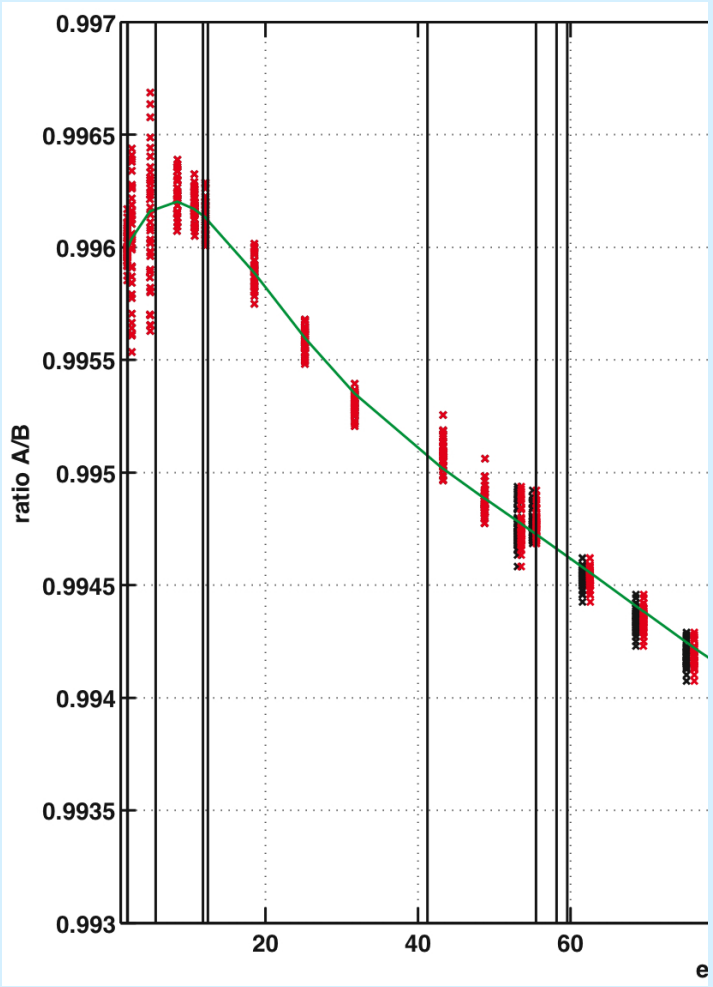


Sensitivity change of $\mathcal{A}$ relative to $\mathcal{B}$ (first 3 days)

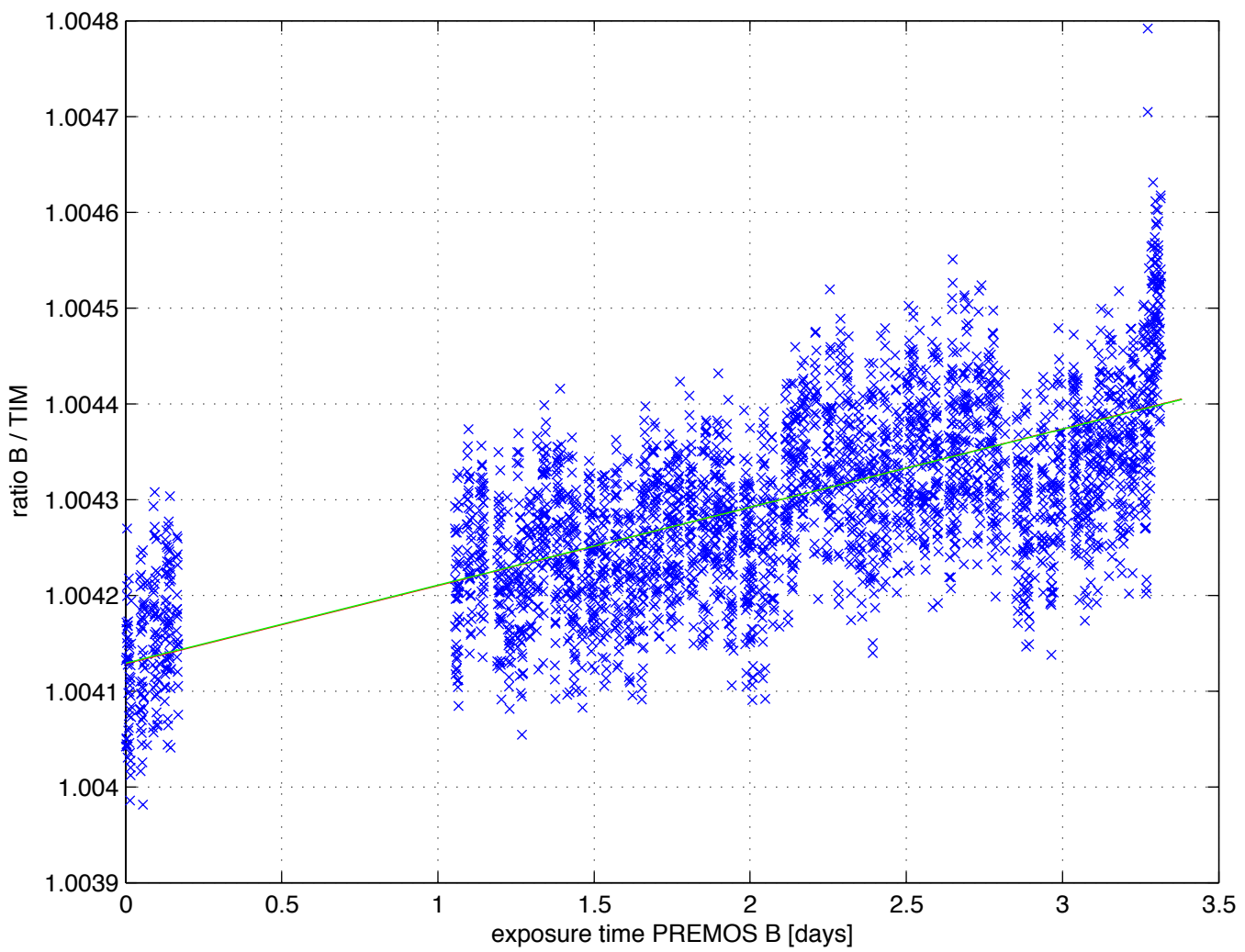


Sensitivity change of $\mathcal{A}$ relative to $\mathcal{B}$ (first 3 days)

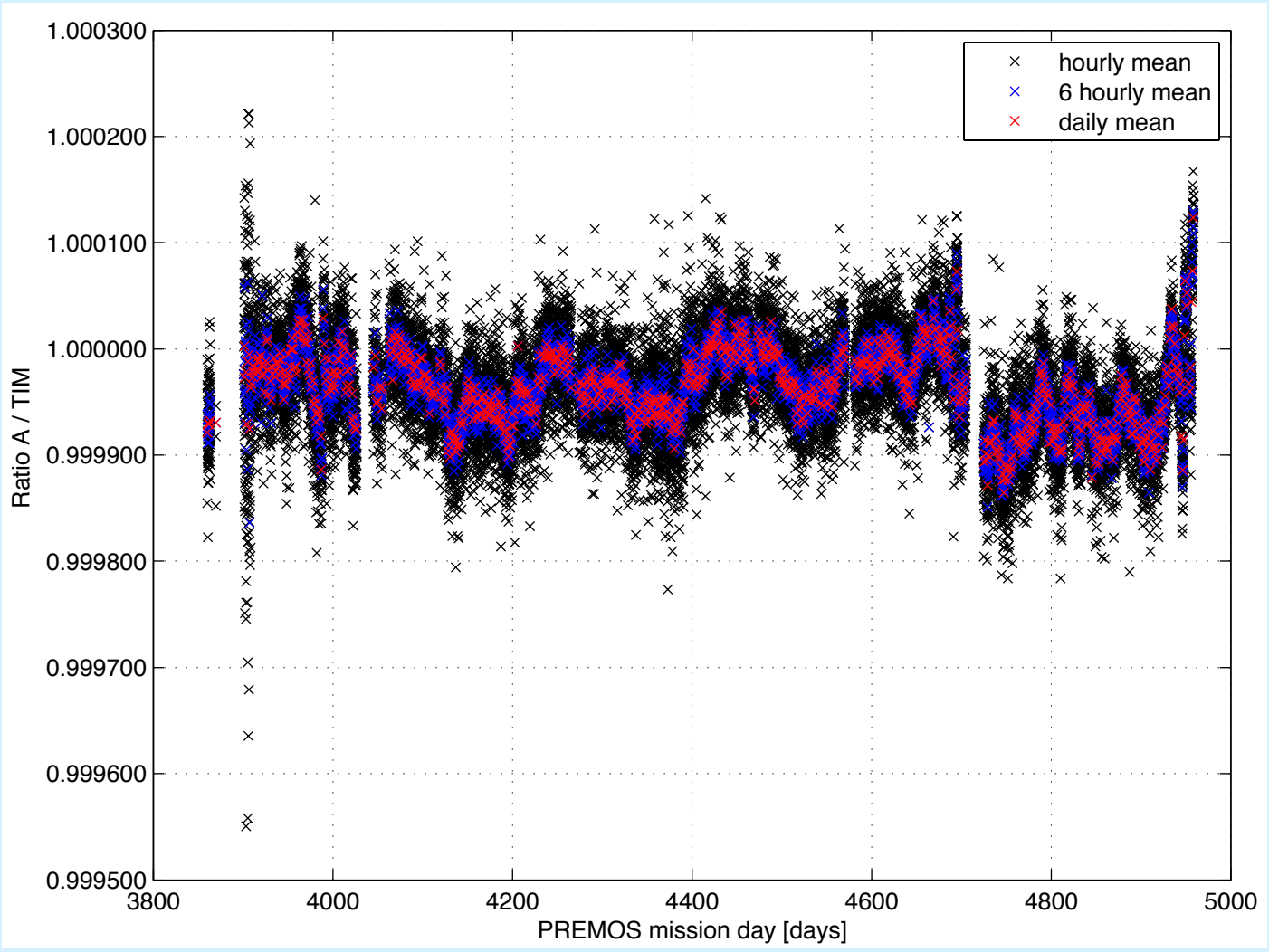




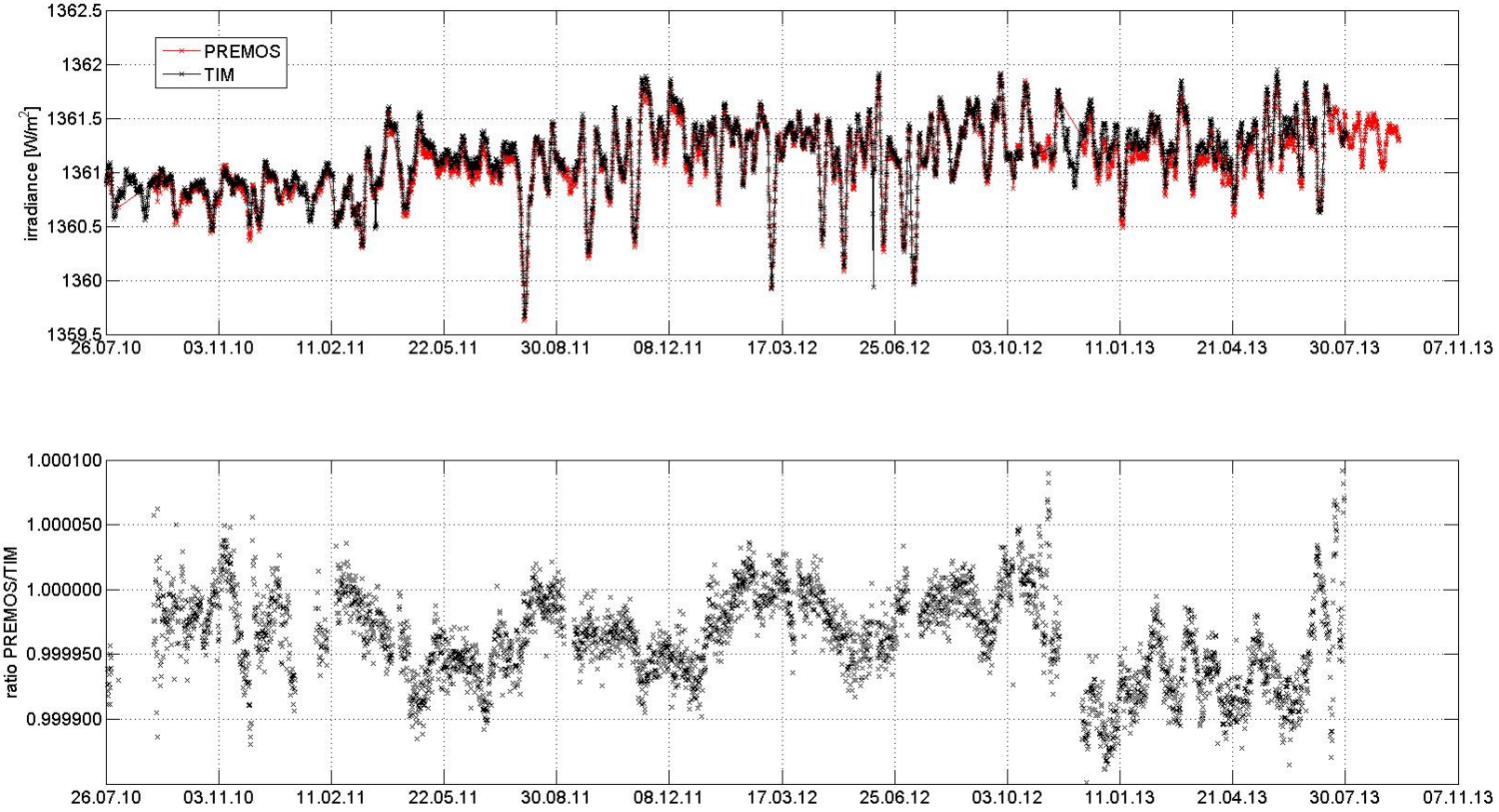
Sensitivity change of $\mathcal{B}$ relative to TIM



Level 2 PREMOS-A
relative to TIM



Comparison PREMOS – TIM



Status of PREMOS-TSI

„PREMOS is in excellent health“

- After 3 years, PREMOS-TSI has less than 100 ppm relative deviation to TIM/SORCE
- Presently, there are still enough TSI experiments in space to recognize outliers of one

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The future of PMOD/WRC TSI observations

- PREMOS/PICARD until early 2014
  very desirable: overlap with TCTE !
- CLARA/NORSAT-1→ launch 2015
- ? ? ? DARA/PROBA3
  KuaFu

Requirements for a TSI monitoring

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➔ Accurate ***absolute*** measurements are required:
Nowadays possible !

➔ *But we certainly also want to assess the variations of TSI and therefore, we still need to aim for continues and overlapping data !*

NORSAT-1

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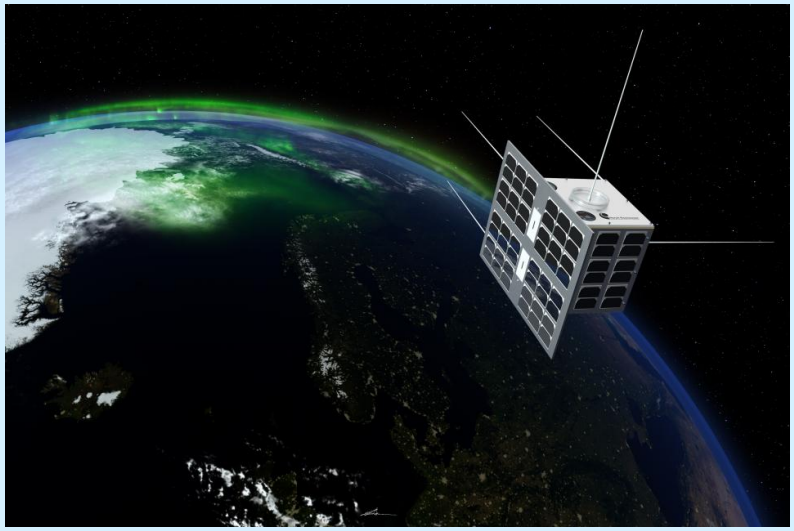


The satellite bus will be provided by Space Flight Laboratory at the University of Toronto, Institute for Aerospace Studies;

Development and preparation time approximately 2 years till ***launch*** of the spacecraft in ***2015***

- ◆ This is exceptionally fast *!*

Nominal operational lifetime is three years.

NORSAT-1 is a low cost mission (20 Mio NOK = ca. 3 Mio €), based on industry and/or military components, ***instead of space grade components***

➔ cheaper by about a factor **10** ***!***

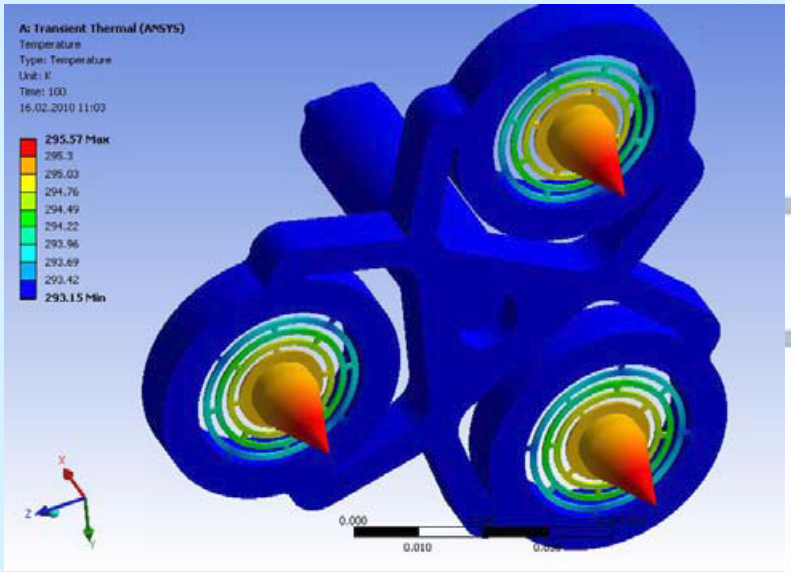
Payloads

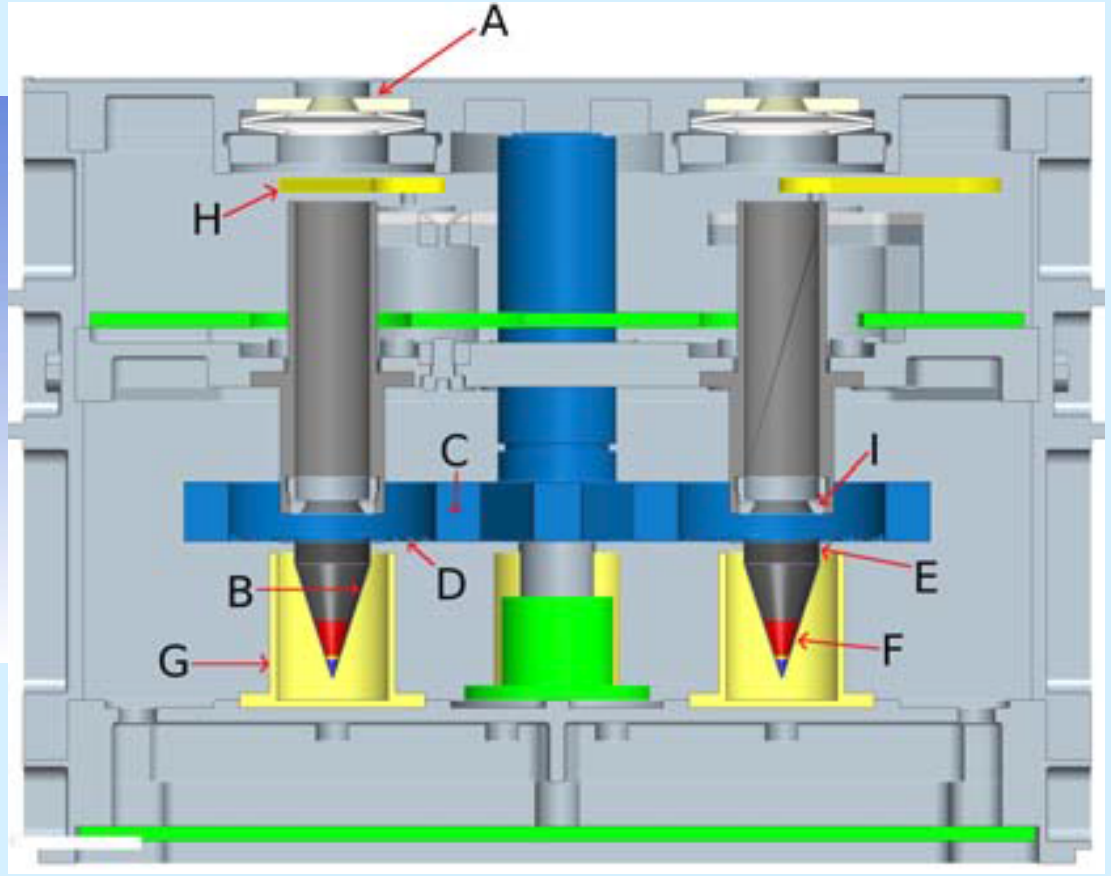
The Total Solar Irradiation (TSI) instrument called CLARA is made by Physikalisch-Meteorologisches Observatorium Davos (PMOD) World Radiation Center in Davos Switzerland

The Langmuir Probe, measurements of space plasma density is made by the University of Oslo, UiO, Norway

The AIS receiver is made by Kongsberg Seatex, Trondheim, Norway

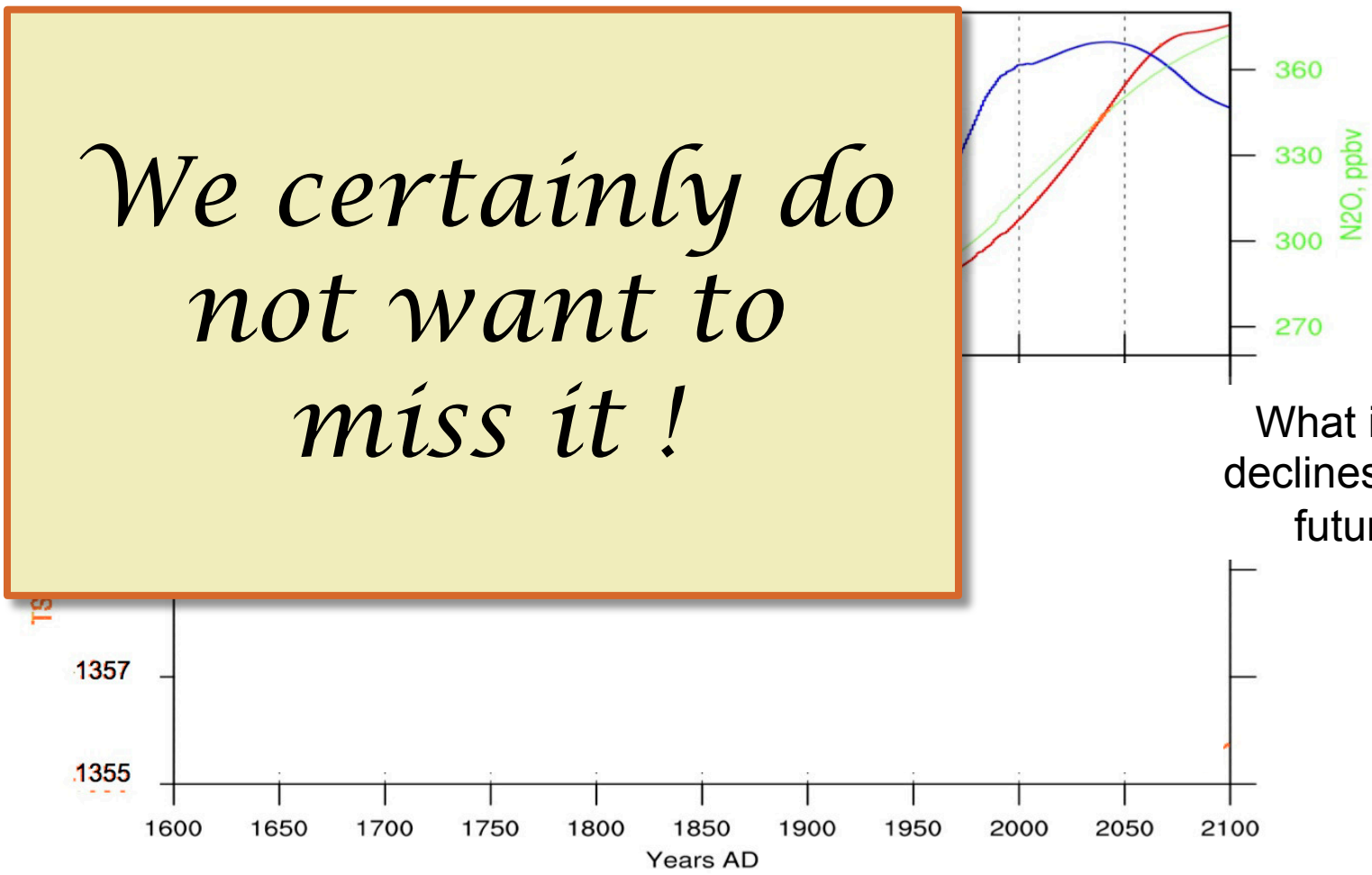
CLARA design





TSI monitoring needs to continue

We certainly do not want to miss it !



What if TSI declines in the future?

Thank you for your attention

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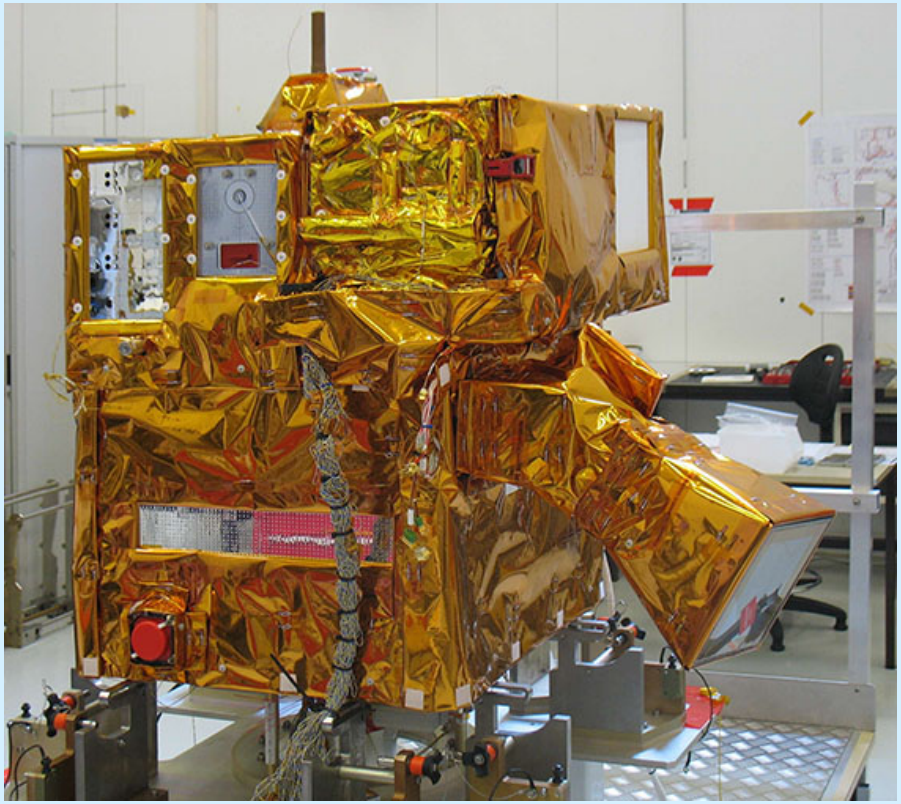
PREMOS



PICARD