

HERMES new PLM TMM Analysis Update

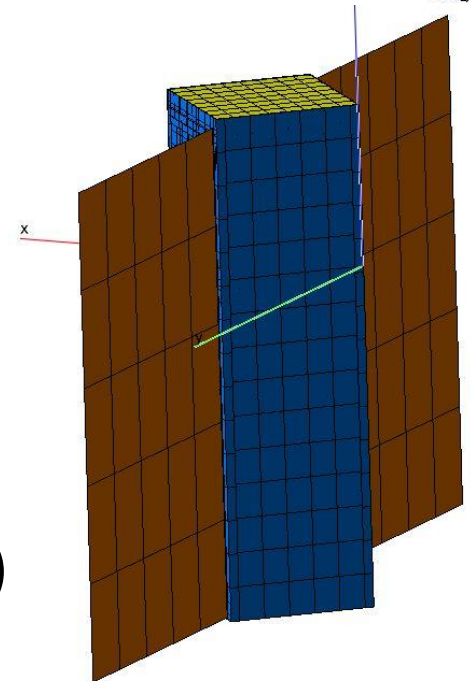
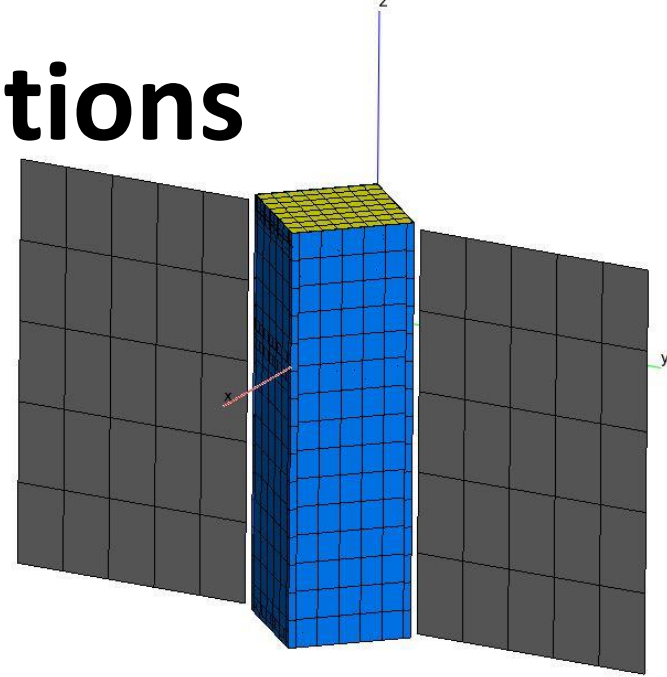
G. Morgante

INAF – OAS Bologna

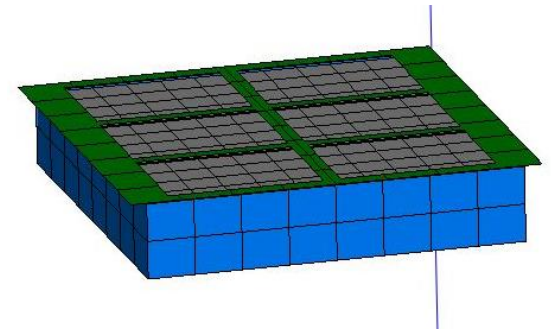
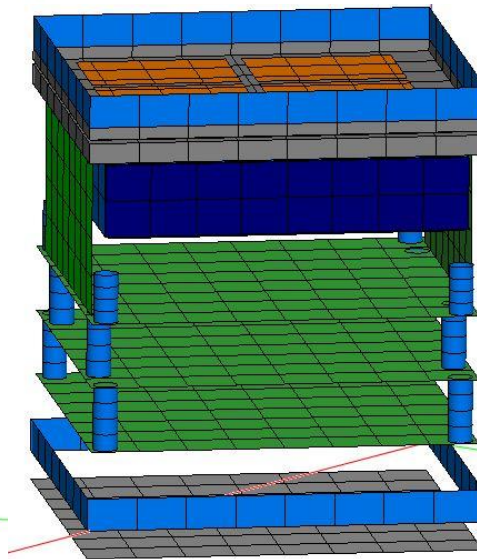
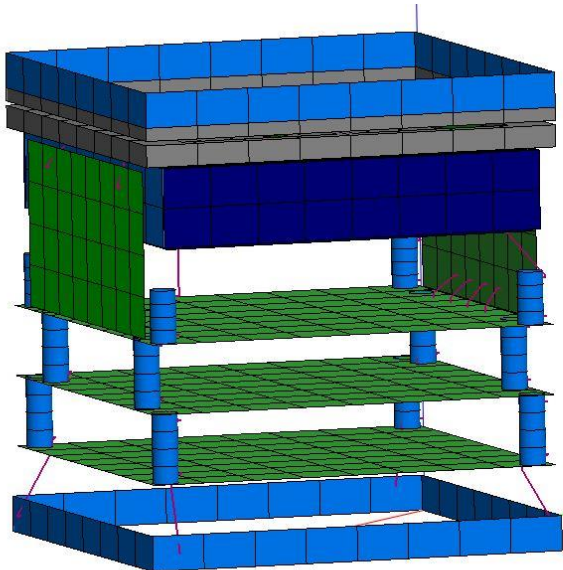
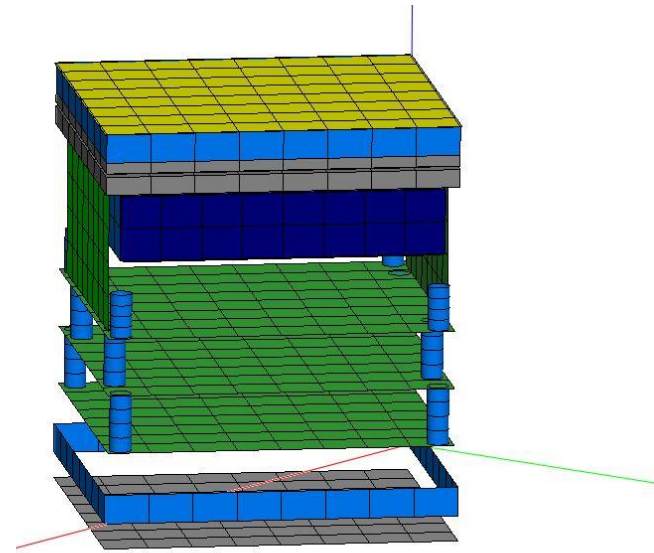
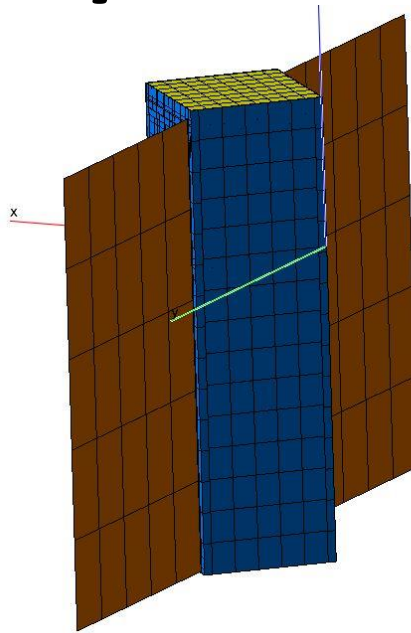
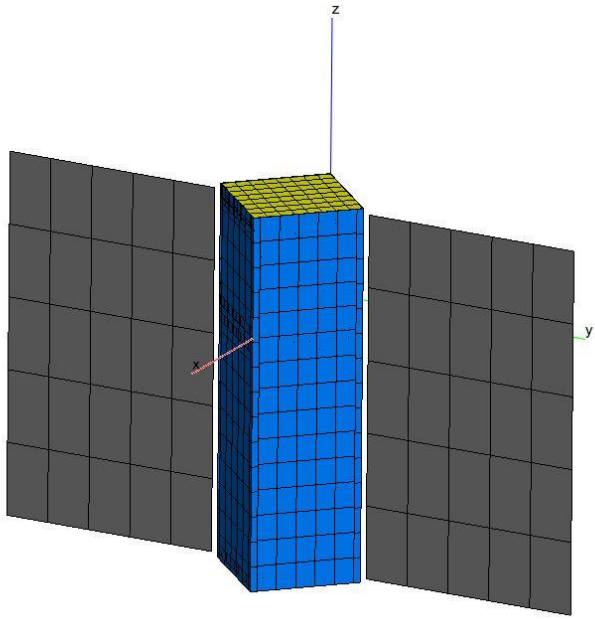
11 Jan 2020

G/TMM assumptions

- **Three 100x100x100 mm blocks**
 - one dedicated to the PLM
 - two for the SVM
 - Al 7075 1 mm thick walls
- **SVM:**
 - each block dissipates a load of 4W
 - this load is dissipated on the four side areas by means of user defined conductors (0.01 W/K)
- **Solar Array:**
 - four 10x30 cm panels
 - opt properties: black paint on front side, Teflon/FEP on back side
 - 4 insulating struts on SVM (assumed 0.01 W/K)



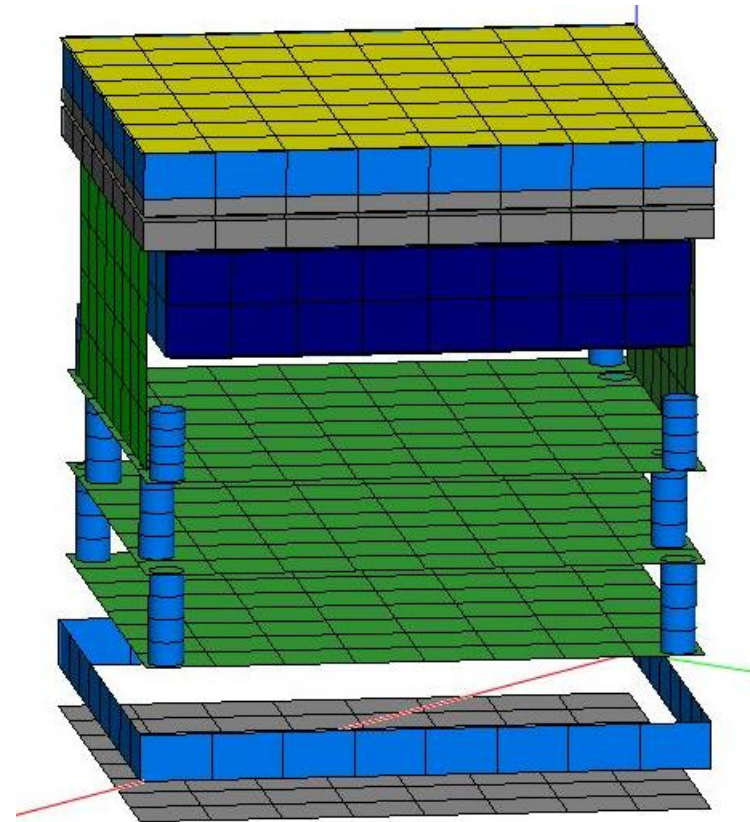
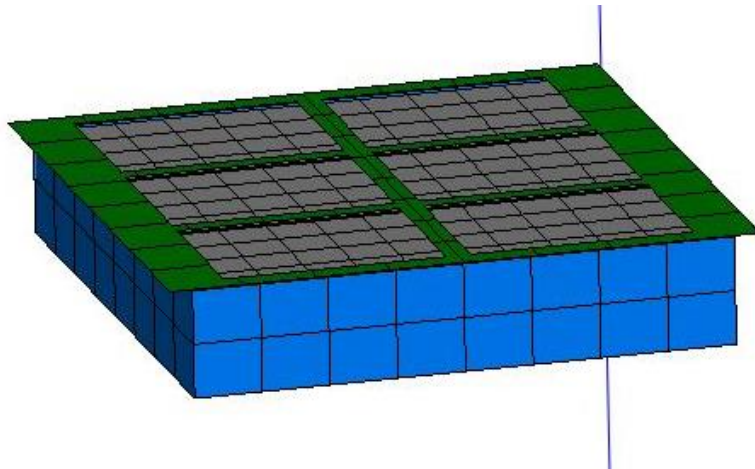
G/TMM



PLM TMM main assumptions

Materials:

- Sun Cap: MLI
- Collimator => AISI 316
- Filter => Kapton + 5NAI
- Detector => Silicon
- Crystals => Gadolinium Aluminium Gallium Garnet (Ce)
- PCB's => Isola96 2mm/1.6 mm thick
 - Cu 8.5 μm common ground layer on top
- Crystal box => AISI316 with 250 μm Tungsten shield
- PLM walls: Al7075 1 mm thick



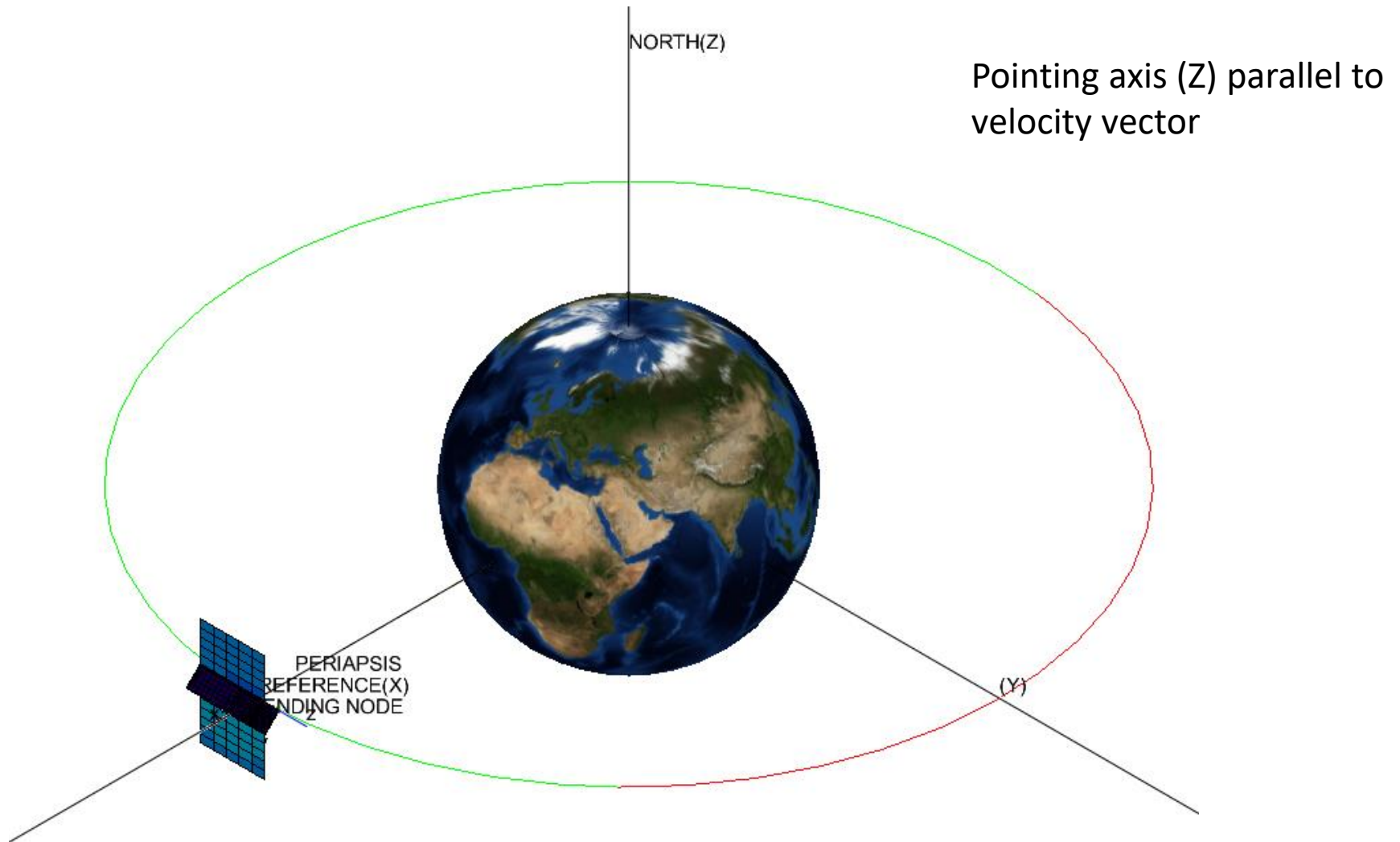
PLM assumptions 3/3

- **Power loads:** 4.25 W total in the PLM
 - Collimator => 0 mW
 - FEE_PCB (green board) => 50mW total (0.405 mW per LYRA-FE)
 - Side PCBs => 35 mW each
 - SDD tile => 10.5 mW each
 - Crystals => 0 mW
 - Box => 0 mW
 - BEE (purple board) => 2400 mW
 - PSU_Time (grey board) => 1000 mW
 - PDHU (yellow board) ==> 605 mW

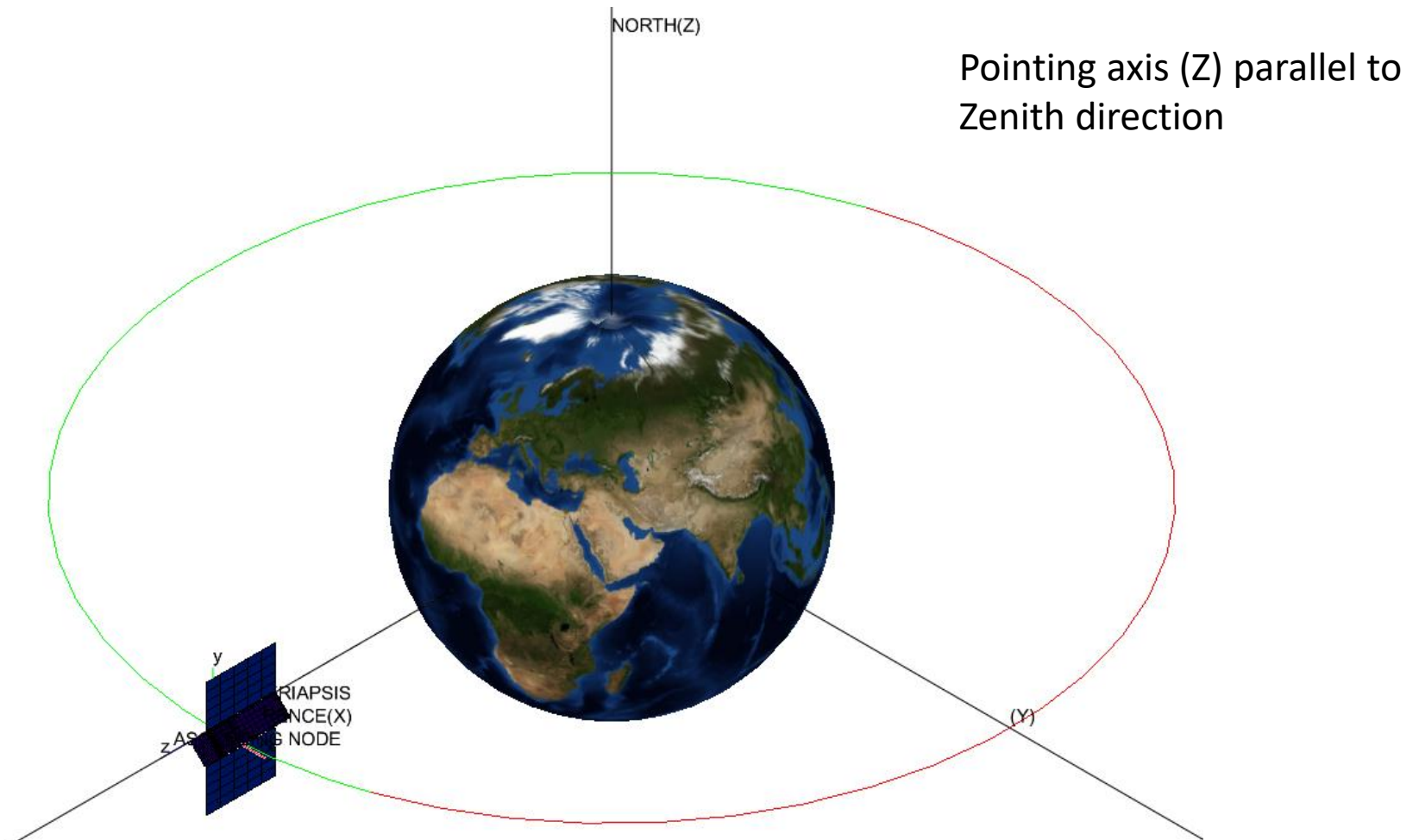
Radiative Cases

- Equatorial orbit, 550 km constant altitude
- Two different cases simulated
 - Pointing direction (Z) parallel to orbit velocity:
 - *Hot Case*
 - Sun Array normal to true Sun direction
 - Y axis normal to orbit
 - Pointing direction (Z) to zenith:
 - *Cold Case*
 - Sun Array normal to true Sun direction
 - Y axis normal to orbit

Radiative Cases: «Hot Case»

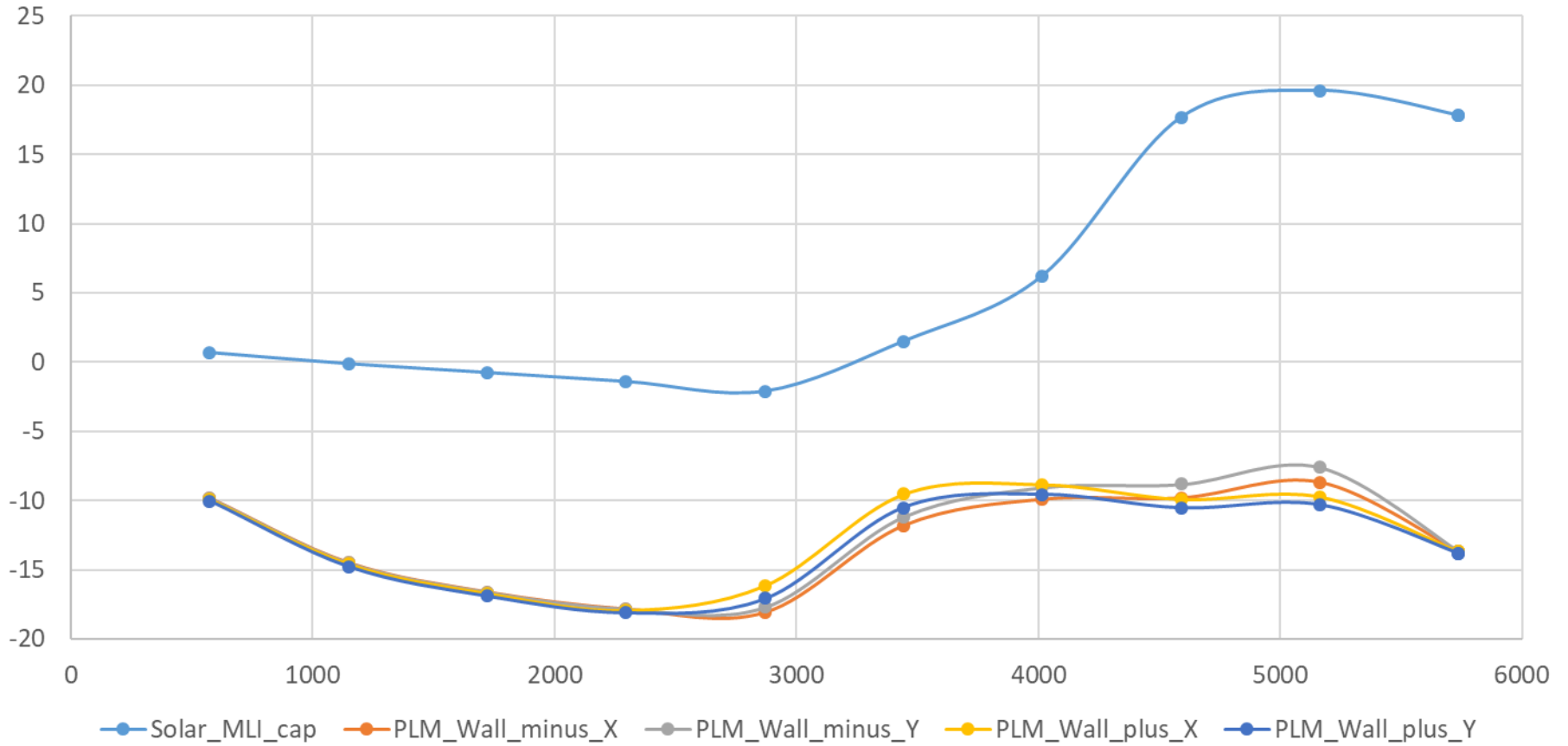


Radiative Cases: «Cold Case»

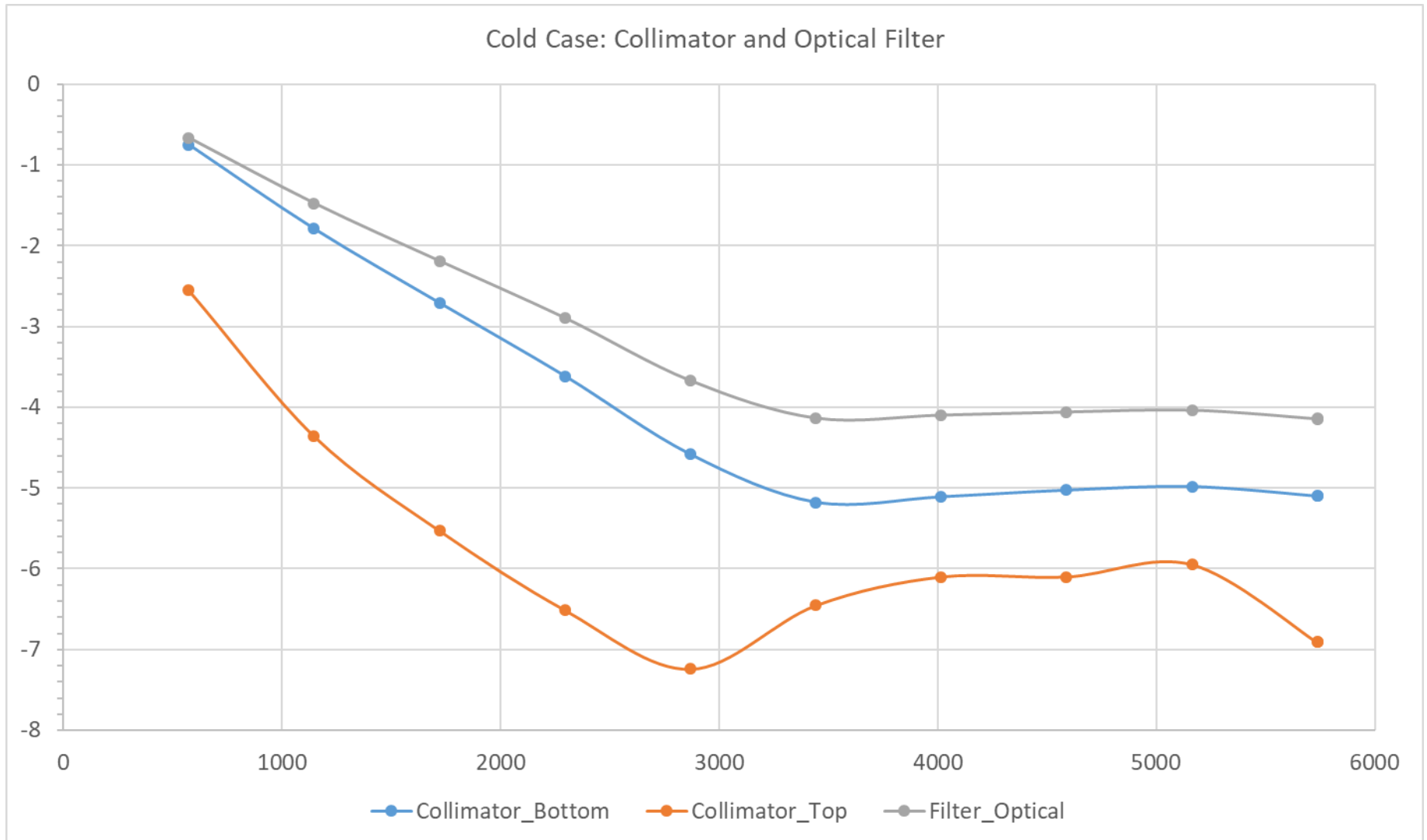


Cold Case

Cold Case: PLM Walls and Sun Cap



Cold Case



Cold Case

Cold Case: SDDs

Steady state values:

SDD1 = 4.0 °C

SDD2 = 4.1 °C

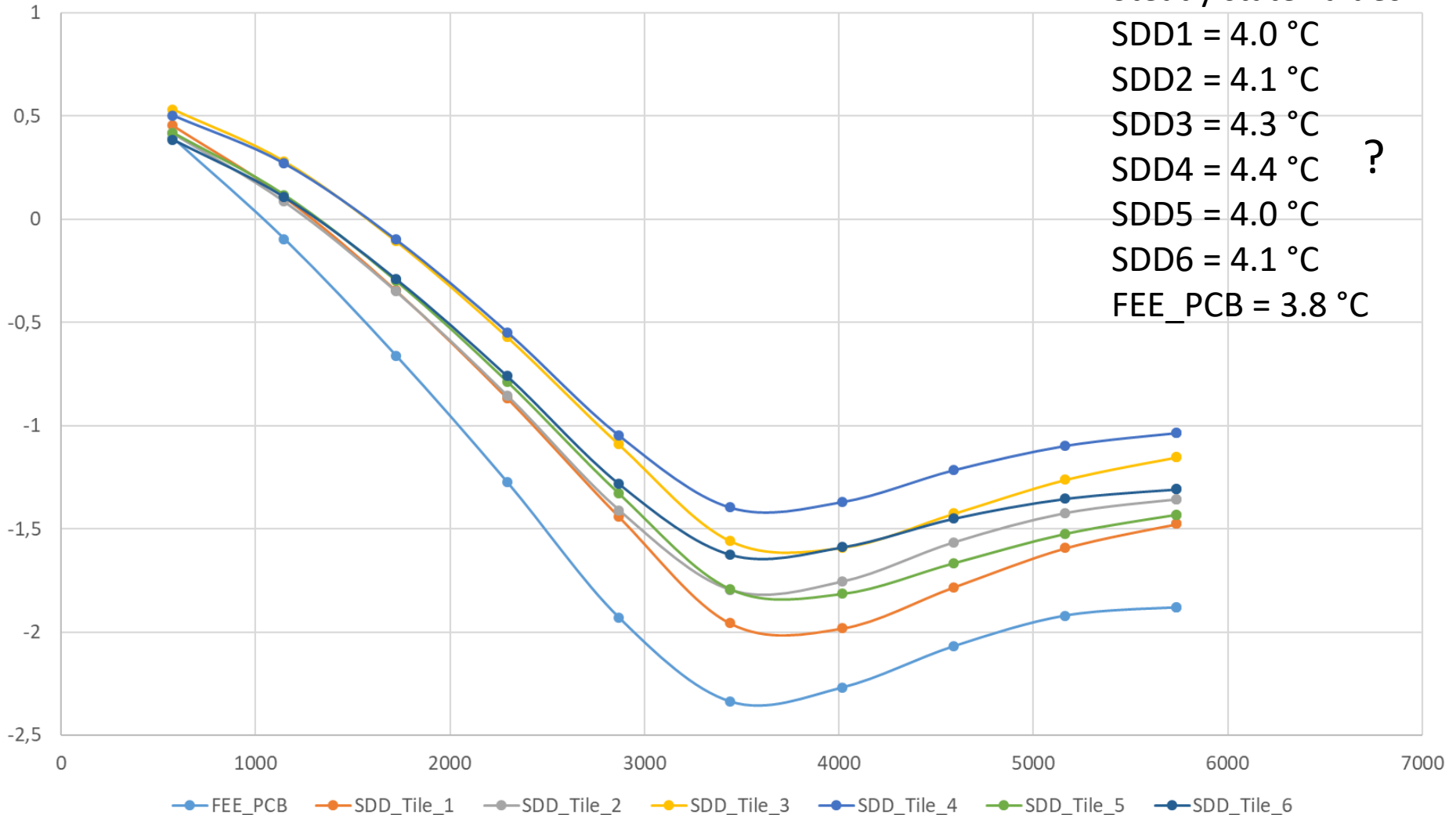
SDD3 = 4.3 °C

SDD4 = 4.4 °C ?

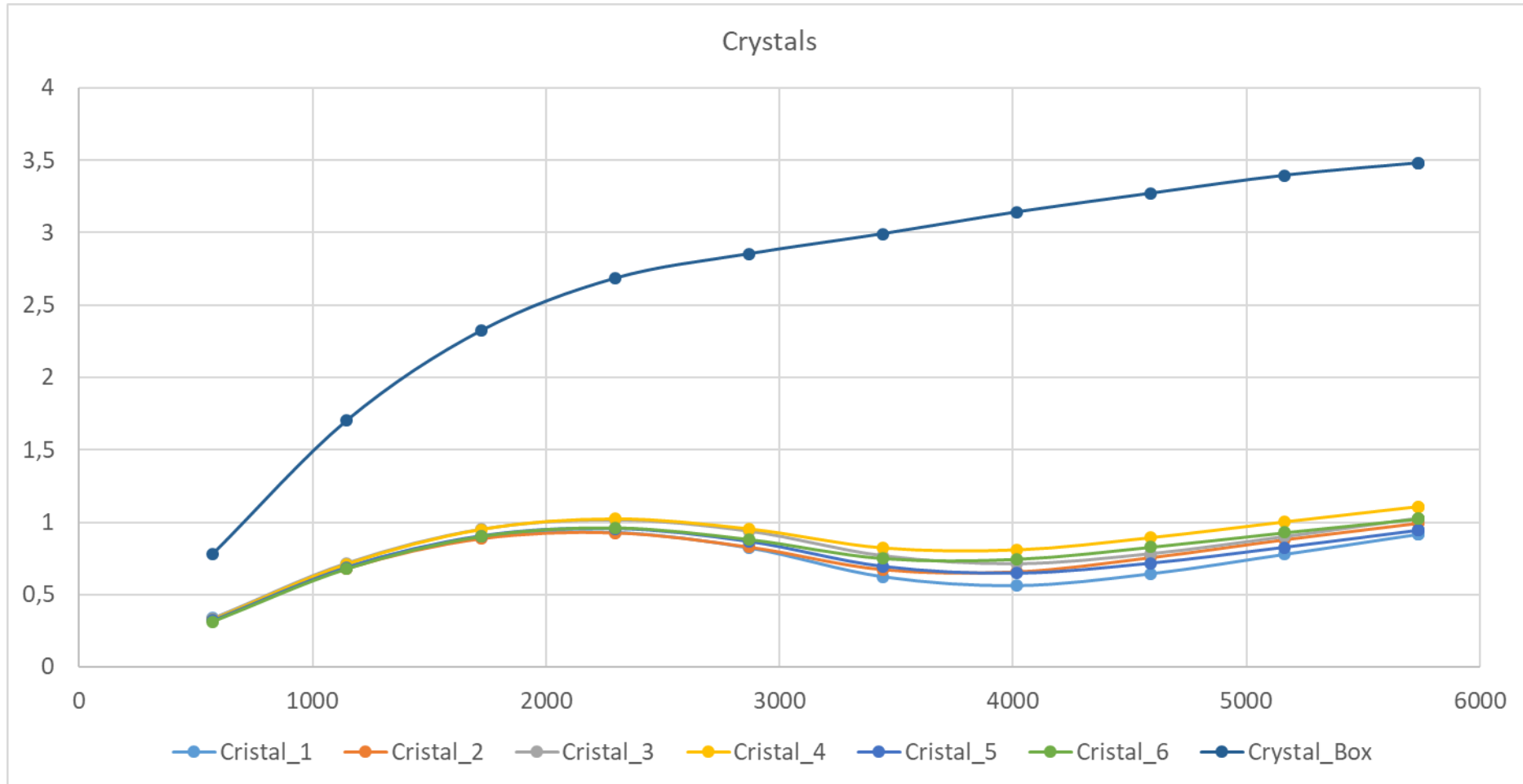
SDD5 = 4.0 °C

SDD6 = 4.1 °C

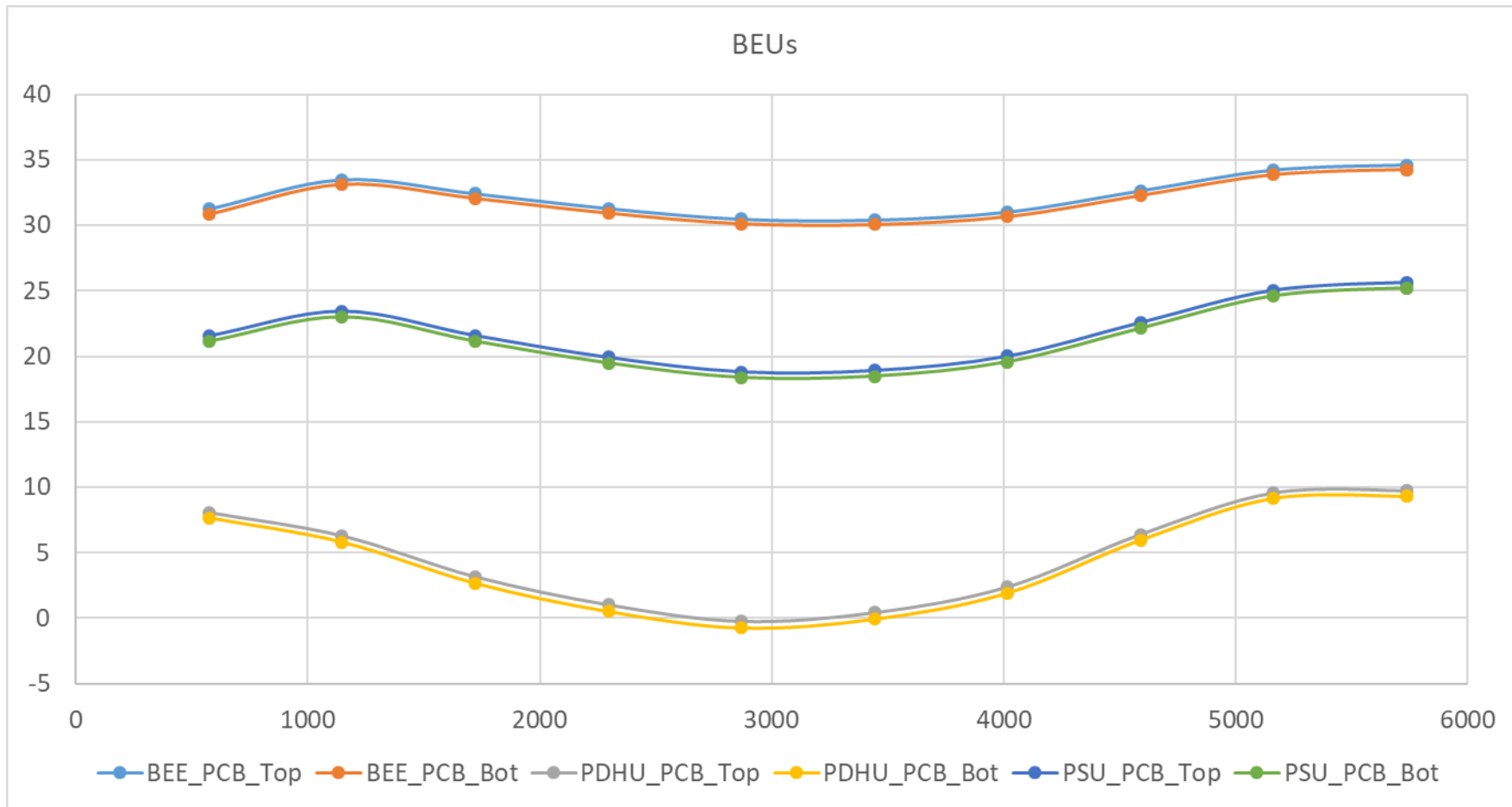
FEE_PCB = 3.8 °C



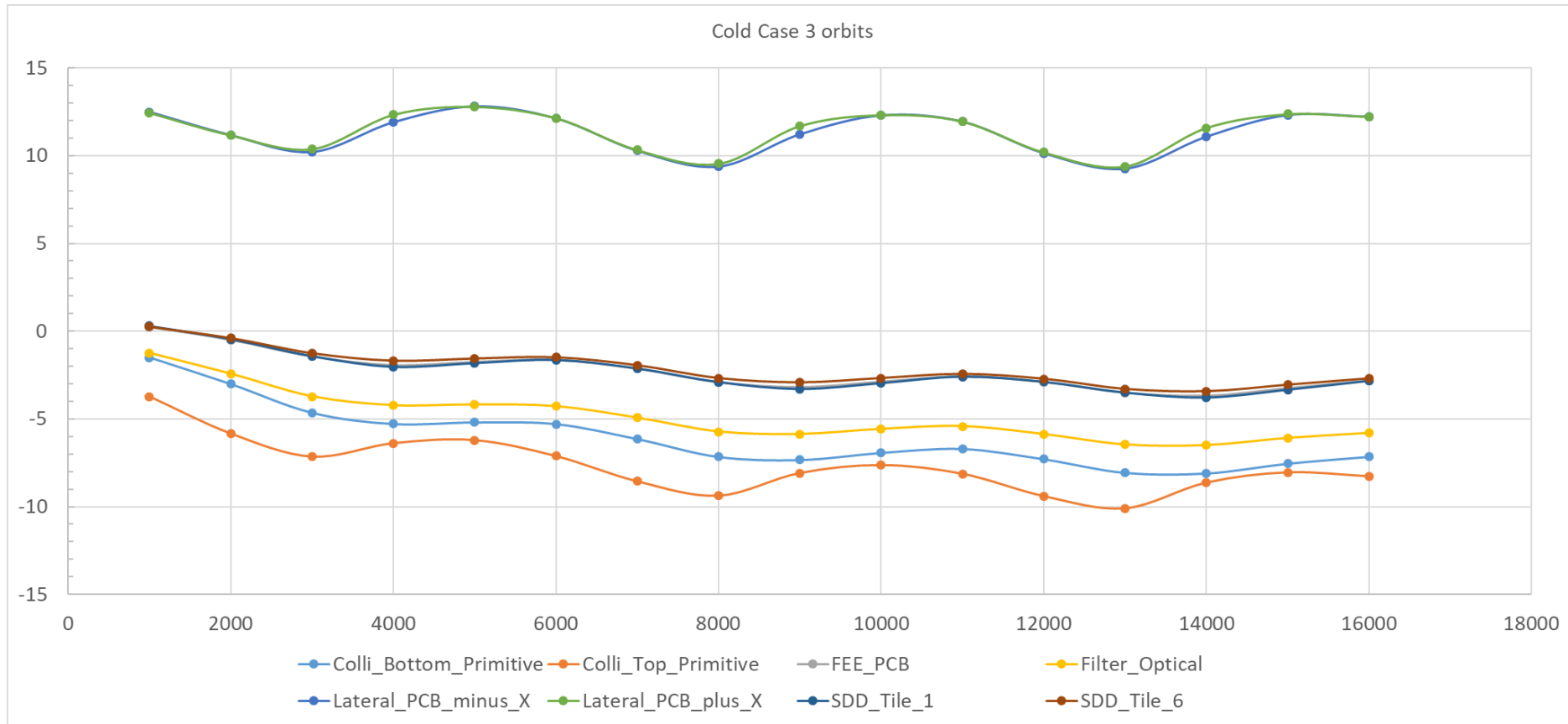
Cold Case



Cold Case

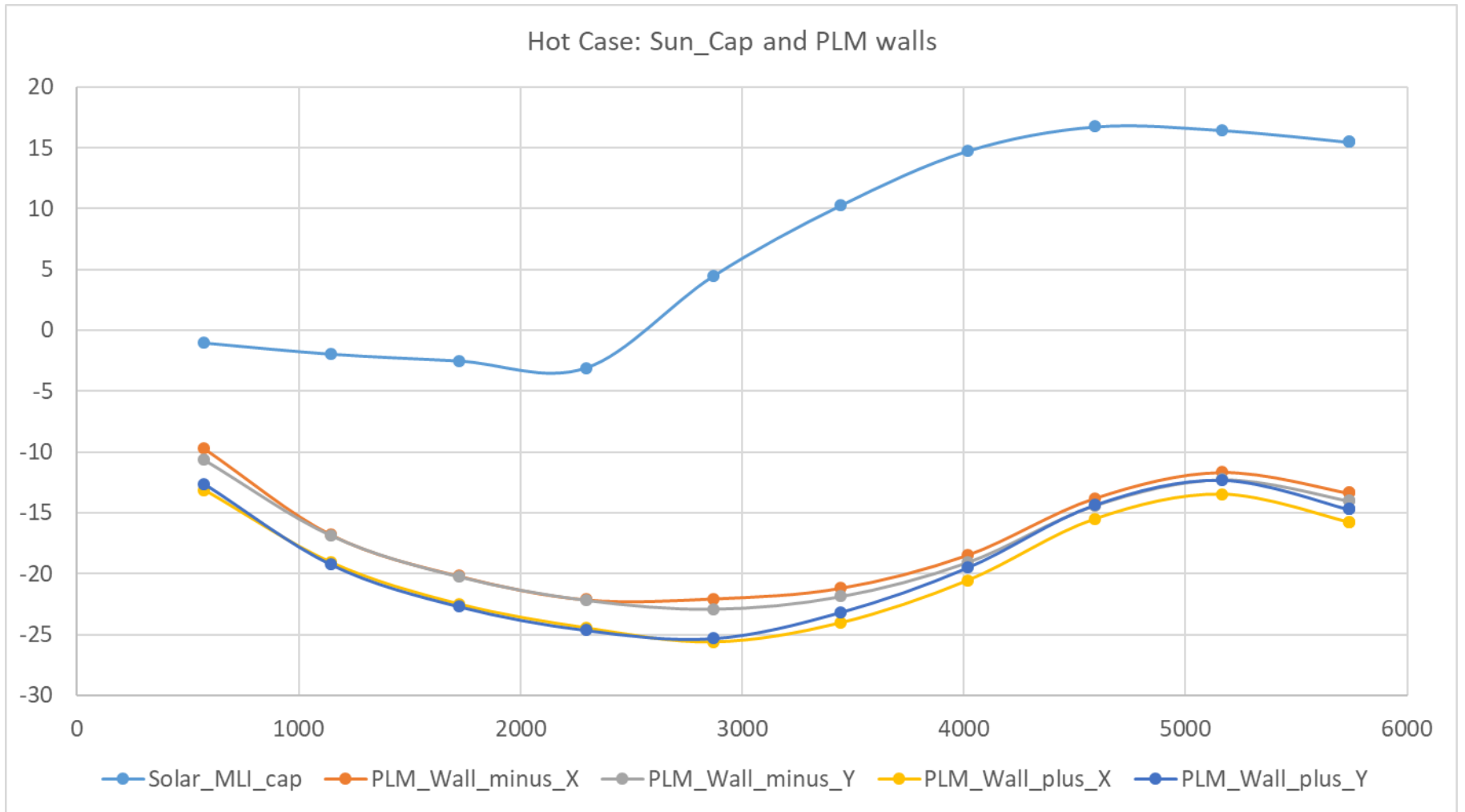


Cold Case: 3 orbits

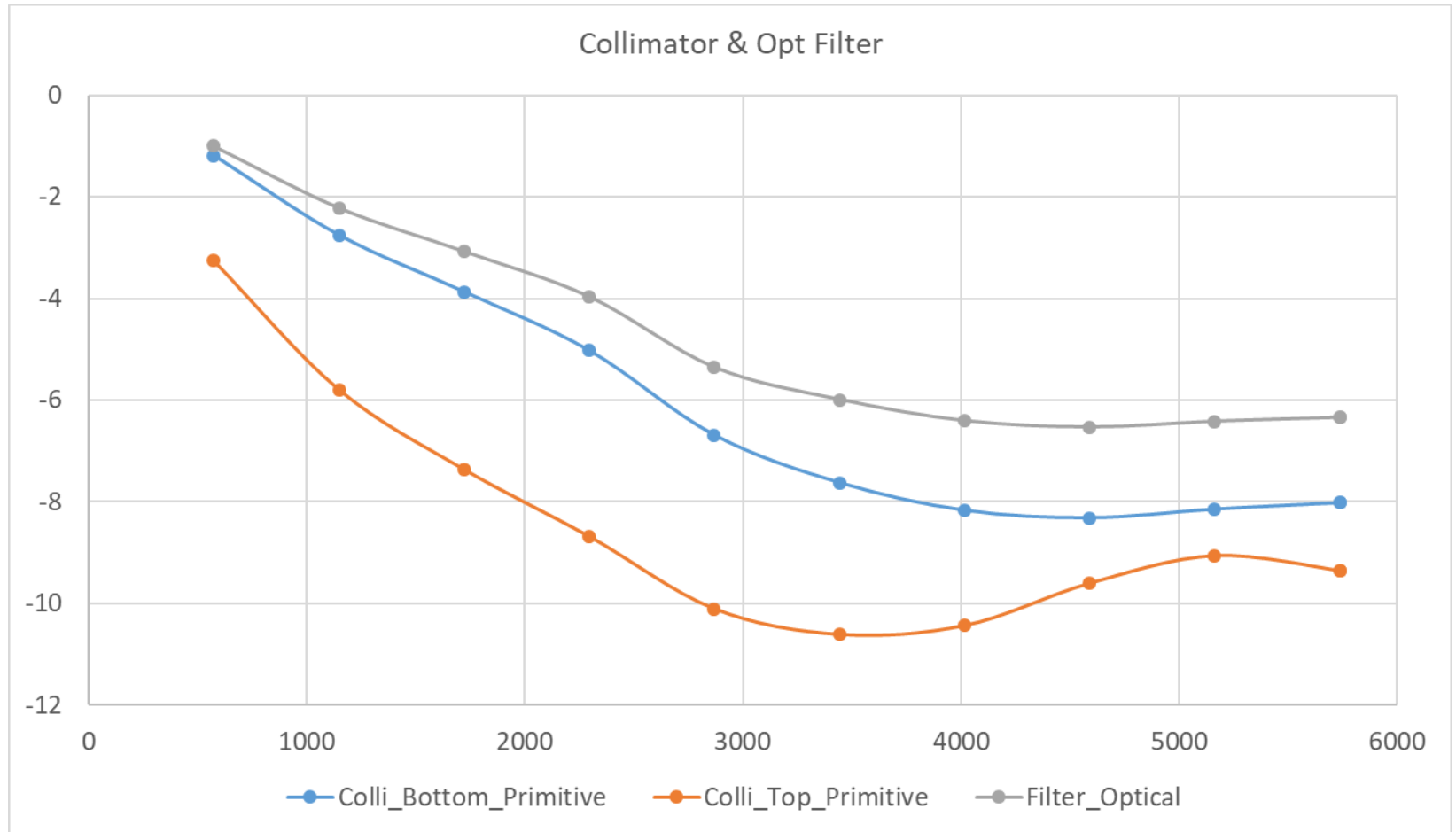


SDD tiles seem to equilibrate around $T = -2.5\text{ }^{\circ}\text{C}$

Hot Case

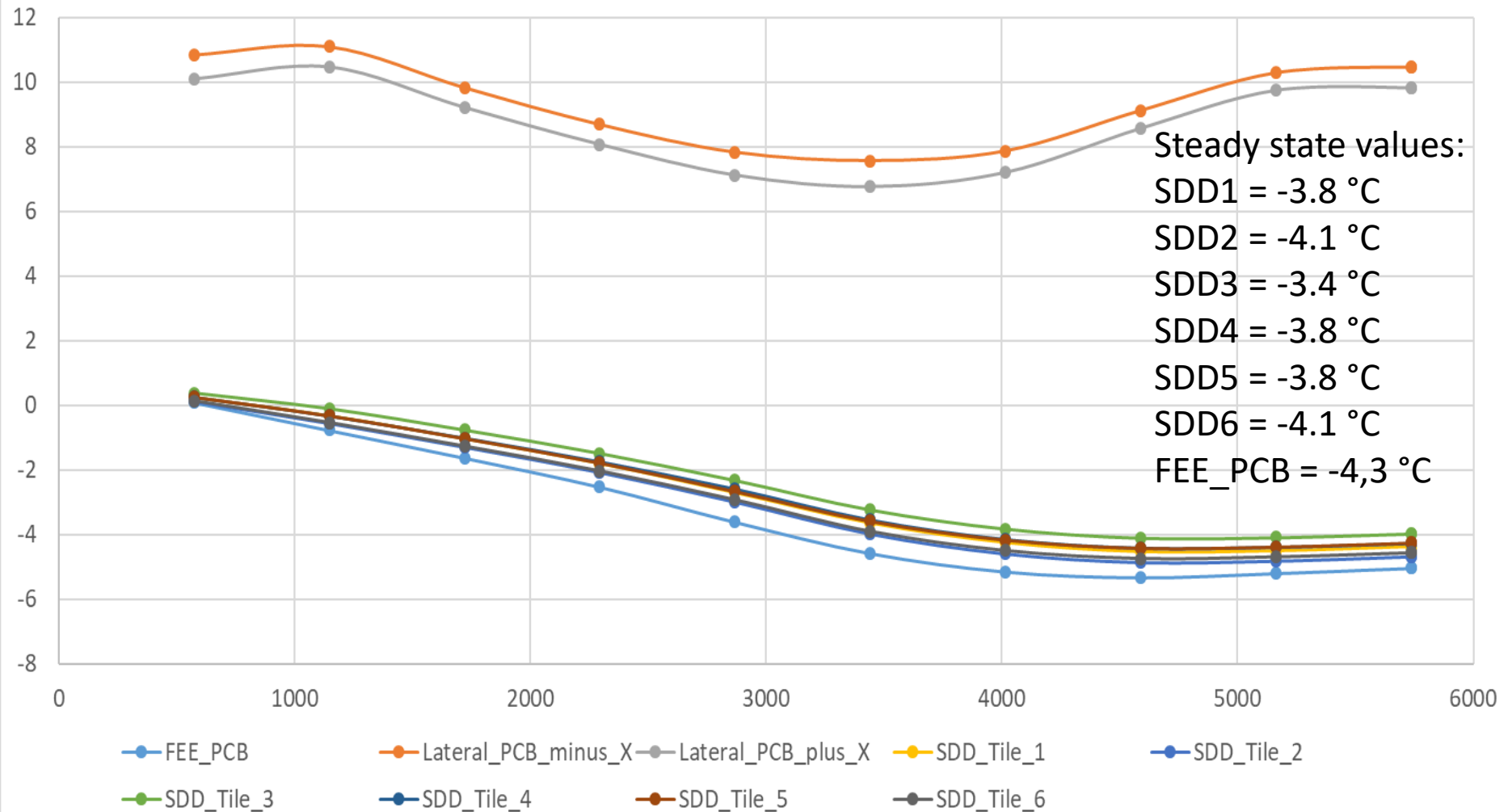


Hot Case

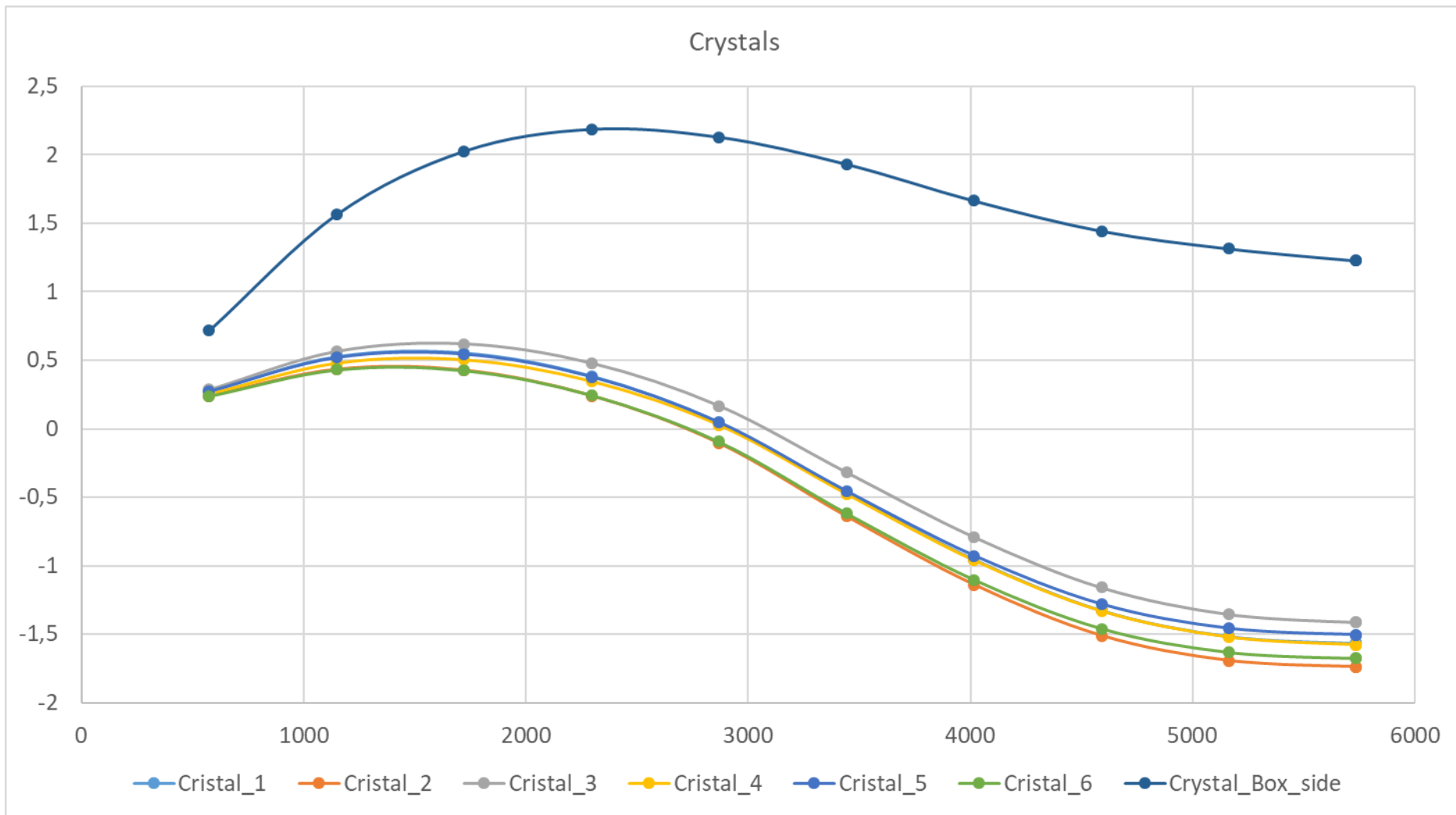


Hot Case

FEE & SDDs



Hot Case



Hot Case

BEUs

