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SAD vs SSD METHODS FOR CYBERKNIFE OCR MEASUREMENTS

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Purpose

Compare SSD and SAD methods for OCR measurements on Cyberknife commissioning acquisitions.

Commissioning of Cyberknife (CK) system at Radioncologia Júlio Teixeira S.A started in February 2016.

The MultiPlan TPS requires OCR (off-center-ratio) processed data at a fixed SAD (source-to-axis distance) of 800 mm.

Accuray physics essencial guide allows the user to measure the OCR either at fixed SSD (source-to-surface distance) or at SAD (source-to-axis distance).

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Materials and Methods

MP3 water phantom

SRS60018 Diode,

TANDEM electrometer

Measuring system MEPHYSTOmc^{2}® from PTW. .

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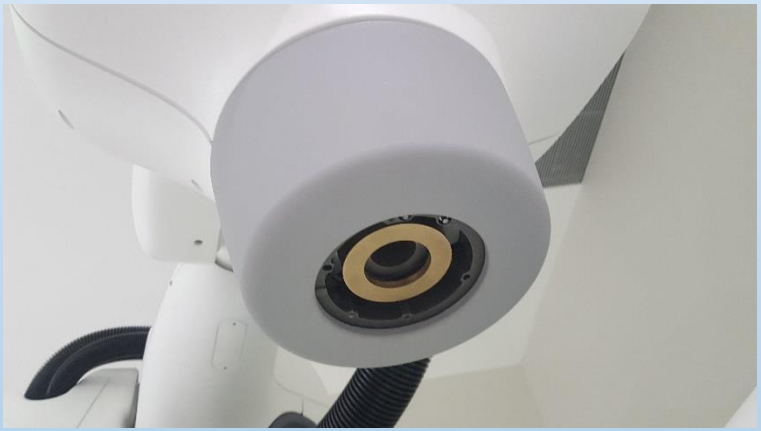
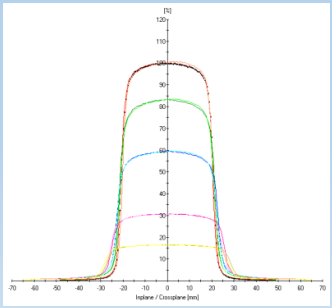
Materials and Methods

OCR measurements for fixed cones:

orthogonal scans at 15, 50, 100, 200, 300 mm depths





60, 50 and 40mm cones

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Materials and Methods

SSD method:

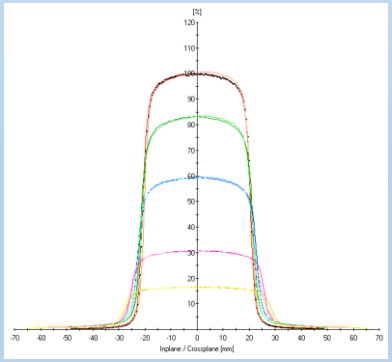
constant 800 mm target-to-water surface distance

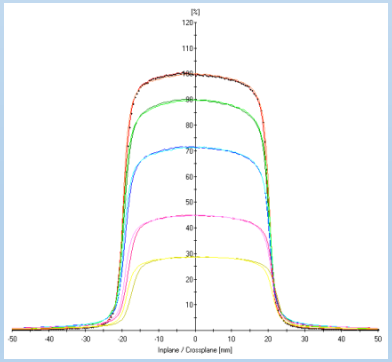
geometrically correction for an SAD equivalent setup

SAD method:

moving the robot over the Z axis

Diode depth adjusted to maintain 800 mm SAD





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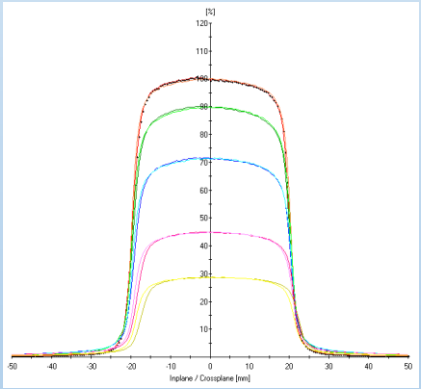
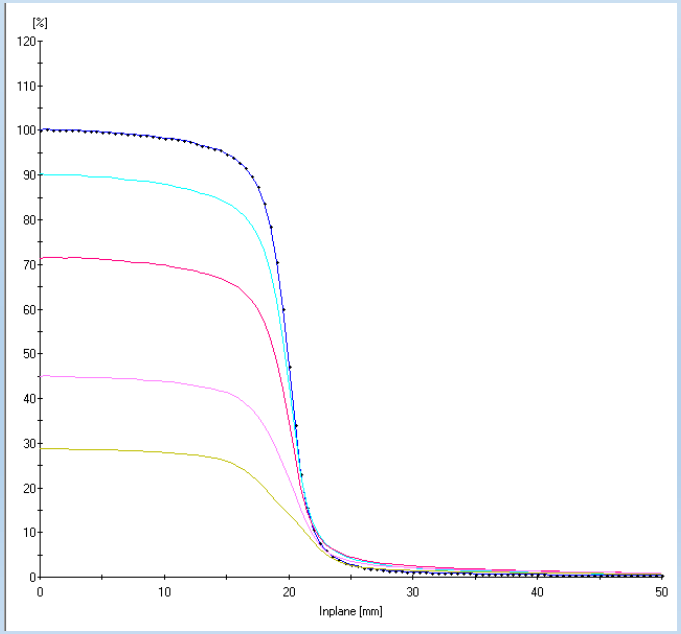
Materials and Methods

Data processed:

averaging each side of crossplane and inplane scans

each point of OCR curve - average of four measured values





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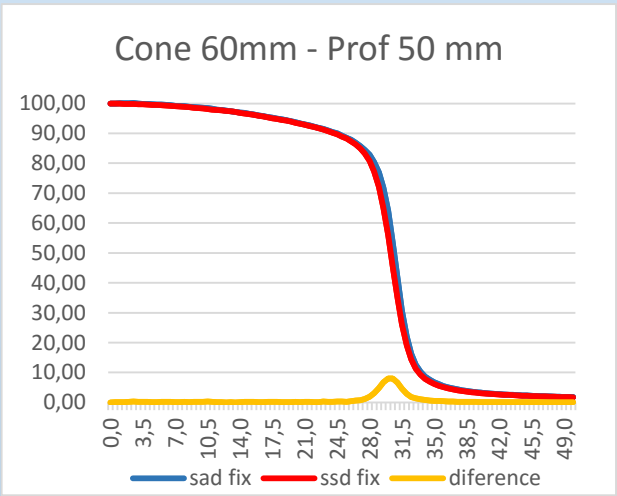
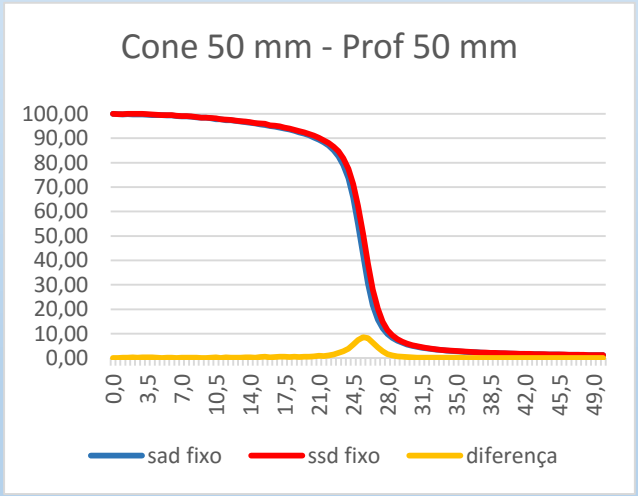
Results

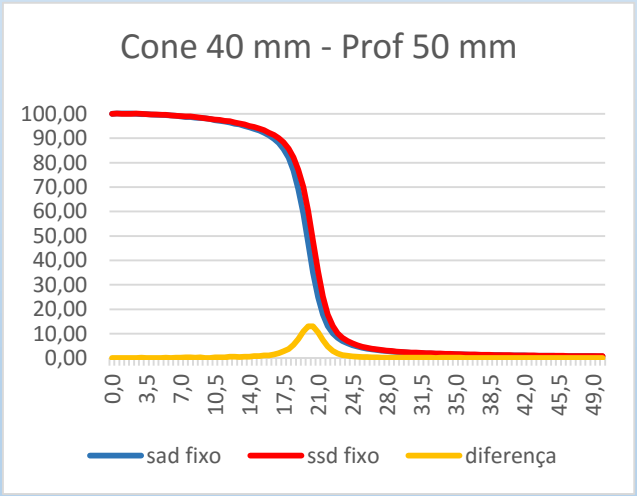
Coefficient of determination calculated point by point

SSD and SAD curves

60, 50 and 40mm cones







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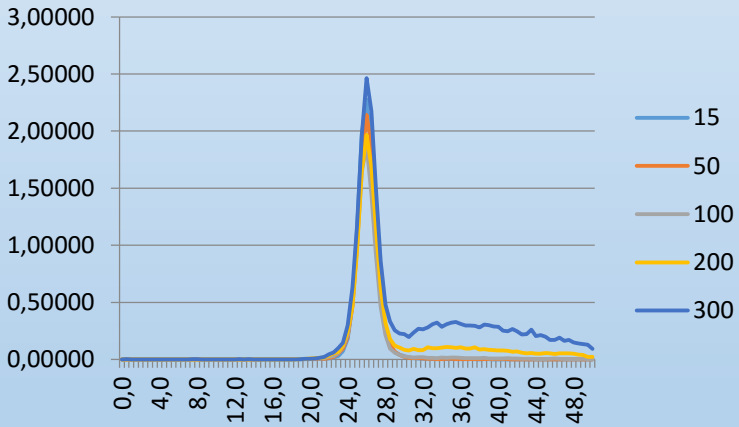
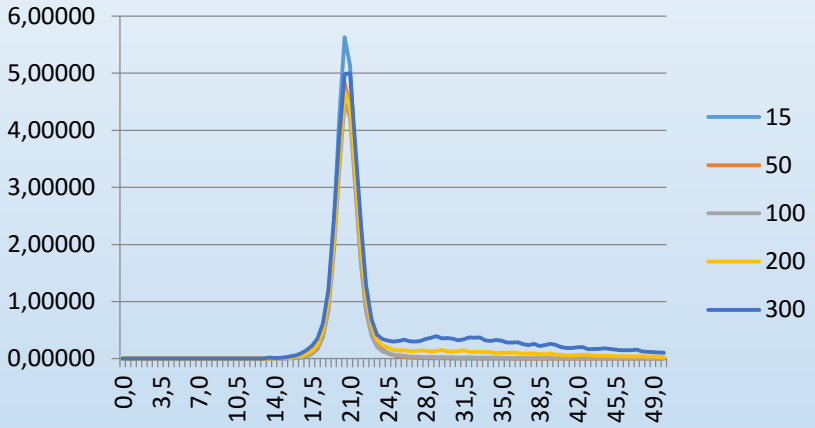
Results

Differences only significant at penumbra

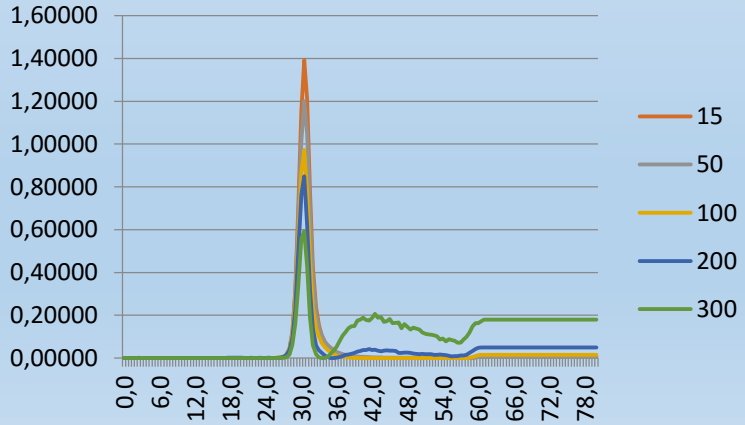
50 mm cone < 2.5%



40 mm cone < 5,6%



60 mm cone < 1.6%



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Conclusions

Both methods are acceptable.

Since SSD are more straightforward it was the chosen method for further data acquisition.