Further simulations on 184L antennas array

LT - December 2020

SIMULATION 2:

Raw meshes (Workstation1)

Sweep 5 – 370 um with steps every 5 um except (25,50,75…) that were already simulated in the previous run.

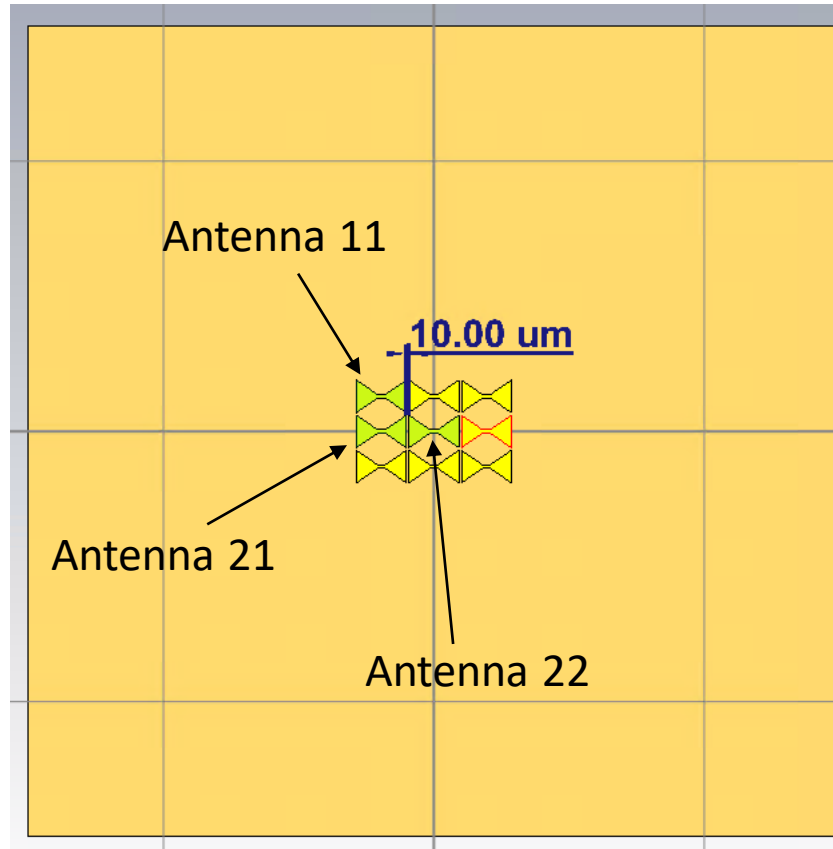With a .py program I merged these two datasets in one.
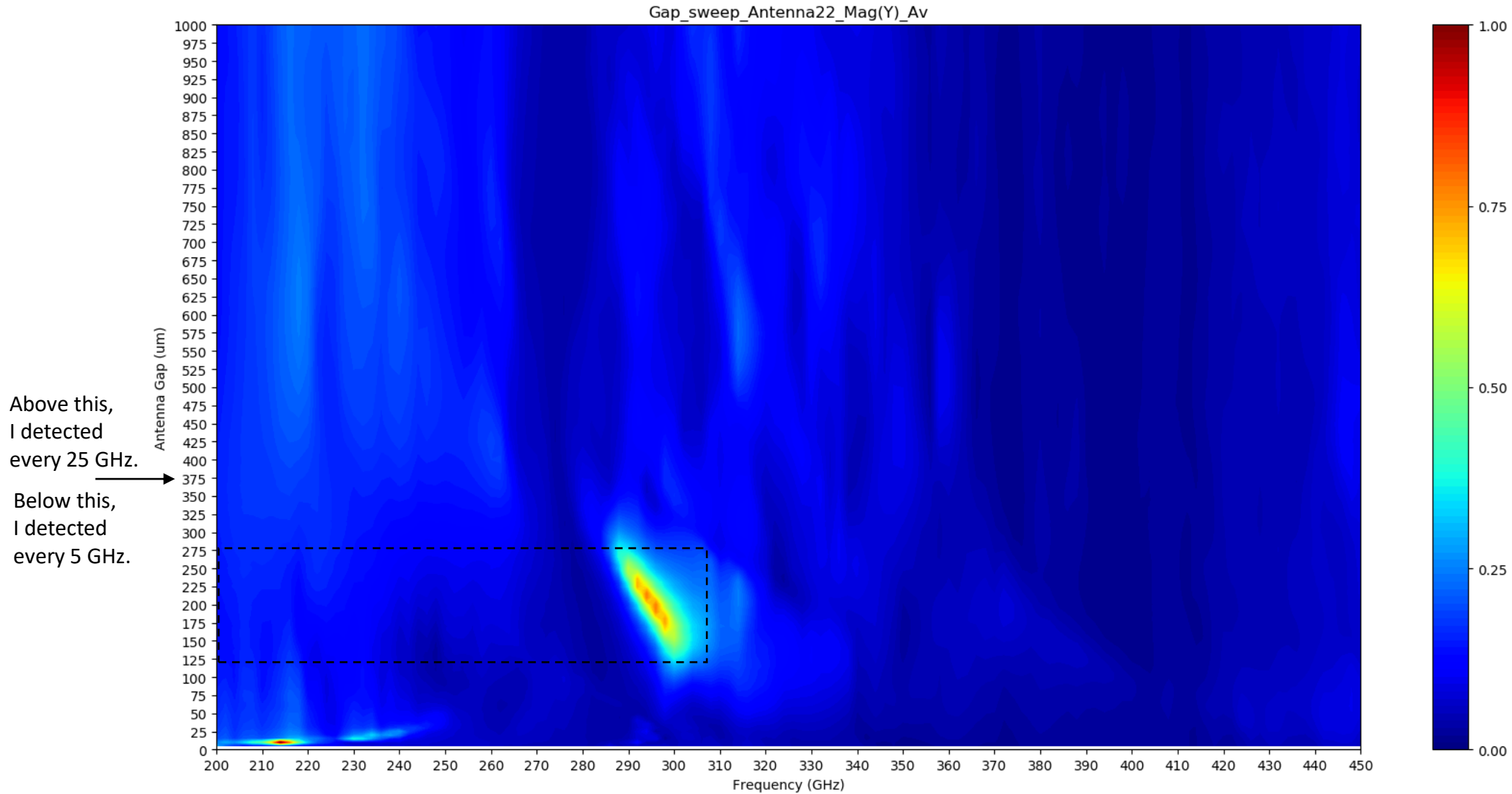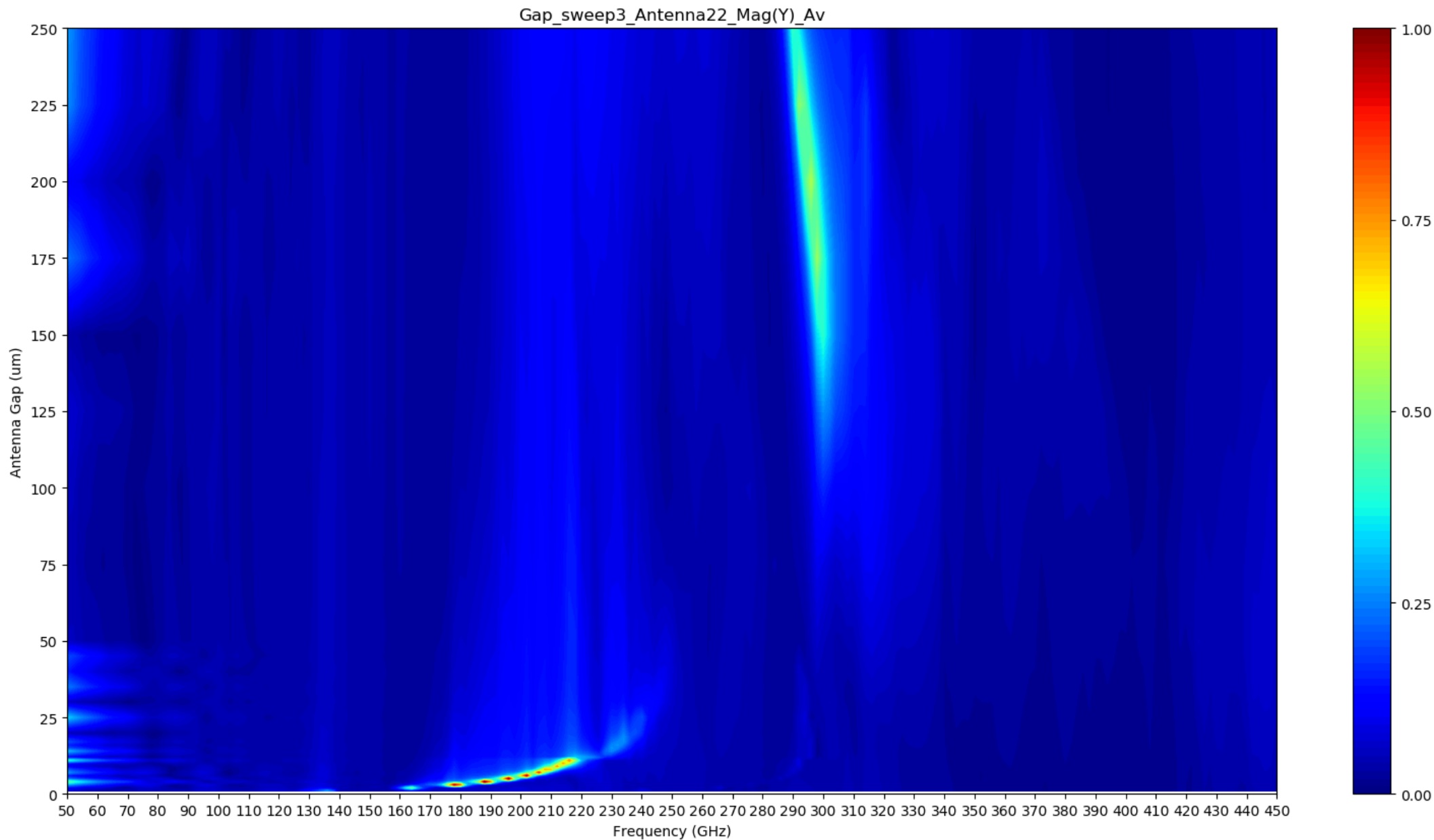
Before (paper):

X = 184 um

Y = 250 um

now

x

x

Antenna 11

10.00 um

Antenna 21

Antenna 22

Array 3x3 - Gap sweep

Merging the sweep 1 and sweep 2

Above this,
I detected
every 25 GHz.

Below this,
I detected
every 5 GHz.

Gap_sweep_Antenna22_Mag(Y)_Av

Array 3x3 - Gap sweep

Gap_sweep3_Antenna22_Mag(Y)_Av

Simulation 3 (raw meshes). Sweep 1 – 20 um every 1 um; 20-50 every 5um; 50-250 every 25 um

Array 7x7 - Gap sweep
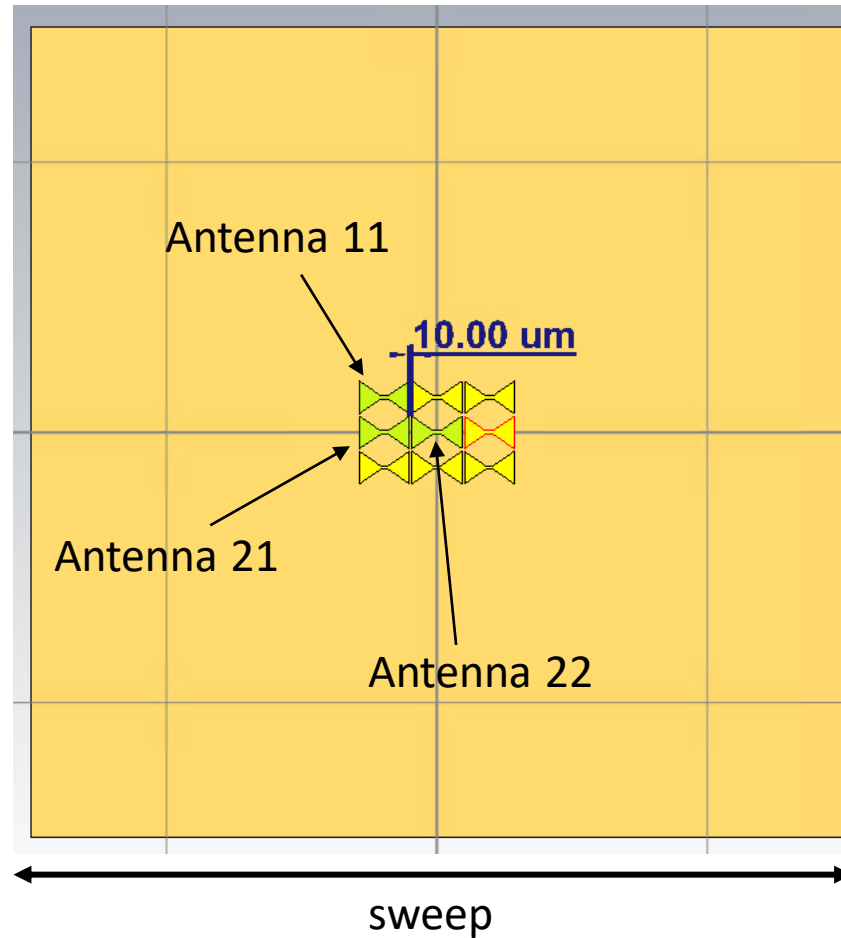

Gap_sweep_Central_Antenna_7x7_Mag(Y)_Av
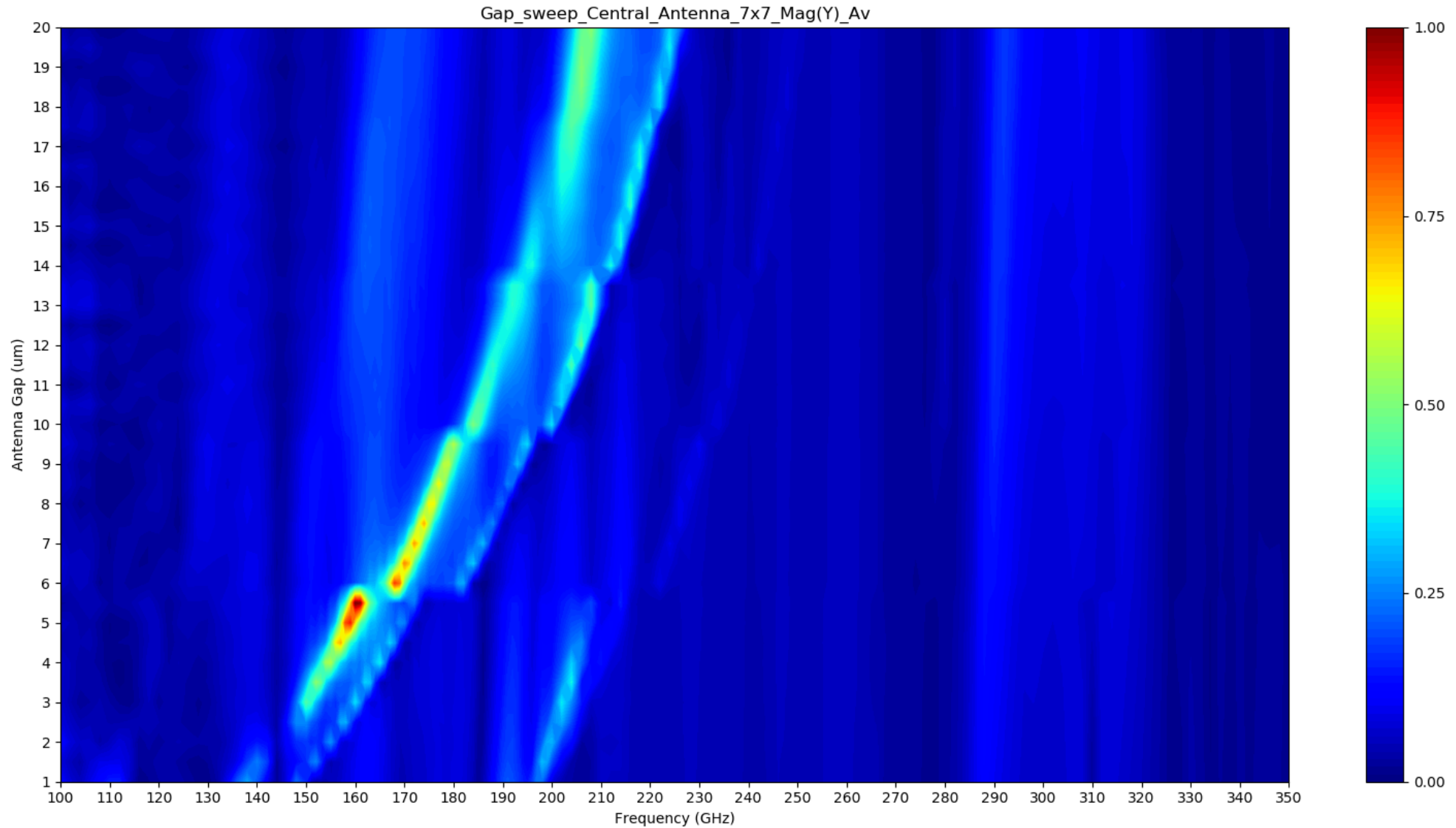
High degree of meshes on the 7x7 array. The sweep is done every 0.5 um of gap (xy) among the antennas
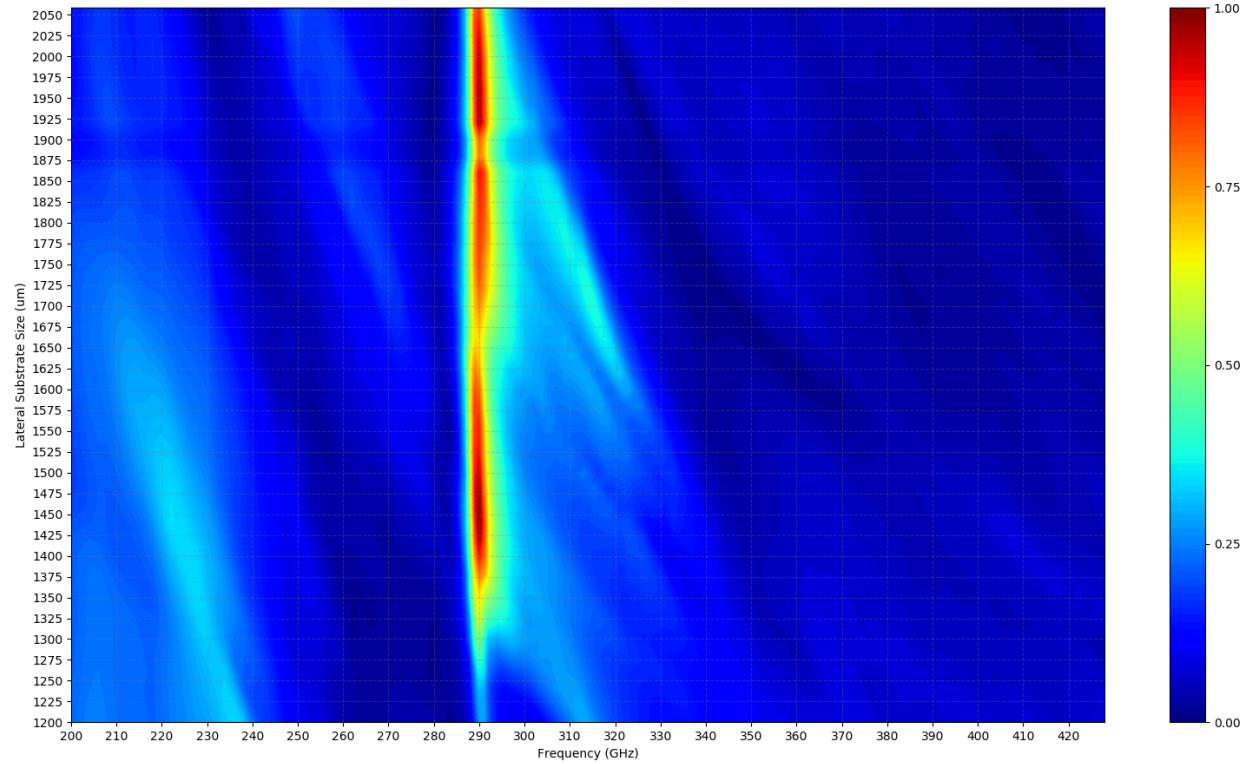
Array 3x3 - Gap sweep

SIMULATION 4:

Raw meshes (Workstation1)

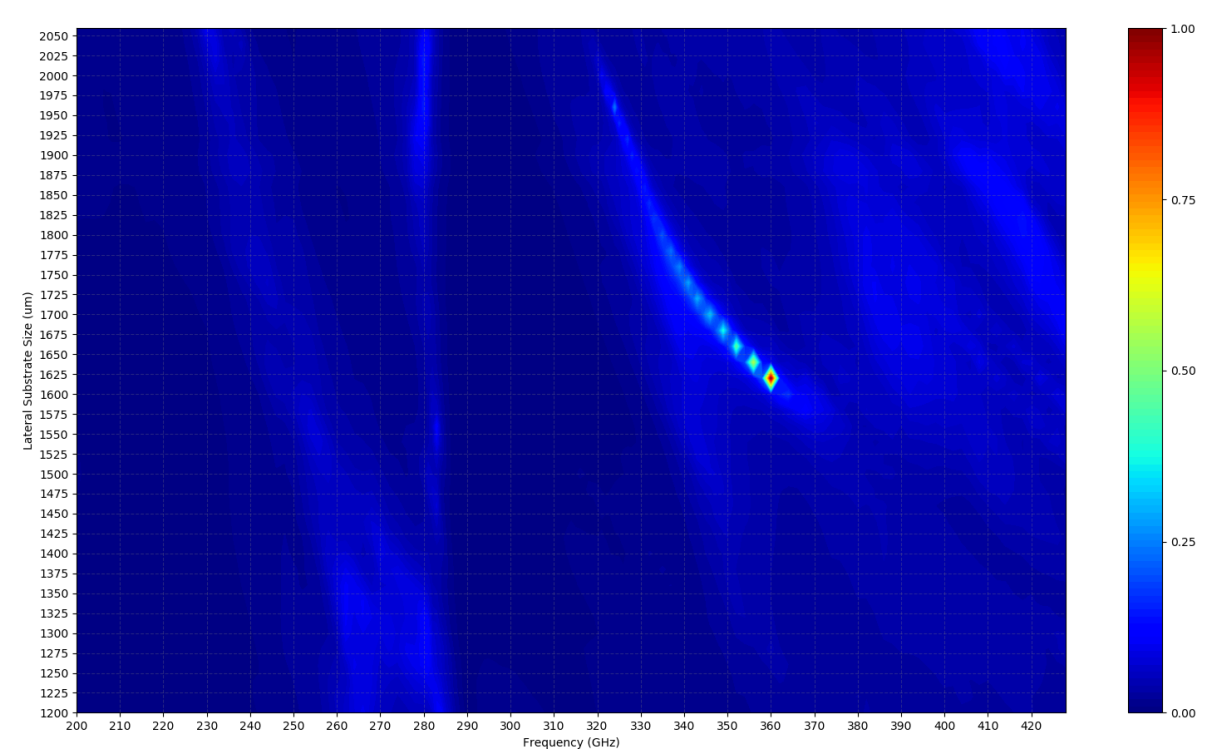Substrate lateral sweep 1200 – 2060 um with 20 um step-size
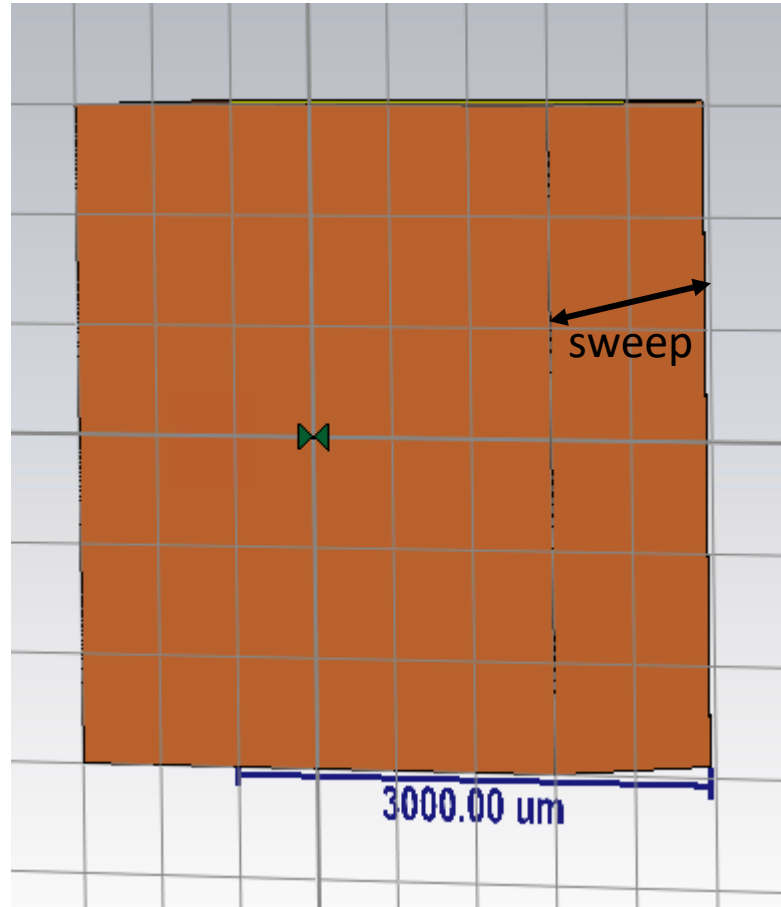
Array 3x3 – Lateral substrate size sweep

SIMULATION 5:

(Workstation1)

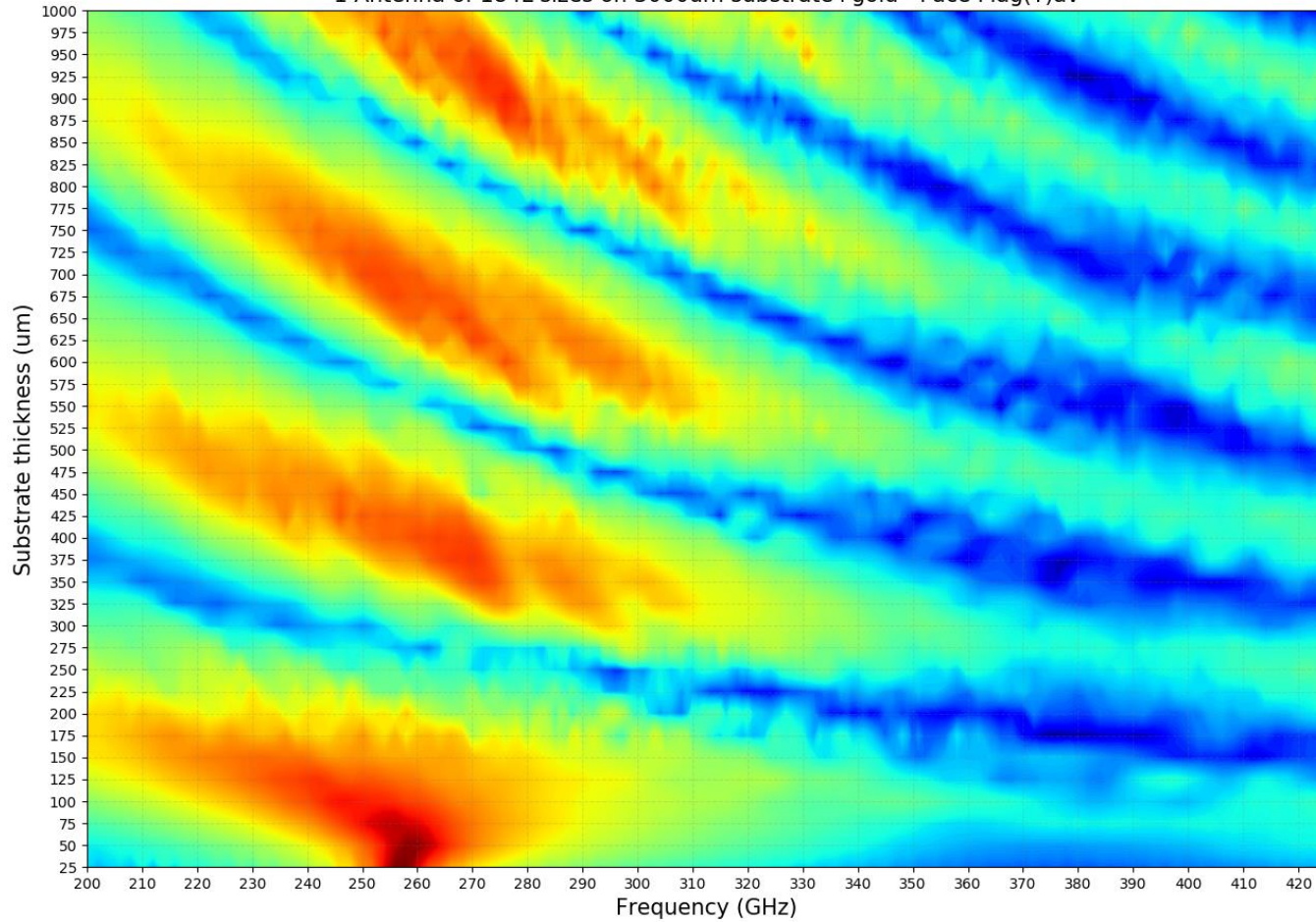Substrate thickness sweep 25 – 1000 um with 25 um step-size

With SL 3mm and gold mirror
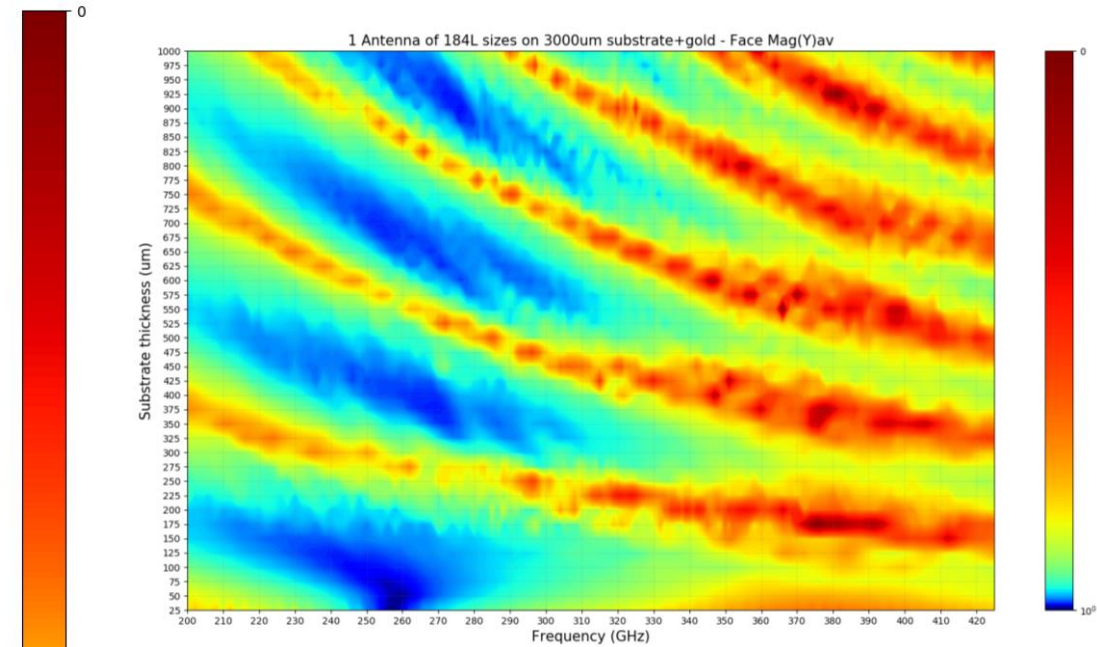
Single Antenna – substrate thickness sweep

direct

1 Antenna of 184L sizes on 3000um substrate+gold - Face Mag(Y)av

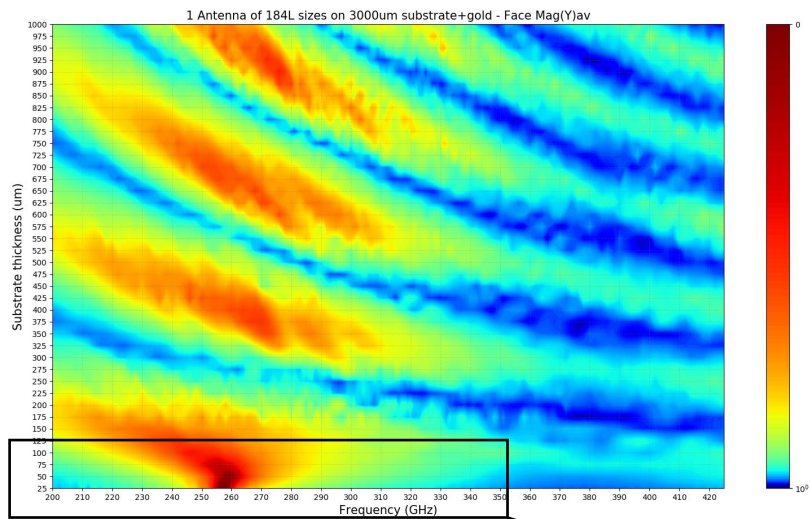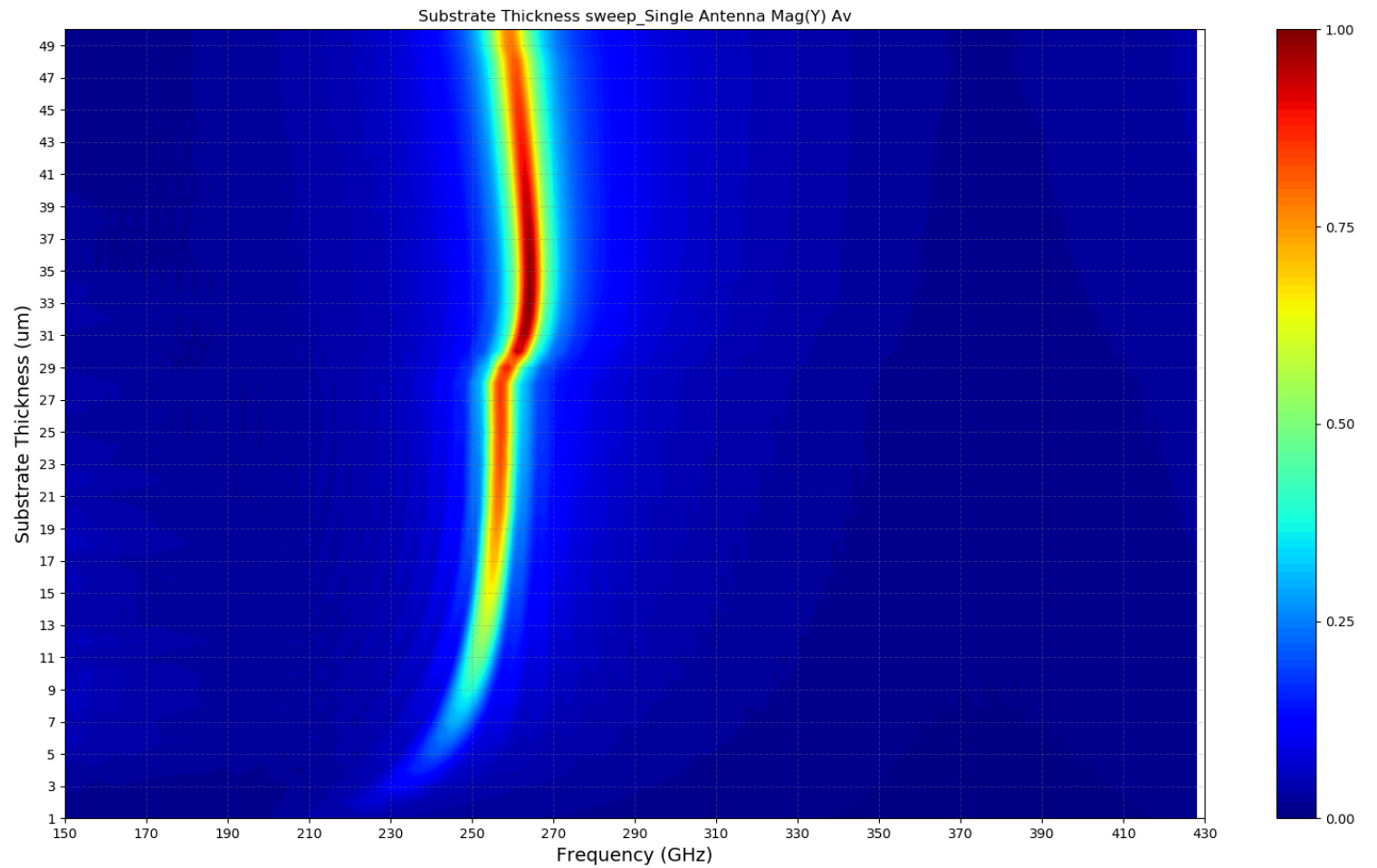### inverse

1 Antenna of 184L sizes on 3000um substrate+gold - Face Mag(Y)av

Single Antenna – substrate thickness sweep

1 Antenna of 184L sizes on 3000um substrate+gold - Face Mag(Y)av

zoom

Substrate Thickness sweep_Single Antenna Mag(Y) Av

184L antenna array:

AL 184 um

AH 120 um

BL 30 um

BW 13.5 um

Thickness 140 nm

Pitch X-axis 368 um

Gap Y-axis 304 um

Quartz (eps 4.4)
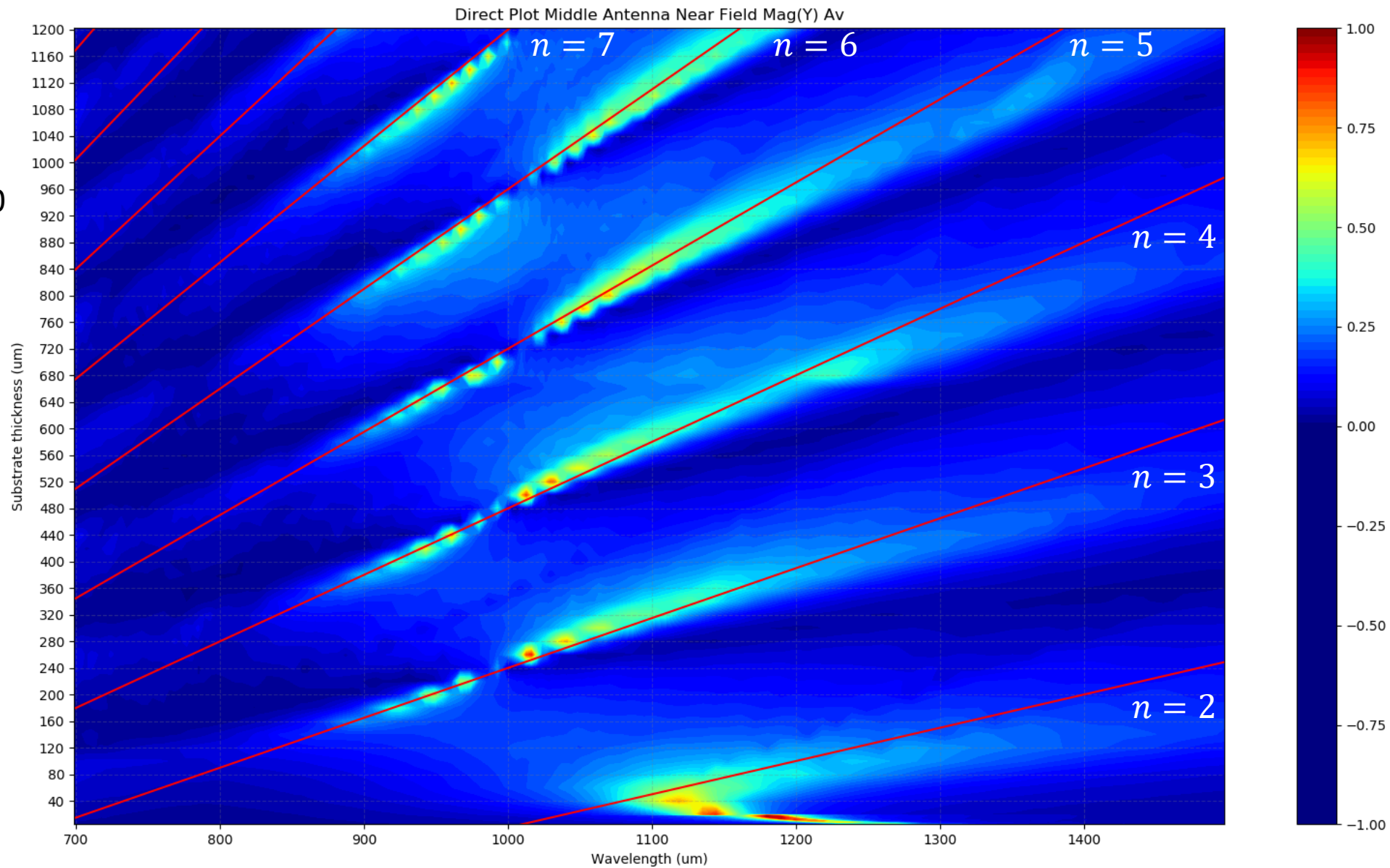
SL 3 mm x 3 mm

Sthick swept

Gold Mirror on back (300 nm)

Array 7x7 – Substrate thickness sweep

Red lines are given by:

$$y = n \cdot \left(\frac{\lambda}{4} - 10\right) - 480$$

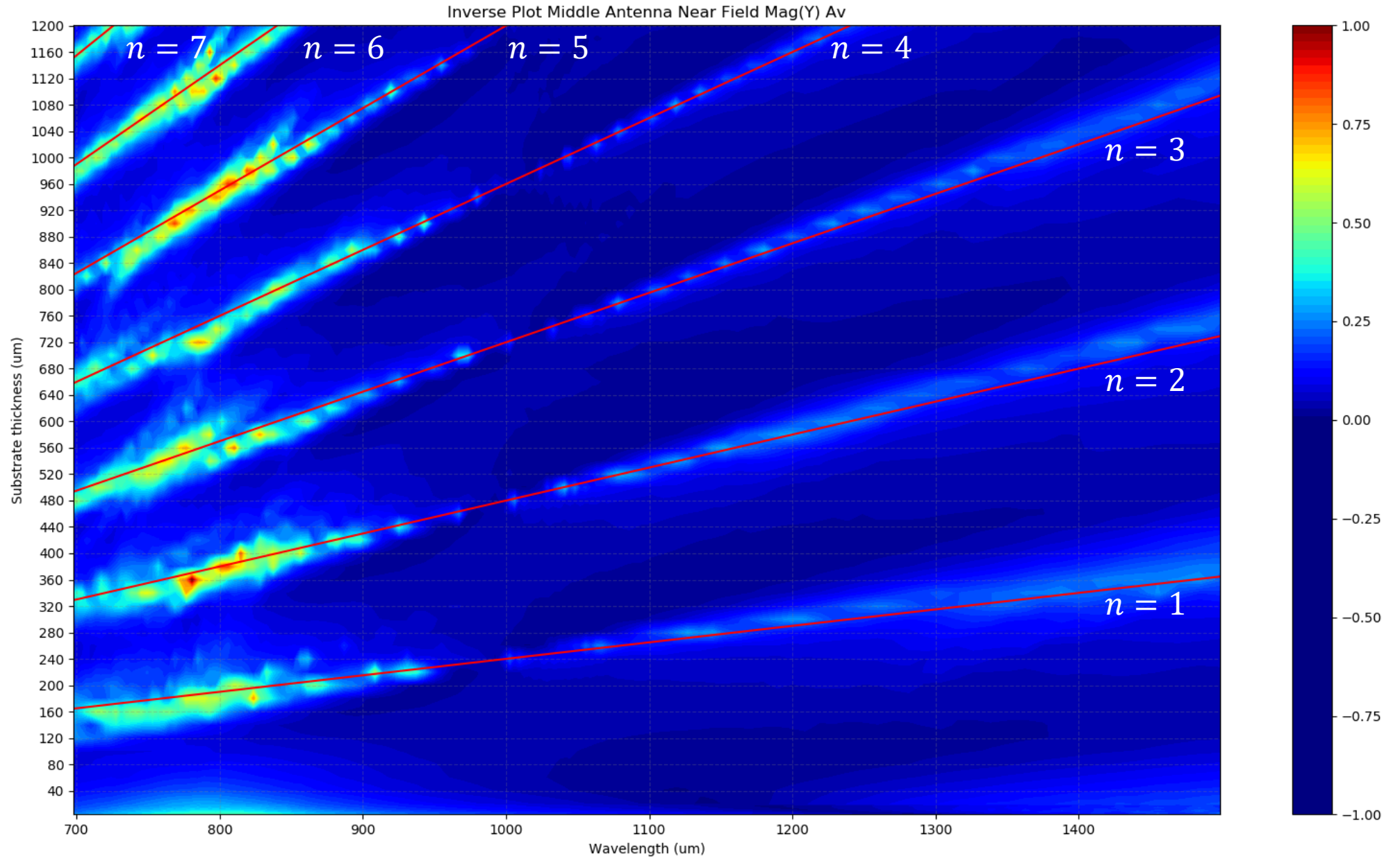$$y = n \cdot \left(\frac{\lambda}{4} - 10\right) - \frac{\lambda}{2}$$

Direct Plot Middle Antenna Near Field Mag(Y) Av

Array 7x7 – Substrate thickness sweep

Red lines are given by:

$$y = n \cdot \left(\frac{\lambda}{4} - 10 \right)$$

which describes the free spectral range (FSR), i.e. the separation between consecutive fringes.

Inverse Plot Middle Antenna Near Field Mag(Y) Av

Array 7x7 – Substrate thickness sweep

Thickness_sweep_140nm_Av(Abs)_substrate_Max