

# F.

H = 15 km

## Statistics Summary:

|                          |                 |  |           |                     |           |
|--------------------------|-----------------|--|-----------|---------------------|-----------|
| T                        | [°C]            |  | 6.70(24)  | 29.70(35)           | 52.40(08) |
| <hr/>                    |                 |  |           |                     |           |
| P                        | [torr]<br>[kPa] |  | 90.80(06) | 90.80(11)<br>12.106 | 90.80(20) |
| $\sigma_x(\Delta\alpha)$ | [dB/km]         |  | 0.079     | 0.079               | 0.078     |

H = 15 km

| 6.7°C       |                             | 29.7°C      |                             | 52.4°C      |                             |
|-------------|-----------------------------|-------------|-----------------------------|-------------|-----------------------------|
| $f_x$ [GHz] | $\alpha_x(\delta\alpha)$    | $f_x$ [GHz] | $\alpha_x(\delta\alpha)$    | $f_x$ [GHz] | $\alpha_x(\delta\alpha)$    |
| P [torr]    | $\alpha_M(\pm\Delta\alpha)$ | P [torr]    | $\alpha_M(\pm\Delta\alpha)$ | P [torr]    | $\alpha_M(\pm\Delta\alpha)$ |
| dB/km       |                             | dB/km       |                             | dB/km       |                             |
| 53.89435    | 0.00(.05)                   | 53.89439    | 0.17(.03)                   | 53.89444    | 0.03(.03)                   |
| 90.7        | 0.09(0.11)                  | 90.8        | 0.09(-0.08)                 | 90.7        | 0.09(0.06)                  |
| 53.99310    | 0.10(.02)                   | 53.99311    | 0.12(.02)                   | 53.99315    | 0.14(.03)                   |
| 90.7        | 0.14(0.04)                  | 90.8        | 0.14(0.02)                  | 90.5        | 0.14(0.00)                  |
| 54.09171    | 0.35(.02)                   | 54.09177    | 0.15(.02)                   | 54.09173    | 0.28(.03)                   |
| 90.8        | 0.23(-0.12)                 | 90.7        | 0.25(0.10)                  | 90.8        | 0.26(-0.02)                 |
| 54.19045    | 0.31(.02)                   | 54.19072    | 0.12(.02)                   | 54.19045    | 0.33(.03)                   |
| 90.8        | 0.23(-0.08)                 | 90.8        | 0.24(0.12)                  | 90.9        | 0.25(-0.08)                 |
| 54.28908    | 0.21(.02)                   | 54.28905    | 0.17(.02)                   | 54.28910    | 0.18(.04)                   |
| 90.8        | 0.16(-0.05)                 | 90.7        | 0.16(-0.01)                 | 90.8        | 0.16(-0.02)                 |
| 54.38650    | 0.20(.02)                   | 54.38661    | 0.13(.02)                   | 54.38778    | 0.00(.03)                   |
| 90.7        | 0.15(-0.05)                 | 90.8        | 0.14(0.01)                  | 90.8        | 0.14(0.14)                  |
| 54.42803    | 0.24(.02)                   | 54.42898    | 0.23(.02)                   | 54.42997    | 0.25(.04)                   |
| 90.7        | 0.16(-0.08)                 | 90.6        | 0.15(-0.08)                 | 90.7        | 0.14(-0.11)                 |
| 54.52916    | 0.30(.02)                   | 54.53024    | 0.12(.03)                   | 54.53024    | 0.26(.03)                   |
| 90.8        | 0.23(-0.07)                 | 90.8        | 0.23(0.11)                  | 90.9        | 0.22(-0.04)                 |
| 54.63010    | 0.24(.02)                   | 54.63013    | 0.54(.03)                   | 54.63019    | 0.40(.03)                   |
| 90.7        | 0.39(0.15)                  | 90.8        | 0.40(-0.14)                 | 90.7        | 0.41(0.01)                  |
| 54.73019    | 0.33(.02)                   | 54.73020    | 0.39(.03)                   | 54.73025    | 0.44(.04)                   |
| 90.8        | 0.39(0.06)                  | 90.8        | 0.40(0.01)                  | 90.3        | 0.41(-0.03)                 |
| 54.83016    | 0.36(.03)                   | 54.83022    | 0.22(.03)                   | 54.83018    | 0.17(.03)                   |
| 90.8        | 0.27(-0.09)                 | 90.7        | 0.26(0.04)                  | 90.8        | 0.25(0.08)                  |
| 54.93026    | 0.34(.03)                   | 54.93052    | 0.12(.03)                   | 54.93024    | 0.22(.04)                   |
| 90.8        | 0.24(-0.10)                 | 90.8        | 0.23(0.11)                  | 90.9        | 0.21(-0.01)                 |
| 55.03023    | 0.25(.03)                   | 55.03020    | 0.27(.03)                   | 55.03025    | 0.27(.04)                   |
| 90.8        | 0.31(0.06)                  | 90.7        | 0.28(0.01)                  | 90.8        | 0.26(-0.01)                 |
| 55.12898    | 0.50(.03)                   | 55.12910    | 0.35(.04)                   | 55.13028    | 0.53(.03)                   |
| 90.8        | 0.50(0.00)                  | 90.8        | 0.48(0.13)                  | 90.8        | 0.47(-0.06)                 |
| 55.16105    | 0.51(.03)                   | 55.16202    | 0.57(.03)                   | 55.16302    | 0.58(.04)                   |
| 90.6        | 0.59(0.08)                  | 90.8        | 0.58(0.01)                  | 90.7        | 0.57(-0.01)                 |
| 55.26355    | 0.74(.03)                   | 55.26464    | 0.79(.04)                   | 55.26464    | 0.60(.04)                   |
| 90.9        | 0.67(-0.07)                 | 90.8        | 0.67(-0.12)                 | 91.4        | 0.66(0.06)                  |
| 55.36584    | 0.34(.03)                   | 55.36589    | 0.54(.04)                   | 55.36595    | 0.40(.03)                   |
| 90.7        | 0.47(0.13)                  | 90.8        | 0.43(-0.11)                 | 90.7        | 0.40(0.00)                  |
| 55.46729    | 0.38(.03)                   | 55.46730    | 0.42(.03)                   | 55.46736    | 0.44(.05)                   |
| 90.8        | 0.39(0.01)                  | 90.8        | 0.35(-0.07)                 | 90.3        | 0.31(-0.13)                 |
| 55.56861    | 0.55(.03)                   | 55.56867    | 0.37(.03)                   | 55.56864    | 0.31(.03)                   |
| 90.8        | 0.45(-0.10)                 | 90.7        | 0.40(0.03)                  | 90.8        | 0.36(0.05)                  |

H = 15 km

| 6.7°C                   |   | 29.7°C                  |   | 52.4°C                  |   |
|-------------------------|---|-------------------------|---|-------------------------|---|
| $f_x$ [GHz]<br>P [torr] | $\alpha_x(\delta\alpha)$<br>$\alpha_M(\pm\Delta\alpha)$ | $f_x$ [GHz]<br>P [torr] | $\alpha_x(\delta\alpha)$<br>$\alpha_M(\pm\Delta\alpha)$ | $f_x$ [GHz]<br>P [torr] | $\alpha_x(\delta\alpha)$<br>$\alpha_M(\pm\Delta\alpha)$ |
| dB/km                   |   | dB/km                   |   | dB/km                   |   |
| 55.67005<br>90.8        | 0.66(.03)<br>0.71( 0.05)                                | 55.67032<br>90.8        | 0.51(.04)<br>0.65( 0.14)                                | 55.67005<br>90.9        | 0.59(.03)<br>0.60( 0.01)                                |
| 55.77138<br>90.8        | 0.98(.03)<br>1.09( 0.11)                                | 55.77135<br>90.7        | 1.09(.03)<br>1.05(-0.04)                                | 55.77140<br>90.8        | 0.90(.03)<br>1.01( 0.11)                                |
| 55.87147<br>90.8        | 0.97(.03)<br>0.94(-0.03)                                | 55.87148<br>90.8        | 0.86(.02)<br>0.87( 0.01)                                | 55.87278<br>90.8        | 0.74(.04)<br>0.79( 0.05)                                |
| 55.89407<br>90.7        | 0.97(.03)<br>0.87(-0.10)                                | 55.89505<br>90.6        | 0.60(.03)<br>0.79( 0.19)                                | 55.89607<br>90.7        | 0.70(.03)<br>0.71( 0.01)                                |
| 55.99793<br>90.9        | 0.61(.03)<br>0.70( 0.09)                                | 55.99903<br>90.9        | 0.64(.02)<br>0.60(-0.04)                                | 55.99904<br>90.7        | 0.52(.04)<br>0.52( 0.00)                                |
| 56.10159<br>90.7        | 0.75(.03)<br>0.79( 0.04)                                | 56.10163<br>90.8        | 0.79(.04)<br>0.67(-0.12)                                | 56.10170<br>90.7        | 0.59(.04)<br>0.58(-0.01)                                |
| 56.20439<br>90.7        | 1.13(.03)<br>1.13( 0.00)                                | 56.20440<br>90.8        | 1.00(.04)<br>0.98(-0.02)                                | 56.20446<br>91.2        | 0.86(.05)<br>0.86( 0.00)                                |
| 56.30705<br>90.8        | 1.50(.03)<br>1.67( 0.17)                                | 56.30712<br>90.7        | 1.35(.03)<br>1.51( 0.16)                                | 56.30708<br>90.8        | 1.46(.04)<br>1.38(-0.08)                                |
| 56.40985<br>90.8        | 1.53(.04)<br>1.69( 0.16)                                | 56.41013<br>90.8        | 1.34(.03)<br>1.53( 0.19)                                | 56.40985<br>90.9        | 1.26(.04)<br>1.40( 0.14)                                |
| 56.51254<br>90.8        | 1.05(.03)<br>1.12( 0.07)                                | 56.51250<br>90.7        | 0.99(.03)<br>0.97(-0.02)                                | 56.51256<br>90.8        | 0.74(.04)<br>0.84( 0.10)                                |
| 56.62709<br>90.7        | 0.75(.03)<br>0.83( 0.08)                                | 56.62809<br>90.7        | 0.77(.02)<br>0.70(-0.07)                                | 56.62912<br>90.7        | 0.57(.03)<br>0.59( 0.02)                                |
| 56.73232<br>90.9        | 0.84(.03)<br>0.87( 0.03)                                | 56.73344<br>90.8        | 0.81(.03)<br>0.73(-0.08)                                | 56.73344<br>91.3        | 0.66(.04)<br>0.62(-0.04)                                |
| 56.83734<br>90.7        | 1.11(.03)<br>1.25( 0.14)                                | 56.83738<br>90.8        | 1.19(.04)<br>1.08(-0.11)                                | 56.83745<br>90.8        | 1.03(.04)<br>0.94(-0.09)                                |
| 56.94149<br>90.7        | 1.75(.04)<br>1.92( 0.17)                                | 56.94151<br>90.8        | 1.68(.04)<br>1.74( 0.06)                                | 56.94157<br>91.0        | 1.54(.05)<br>1.59( 0.05)                                |
| 57.04551<br>90.8        | 1.63(.03)<br>1.71( 0.08)                                | 57.04557<br>90.7        | 1.45(.04)<br>1.51( 0.06)                                | 57.04554<br>90.8        | 1.20(.04)<br>1.35( 0.15)                                |
| 57.14966<br>90.8        | 1.18(.03)<br>1.13(-0.05)                                | 57.14993<br>90.8        | 0.76(.04)<br>0.95( 0.19)                                | 57.14966<br>90.9        | 0.95(.04)<br>0.81(-0.14)                                |
| 57.25368<br>90.8        | 0.81(.04)<br>0.91( 0.10)                                | 57.25366<br>90.7        | 0.66(.03)<br>0.75( 0.09)                                | 57.25372<br>90.8        | 0.52(.04)<br>0.63( 0.11)                                |
| 57.36012<br>90.7        | 1.15(.06)<br>0.99(-0.16)                                | 57.35656<br>90.8        | 0.90(.03)<br>0.81(-0.09)                                | 57.36217<br>90.7        | 0.80(.06)<br>0.68(-0.12)                                |
| 57.46671<br>90.9        | 1.47(.04)<br>1.44(-0.03)                                | 57.46785<br>90.8        | 1.36(.04)<br>1.22(-0.14)                                | 57.46785<br>91.0        | 0.90(.04)<br>1.03( 0.13)                                |

H = 15 km

| 6.7°C       |                             | 29.7°C      |                             | 52.4°C      |                             |
|-------------|-----------------------------|-------------|-----------------------------|-------------|-----------------------------|
| $f_x$ [GHz] | $\alpha_x(\delta\alpha)$    | $f_x$ [GHz] | $\alpha_x(\delta\alpha)$    | $f_x$ [GHz] | $\alpha_x(\delta\alpha)$    |
| P [torr]    | $\alpha_M(\pm\Delta\alpha)$ | P [torr]    | $\alpha_M(\pm\Delta\alpha)$ | P [torr]    | $\alpha_M(\pm\Delta\alpha)$ |
| dB/km       |                             | dB/km       |                             | dB/km       |                             |
| 57.57310    | 2.10(.04)                   | 57.57315    | 1.79(.03)                   | 57.57321    | 1.81(.05)                   |
| 90.7        | 2.25( 0.15)                 | 90.8        | 1.98( 0.19)                 | 90.8        | 1.76(-0.05)                 |
| 57.67862    | 2.06(.04)                   | 57.67863    | 1.74(.05)                   | 57.67870    | 1.68(.04)                   |
| 90.7        | 2.13( 0.07)                 | 90.8        | 1.85( 0.11)                 | 90.4        | 1.63(-0.05)                 |
| 57.78398    | 1.51(.04)                   | 57.78406    | 1.22(.04)                   | 57.78402    | 1.03(.03)                   |
| 90.8        | 1.39(-0.12)                 | 90.7        | 1.15(-0.07)                 | 90.8        | 0.96(-0.07)                 |
| 57.88948    | 1.11(.03)                   | 57.88976    | 0.82(.04)                   | 57.88949    | 0.66(.04)                   |
| 90.8        | 1.07(-0.04)                 | 90.8        | 0.86( 0.04)                 | 90.9        | 0.70( 0.04)                 |
| 57.99486    | 1.12(.03)                   | 57.99483    | 0.80(.03)                   | 57.99490    | 0.78(.05)                   |
| 90.8        | 1.07(-0.05)                 | 90.7        | 0.86( 0.06)                 | 90.8        | 0.69(-0.09)                 |
| 58.09890    | 1.41(.02)                   | 58.09419    | 1.22(.03)                   | 58.09982    | 0.89(.02)                   |
| 90.9        | 1.39(-0.02)                 | 90.6        | 1.09(-0.13)                 | 90.8        | 0.91( 0.02)                 |
| 58.18797    | 2.09(.02)                   | 58.20227    | 1.79(.04)                   | 58.18943    | 1.47(.02)                   |
| 90.8        | 2.02(-0.07)                 | 90.9        | 1.78(-0.01)                 | 90.7        | 1.39(-0.08)                 |
| 58.29363    | 2.98(.03)                   | 58.30891    | 2.71(.03)                   | 58.30898    | 2.45(.03)                   |
| 90.7        | 3.17( 0.19)                 | 90.8        | 2.82( 0.11)                 | 90.9        | 2.45( 0.00)                 |
| 58.37682    | 3.25(.02)                   | 58.37750    | 2.75(.02)                   | 58.37752    | 2.33(.02)                   |
| 91.0        | 3.42( 0.17)                 | 90.6        | 2.92( 0.17)                 | 91.0        | 2.51( 0.18)                 |
| 58.41573    | 3.05(.04)                   | 58.41574    | 2.81(.04)                   | 58.41580    | 2.20(.04)                   |
| 90.7        | 3.25( 0.20)                 | 90.8        | 2.74(-0.07)                 | 90.3        | 2.34( 0.14)                 |
| 58.46980    | 2.77(.04)                   | 58.47028    | 2.21(.02)                   | 58.47041    | 1.87(.02)                   |
| 91.0        | 2.85( 0.08)                 | 90.7        | 2.37( 0.16)                 | 90.8        | 2.00( 0.13)                 |
| 58.52244    | 2.37(.02)                   | 58.52251    | 1.99(.03)                   | 58.52247    | 1.51(.03)                   |
| 90.7        | 2.40( 0.03)                 | 90.7        | 1.96(-0.03)                 | 90.8        | 1.63( 0.12)                 |
| 58.56258    | 2.04(.02)                   | 58.56282    | 1.66(.02)                   | 58.56304    | 1.38(.02)                   |
| 90.7        | 2.07( 0.03)                 | 90.8        | 1.67( 0.01)                 | 90.8        | 1.37(-0.01)                 |
| 58.62928    | 1.62(.02)                   | 58.62956    | 1.31(.03)                   | 58.62928    | 1.15(.03)                   |
| 90.8        | 1.63( 0.01)                 | 90.8        | 1.30(-0.01)                 | 90.9        | 1.04(-0.11)                 |
| 58.73600    | 1.33(.03)                   | 58.73598    | 0.95(.03)                   | 58.73603    | 0.92(.04)                   |
| 90.8        | 1.27(-0.06)                 | 90.7        | 1.00( 0.05)                 | 90.8        | 0.79(-0.13)                 |
| 58.84141    | 1.23(.02)                   | 58.84154    | 0.97(.02)                   | 58.82828    | 0.90(.02)                   |
| 90.7        | 1.23( 0.00)                 | 90.8        | 0.96(-0.01)                 | 90.7        | 0.76(-0.14)                 |
| 58.92219    | 1.30(.01)                   | 58.92398    | 1.20(.01)                   |             |                             |
| 90.8        | 1.39( 0.09)                 | 90.9        | 1.10(-0.10)                 |             |                             |
| 59.02919    | 1.75(.02)                   | 59.02930    | 1.54(.01)                   | 59.04470    | 1.32(.03)                   |
| 90.7        | 1.96( 0.21)                 | 90.9        | 1.59( 0.05)                 | 90.9        | 1.40( 0.08)                 |
| 59.11343    | 2.48(.01)                   | 59.15281    | 2.34(.03)                   | 59.15287    | 1.92(.03)                   |
| 91.0        | 2.63( 0.15)                 | 90.8        | 2.38( 0.04)                 | 91.3        | 2.05( 0.13)                 |

H = 15 km

| 6.7°C       |                             | 29.7°C      |                             | 52.4°C      |                             |
|-------------|-----------------------------|-------------|-----------------------------|-------------|-----------------------------|
| $f_x$ [GHz] | $\alpha_x(\delta\alpha)$    | $f_x$ [GHz] | $\alpha_x(\delta\alpha)$    | $f_x$ [GHz] | $\alpha_x(\delta\alpha)$    |
| P [torr]    | $\alpha_M(\pm\Delta\alpha)$ | P [torr]    | $\alpha_M(\pm\Delta\alpha)$ | P [torr]    | $\alpha_M(\pm\Delta\alpha)$ |
| dB/km       |                             | dB/km       |                             | dB/km       |                             |
| 59.20757    | 2.61(.01)                   | 59.20808    | 2.16(.01)                   | 59.20821    | 1.84(.01)                   |
| 90.9        | 2.71( 0.10)                 | 90.7        | 2.28( 0.12)                 | 90.8        | 1.94( 0.10)                 |
| 59.26085    | 2.28(.02)                   | 59.26093    | 2.00(.03)                   | 59.26089    | 1.59(.03)                   |
| 90.8        | 2.36( 0.08)                 | 90.7        | 1.94(-0.06)                 | 90.8        | 1.61( 0.02)                 |
| 59.30154    | 2.14(.01)                   | 59.30178    | 1.71(.01)                   | 59.30200    | 1.37(.01)                   |
| 90.8        | 2.10(-0.04)                 | 90.8        | 1.69(-0.02)                 | 90.8        | 1.38( 0.01)                 |
| 59.36905    | 1.94(.02)                   | 59.36934    | 1.48(.02)                   | 59.36906    | 1.28(.03)                   |
| 90.8        | 1.87(-0.07)                 | 90.8        | 1.48( 0.00)                 | 90.9        | 1.19(-0.09)                 |
| 59.39716    | 1.89(.01)                   | 59.39717    | 1.56(.01)                   | 59.39779    | 1.16(.01)                   |
| 90.9        | 1.86(-0.03)                 | 90.8        | 1.47(-0.09)                 | 90.7        | 1.19( 0.03)                 |
| 59.47712    | 2.09(.02)                   | 59.47709    | 1.67(.02)                   | 59.47715    | 1.34(.02)                   |
| 90.8        | 2.10( 0.01)                 | 90.7        | 1.69( 0.02)                 | 90.8        | 1.38( 0.04)                 |
| 59.56507    | 2.49(.01)                   | 59.56580    | 2.06(.01)                   | 59.56603    | 1.79(.01)                   |
| 90.9        | 2.56( 0.07)                 | 91.0        | 2.13( 0.07)                 | 90.8        | 1.80( 0.01)                 |
| 59.58385    | 2.55(.03)                   | 59.58388    | 2.13(.02)                   | 59.58528    | 1.74(.03)                   |
| 90.8        | 2.61( 0.06)                 | 90.8        | 2.17( 0.04)                 | 90.8        | 1.85( 0.11)                 |
| 59.65641    | 2.33(.01)                   | 59.67102    | 1.82(.02)                   | 59.67102    | 1.43(.03)                   |
| 90.8        | 2.42( 0.09)                 | 90.9        | 1.90( 0.08)                 | 90.7        | 1.58( 0.15)                 |
| 59.76475    | 1.68(.01)                   | 59.76486    | 1.31(.01)                   | 59.76505    | 1.09(.01)                   |
| 90.7        | 1.74( 0.06)                 | 91.0        | 1.37( 0.06)                 | 90.8        | 1.11( 0.02)                 |
| 59.85004    | 1.36(.01)                   | 59.85074    | 1.11(.01)                   | 59.85077    | 0.95(.01)                   |
| 91.0        | 1.43( 0.07)                 | 90.6        | 1.12( 0.01)                 | 91.0        | 0.88(-0.07)                 |
| 59.94535    | 1.36(.01)                   | 59.94587    | 0.97(.01)                   | 59.94600    | 0.86(.01)                   |
| 90.9        | 1.36( 0.00)                 | 90.7        | 1.06( 0.09)                 | 90.8        | 0.83(-0.03)                 |
| 60.04049    | 1.61(.01)                   | 60.04074    | 1.12(.01)                   | 60.04096    | 0.93(.01)                   |
| 90.7        | 1.54(-0.07)                 | 90.7        | 1.20( 0.08)                 | 90.8        | 0.96( 0.03)                 |
| 60.13730    | 2.12(.01)                   | 60.13732    | 1.66(.01)                   | 60.13795    | 1.29(.01)                   |
| 90.9        | 2.07(-0.05)                 | 90.8        | 1.64(-0.02)                 | 90.8        | 1.33( 0.04)                 |
| 60.21825    | 2.93(.06)                   |             |                             | 60.21828    | 1.83(.07)                   |
| 90.8        | 2.85(-0.08)                 |             |                             | 90.8        | 1.92( 0.09)                 |
| 60.29818    | 3.63(.01)                   | 60.29890    | 3.00(.01)                   | 60.29915    | 2.48(.01)                   |
| 90.9        | 3.70( 0.07)                 | 90.9        | 3.09( 0.09)                 | 90.8        | 2.62( 0.14)                 |
| 60.32634    | 3.94(.05)                   | 60.32647    | 3.04(.05)                   | 60.32776    | 2.44(.07)                   |
| 90.8        | 3.90(-0.04)                 | 90.8        | 3.27( 0.23)                 | 90.8        | 2.79( 0.35)                 |
| 60.39064    | 3.94(.01)                   | 60.39247    | 3.36(.01)                   | 60.39216    | 2.77(.01)                   |
| 90.7        | 4.11( 0.17)                 | 90.9        | 3.47( 0.11)                 | 90.7        | 2.96( 0.19)                 |
| 60.50031    | 3.17(.01)                   | 60.50043    | 2.67(.01)                   | 60.50063    | 2.19(.01)                   |
| 90.7        | 3.34( 0.17)                 | 91.0        | 2.77( 0.10)                 | 90.8        | 2.33( 0.14)                 |

H = 15 km

| 6.7°C                   |   | 29.7°C                  |   | 52.4°C                  |   |
|-------------------------|---|-------------------------|---|-------------------------|---|
| $f_x$ [GHz]<br>P [torr] | $\alpha_x(\delta\alpha)$<br>$\alpha_M(\pm\Delta\alpha)$ | $f_x$ [GHz]<br>P [torr] | $\alpha_x(\delta\alpha)$<br>$\alpha_M(\pm\Delta\alpha)$ | $f_x$ [GHz]<br>P [torr] | $\alpha_x(\delta\alpha)$<br>$\alpha_M(\pm\Delta\alpha)$ |
| dB/km                   |   | dB/km                   |   | dB/km                   |   |
| 60.58666<br>90.9        | 2.25(.01)<br>2.31( 0.06)                                | 60.58736<br>90.6        | 1.80(.01)<br>1.85( 0.05)                                | 60.58739<br>91.0        | 1.43(.01)<br>1.51( 0.08)                                |
| 60.68315<br>91.0        | 1.61(.01)<br>1.62( 0.01)                                | 60.68366<br>90.6        | 1.31(.01)<br>1.27(-0.04)                                | 60.68380<br>90.8        | 1.00(.01)<br>1.02( 0.02)                                |
| 60.77945<br>90.7        | 1.34(.01)<br>1.34( 0.00)                                | 60.77970<br>90.7        | 1.05(.00)<br>1.05( 0.00)                                | 60.77993<br>90.8        | 0.83(.00)<br>0.84( 0.01)                                |
| 60.87746<br>90.9        | 1.36(.01)<br>1.37( 0.01)                                | 60.87748<br>90.8        | 1.11(.00)<br>1.08(-0.03)                                | 60.87812<br>90.7        | 0.84(.01)<br>0.87( 0.03)                                |
| 61.03128<br>90.9        | 2.08(.01)<br>2.16( 0.08)                                | 61.03202<br>91.0        | 1.75(.01)<br>1.80( 0.05)                                | 61.03226<br>90.8        | 1.53(.01)<br>1.51(-0.02)                                |
| 61.12484<br>91.0        | 2.79(.02)<br>2.95( 0.16)                                | 61.12672<br>90.7        | 2.44(.01)<br>2.56( 0.12)                                | 61.12655<br>90.7        | 2.06(.01)<br>2.24( 0.18)                                |
| 61.23587<br>90.7        | 2.37(.01)<br>2.48( 0.11)                                | 61.23610<br>90.8        | 2.03(.01)<br>2.09( 0.06)                                | 61.23618<br>91.0        | 1.66(.01)<br>1.79( 0.13)                                |
| 61.32327<br>91.0        | 1.75(.00)<br>1.73(-0.02)                                | 61.32398<br>90.6        | 1.39(.00)<br>1.40( 0.01)                                | 61.32407<br>90.8        | 1.16(.01)<br>1.16( 0.00)                                |
| 61.42093<br>90.9        | 1.35(.00)<br>1.32(-0.03)                                | 61.42161<br>91.0        | 1.08(.01)<br>1.06(-0.02)                                | 61.42156<br>90.8        | 0.90(.01)<br>0.86(-0.04)                                |
| 61.51841<br>90.7        | 1.32(.01)<br>1.28(-0.04)                                | 61.51866<br>90.8        | 1.06(.01)<br>1.03(-0.03)                                | 61.51891<br>90.8        | 0.85(.01)<br>0.84(-0.01)                                |
| 61.61761<br>90.9        | 1.64(.00)<br>1.59(-0.05)                                | 61.61772<br>90.7        | 1.27(.01)<br>1.31( 0.04)                                | 61.61826<br>91.0        | 1.05(.01)<br>1.09( 0.04)                                |
| 61.76435<br>90.7        | 2.68(.01)<br>2.77( 0.09)                                | 61.76543<br>91.0        | 2.33(.01)<br>2.44( 0.11)                                | 61.76534<br>90.8        | 2.09(.01)<br>2.16( 0.07)                                |
| 61.85906<br>91.0        | 2.46(.01)<br>2.62( 0.16)                                | 61.86097<br>90.7        | 2.17(.01)<br>2.26( 0.09)                                | 61.86080<br>90.7        | 1.87(.01)<br>1.98( 0.11)                                |
| 61.97160<br>90.9        | 1.72(.01)<br>1.71(-0.01)                                | 61.97166<br>90.8        | 1.46(.00)<br>1.41(-0.05)                                | 61.97174<br>91.0        | 1.14(.01)<br>1.18( 0.04)                                |
| 62.05983<br>90.7        | 1.47(.01)<br>1.42(-0.05)                                | 62.06060<br>90.7        | 1.26(.01)<br>1.15(-0.11)                                | 62.06069<br>90.8        | 1.01(.01)<br>0.95(-0.06)                                |
| 62.15881<br>90.7        | 1.55(.01)<br>1.50(-0.05)                                | 62.15940<br>91.0        | 1.24(.00)<br>1.23(-0.01)                                | 62.15936<br>90.8        | 1.01(.01)<br>1.01( 0.00)                                |
| 62.25737<br>90.6        | 2.08(.01)<br>2.04(-0.04)                                | 62.25762<br>90.8        | 1.73(.01)<br>1.70(-0.03)                                | 62.25788<br>90.8        | 1.44(.01)<br>1.44( 0.00)                                |
| 62.35796<br>90.7        | 3.02(.01)<br>3.14( 0.12)                                | 62.35788<br>90.7        | 2.64(.01)<br>2.74( 0.10)                                | 62.35843<br>91.1        | 2.32(.01)<br>2.41( 0.09)                                |
| 62.49746<br>90.7        | 3.06(.00)<br>3.22( 0.16)                                | 62.49854<br>91.0        | 2.67(.01)<br>2.79( 0.12)                                | 62.49846<br>90.8        | 2.40(.01)<br>2.44( 0.04)                                |

H = 15 km

| 6.7°C       |                             | 29.7°C      |                             | 52.4°C      |                             |
|-------------|-----------------------------|-------------|-----------------------------|-------------|-----------------------------|
| $f_x$ [GHz] | $\alpha_x(\delta\alpha)$    | $f_x$ [GHz] | $\alpha_x(\delta\alpha)$    | $f_x$ [GHz] | $\alpha_x(\delta\alpha)$    |
| P [torr]    | $\alpha_M(\pm\Delta\alpha)$ | P [torr]    | $\alpha_M(\pm\Delta\alpha)$ | P [torr]    | $\alpha_M(\pm\Delta\alpha)$ |
| dB/km       |                             | dB/km       |                             | dB/km       |                             |
| 62.59328    | 2.16(.00)                   | 62.59521    | 1.84(.00)                   | 62.59505    | 1.45(.01)                   |
| 91.0        | 2.20( 0.04)                 | 90.7        | 1.83(-0.01)                 | 90.7        | 1.55( 0.10)                 |
| 62.70716    | 1.56(.01)                   | 62.70722    | 1.17(.01)                   | 62.70731    | 1.05(.01)                   |
| 90.9        | 1.46(-0.10)                 | 90.7        | 1.21( 0.04)                 | 91.0        | 1.00(-0.05)                 |
| 62.79644    | 1.31(.01)                   | 62.79723    | 1.11(.00)                   | 62.79731    | 0.94(.01)                   |
| 90.7        | 1.34( 0.03)                 | 90.7        | 1.12( 0.01)                 | 90.8        | 0.95( 0.01)                 |
| 62.89660    | 1.62(.00)                   | 62.89720    | 1.44(.01)                   | 62.89715    | 1.24(.01)                   |
| 90.7        | 1.64( 0.02)                 | 91.0        | 1.45( 0.01)                 | 90.8        | 1.28( 0.04)                 |
| 62.99633    | 1.92(.00)                   | 62.99658    | 1.84(.01)                   | 62.99685    | 1.65(.01)                   |
| 90.7        | 2.01( 0.09)                 | 90.8        | 1.87( 0.03)                 | 90.8        | 1.74( 0.09)                 |
| 63.09812    | 1.41(.01)                   | 63.09804    | 1.27(.01)                   | 63.09860    | 1.17(.01)                   |
| 90.7        | 1.44( 0.03)                 | 90.7        | 1.29( 0.02)                 | 91.1        | 1.15(-0.02)                 |
| 63.23056    | 0.84(.01)                   | 63.23166    | 0.77(.00)                   | 63.23157    | 0.61(.01)                   |
| 90.7        | 0.83(-0.01)                 | 91.0        | 0.71(-0.06)                 | 90.8        | 0.62( 0.01)                 |
| 63.32750    | 0.77(.01)                   | 63.32946    | 0.67(.01)                   | 63.32929    | 0.61(.01)                   |
| 91.0        | 0.74(-0.03)                 | 90.7        | 0.65(-0.02)                 | 90.7        | 0.57(-0.04)                 |
| 63.44272    | 0.98(.01)                   | 63.44278    | 0.89(.01)                   | 63.44288    | 0.80(.01)                   |
| 90.9        | 0.97(-0.01)                 | 90.8        | 0.88(-0.01)                 | 91.0        | 0.80( 0.00)                 |
| 63.53305    | 1.36(.01)                   | 63.53384    | 1.30(.01)                   | 63.53394    | 1.17(.01)                   |
| 90.7        | 1.34(-0.02)                 | 90.7        | 1.29(-0.01)                 | 90.8        | 1.24( 0.07)                 |
| 63.63439    | 1.15(.01)                   | 63.63499    | 1.06(.01)                   | 63.63496    | 1.01(.01)                   |
| 90.7        | 1.17( 0.02)                 | 90.9        | 1.11( 0.05)                 | 90.8        | 1.04( 0.03)                 |
| 63.73529    | 0.69(.00)                   | 63.73555    | 0.64(.01)                   | 63.73582    | 0.61(.01)                   |
| 90.7        | 0.70( 0.01)                 | 90.8        | 0.64( 0.00)                 | 90.8        | 0.57(-0.04)                 |
| 63.83827    | 0.52(.01)                   | 63.83819    | 0.43(.01)                   | 63.83876    | 0.42(.01)                   |
| 90.7        | 0.52( 0.00)                 | 90.7        | 0.46( 0.03)                 | 91.0        | 0.41(-0.01)                 |
| 63.96365    | 0.52(.01)                   | 63.96476    | 0.50(.01)                   | 63.96468    | 0.62(.01)                   |
| 90.7        | 0.57( 0.05)                 | 91.0        | 0.53( 0.03)                 | 90.8        | 0.48(-0.14)                 |
| 64.06172    | 0.75(.01)                   | 64.06370    | 0.81(.01)                   | 64.06353    | 0.83(.01)                   |
| 91.0        | 0.82( 0.07)                 | 90.7        | 0.81( 0.00)                 | 90.7        | 0.79(-0.04)                 |
| 64.17828    | 0.78(.01)                   | 64.17834    | 0.74(.01)                   | 64.17834    | 0.77(.02)                   |
| 90.9        | 0.84( 0.06)                 | 90.8        | 0.83( 0.09)                 | 90.8        | 0.82( 0.05)                 |
| 64.26966    | 0.52(.01)                   | 64.27046    | 0.42(.01)                   | 64.27053    | 0.43(.01)                   |
| 90.7        | 0.52( 0.00)                 | 90.7        | 0.49( 0.07)                 | 90.7        | 0.46( 0.03)                 |
| 64.37216    | 0.37(.01)                   | 64.37273    | 0.40(.01)                   | 64.37268    | 0.33(.01)                   |
| 90.7        | 0.35(-0.02)                 | 90.6        | 0.33(-0.07)                 | 90.7        | 0.30(-0.03)                 |
| 64.47395    | 0.39(.01)                   | 64.47437    | 0.37(.01)                   | 64.47477    | 0.32(.01)                   |
| 90.7        | 0.34(-0.05)                 | 90.8        | 0.32(-0.05)                 | 91.1        | 0.30(-0.02)                 |

H = 15 km

| 6.7°C                |                      | 29.7°C               |                      | 52.4°C               |                      |
|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| f <sub>x</sub> [GHz] | α <sub>x</sub> (δα)  | f <sub>x</sub> [GHz] | α <sub>x</sub> (δα)  | f <sub>x</sub> [GHz] | α <sub>x</sub> (δα)  |
| P [torr]             | α <sub>M</sub> (±Δα) | P [torr]             | α <sub>M</sub> (±Δα) | P [torr]             | α <sub>M</sub> (±Δα) |
| dB/km                |                      | dB/km                |                      | dB/km                |                      |
| 64.57841             | 0.47(.01)            | 64.57832             | 0.47(.00)            | 64.57892             | 0.43(.01)            |
| 90.7                 | 0.45(-0.02)          | 90.7                 | 0.45(-0.02)          | 91.1                 | 0.45( 0.02)          |
| 64.69676             | 0.62(.01)            | 64.69785             | 0.55(.01)            | 64.69775             | 0.60(.01)            |
| 90.7                 | 0.59(-0.03)          | 91.0                 | 0.61( 0.06)          | 90.7                 | 0.63( 0.03)          |
| 64.79544             | 0.36(.01)            | 64.79757             | 0.35(.00)            | 64.79775             | 0.35(.01)            |
| 90.6                 | 0.37( 0.01)          | 90.7                 | 0.37( 0.02)          | 90.8                 | 0.36( 0.01)          |
| 64.91384             | 0.26(.01)            | 64.91387             | 0.19(.00)            | 64.91389             | 0.23(.01)            |
| 91.0                 | 0.22(-0.04)          | 91.0                 | 0.21( 0.02)          | 90.8                 | 0.20(-0.03)          |
| 65.00622             | 0.19(.01)            | 65.00697             | 0.23(.00)            | 65.00715             | 0.26(.01)            |
| 90.7                 | 0.20( 0.01)          | 90.7                 | 0.20(-0.03)          | 90.7                 | 0.19(-0.07)          |
| 65.10994             | 0.27(.00)            | 65.11053             | 0.33(.01)            | 65.11047             | 0.28(.01)            |
| 90.7                 | 0.26(-0.01)          | 90.6                 | 0.27(-0.06)          | 90.7                 | 0.27(-0.01)          |
| 65.21290             | 0.42(.01)            | 65.21333             | 0.38(.00)            | 65.21374             | 0.39(.01)            |
| 90.7                 | 0.36(-0.06)          | 90.7                 | 0.39( 0.01)          | 91.0                 | 0.42( 0.03)          |
| 65.31856             | 0.27(.00)            | 65.31847             | 0.29(.01)            | 65.31902             | 0.28(.01)            |
| 90.7                 | 0.25(-0.02)          | 90.7                 | 0.26(-0.03)          | 90.8                 | 0.27(-0.01)          |
| 65.42985             | 0.13(.01)            | 65.43095             | 0.15(.01)            | 65.43086             | 0.15(.01)            |
| 90.7                 | 0.15( 0.02)          | 91.0                 | 0.14(-0.01)          | 90.7                 | 0.14(-0.01)          |
| 65.52966             | 0.12(.01)            | 65.53182             | 0.11(.01)            | 65.53199             | 0.14(.01)            |
| 90.6                 | 0.12( 0.00)          | 90.7                 | 0.12( 0.01)          | 90.8                 | 0.12(-0.02)          |
| 65.64940             | 0.22(.01)            | 65.64942             | 0.17(.01)            | 65.64945             | 0.16(.01)            |
| 90.9                 | 0.15(-0.07)          | 91.0                 | 0.16(-0.01)          | 90.8                 | 0.16( 0.00)          |
| 65.74282             | 0.20(.01)            | 65.74358             | 0.20(.01)            | 65.74377             | 0.25(.01)            |
| 90.6                 | 0.20( 0.00)          | 90.7                 | 0.23( 0.03)          | 90.7                 | 0.25( 0.00)          |
| 65.84772             | 0.15(.01)            | 65.84833             | 0.14(.01)            | 65.84827             | 0.18(.01)            |
| 90.7                 | 0.15( 0.00)          | 90.6                 | 0.16( 0.02)          | 90.7                 | 0.18( 0.00)          |
| 65.95185             | 0.11(.01)            | 65.95229             | 0.06(.01)            | 65.95271             | 0.05(.01)            |
| 90.7                 | 0.09(-0.02)          | 90.7                 | 0.09( 0.03)          | 91.1                 | 0.09( 0.04)          |
| 66.05872             | 0.01(.00)            | 66.05863             | 0.01(.01)            | 66.05919             | 0.06(.01)            |
| 90.7                 | 0.07( 0.06)          | 90.7                 | 0.07( 0.06)          | 90.7                 | 0.07( 0.01)          |
| 66.16294             | 0.04(.01)            | 66.16407             | 0.08(.01)            | 66.16397             | 0.08(.01)            |
| 90.6                 | 0.08( 0.04)          | 91.0                 | 0.08( 0.00)          | 90.7                 | 0.09( 0.01)          |
| 66.26387             | 0.13(.01)            | 66.26606             | 0.11(.01)            | 66.26624             | 0.07(.01)            |
| 90.6                 | 0.11(-0.02)          | 90.7                 | 0.12( 0.01)          | 90.8                 | 0.14( 0.07)          |



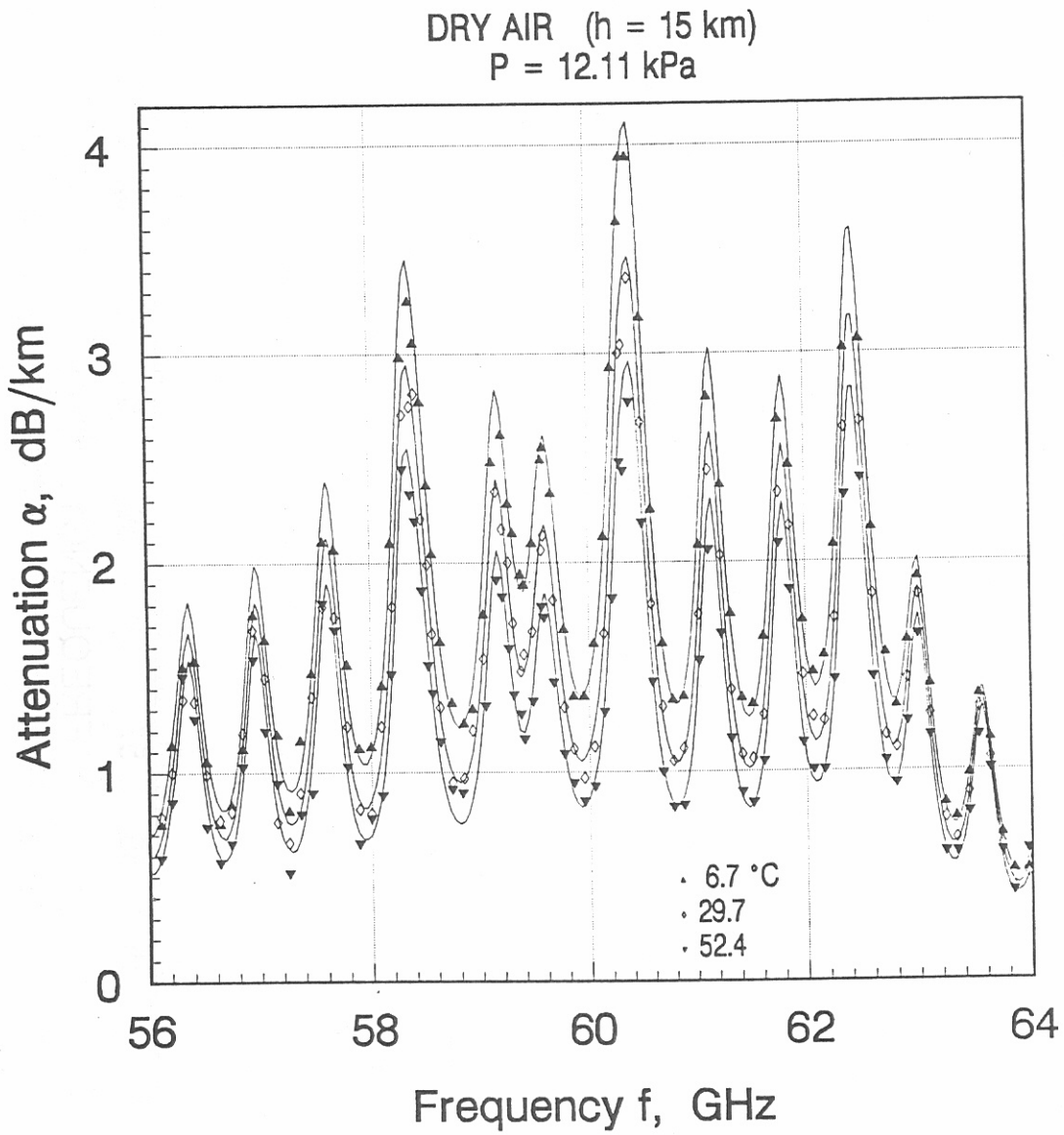


Figure A-6a. Predicted and measured attenuation rates of dry air,  $\alpha_M$  and  $\alpha_x$ , at H = 15 km (see F.) for frequencies between 56 and 64 GHz.

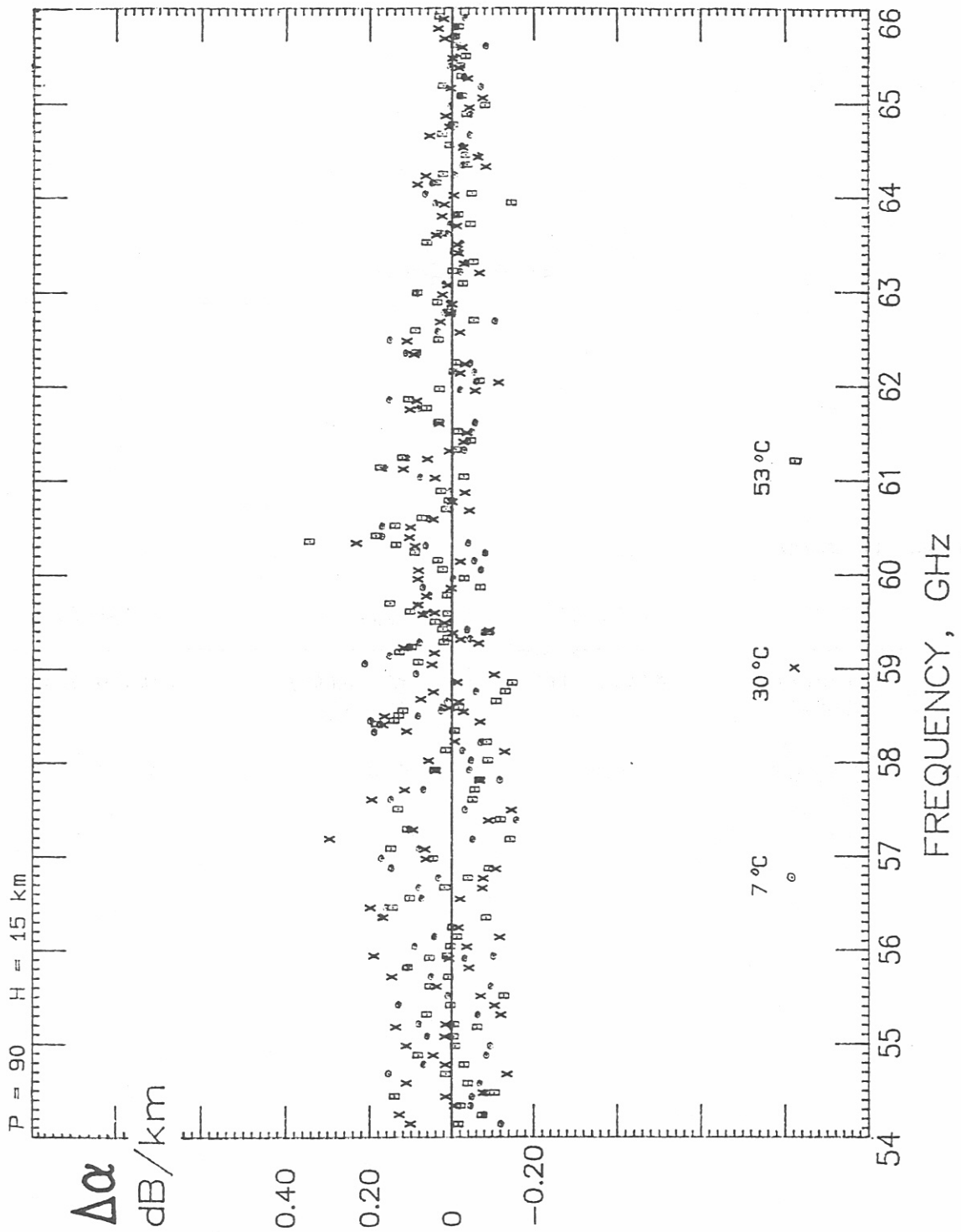


Figure A-6b. Differences  $\Delta\alpha = \alpha_M - \alpha_x$  between predicted and measured attenuation for the results listed under F.