Artefacts of isotropic inversion applied to data from an anisotropic Earth

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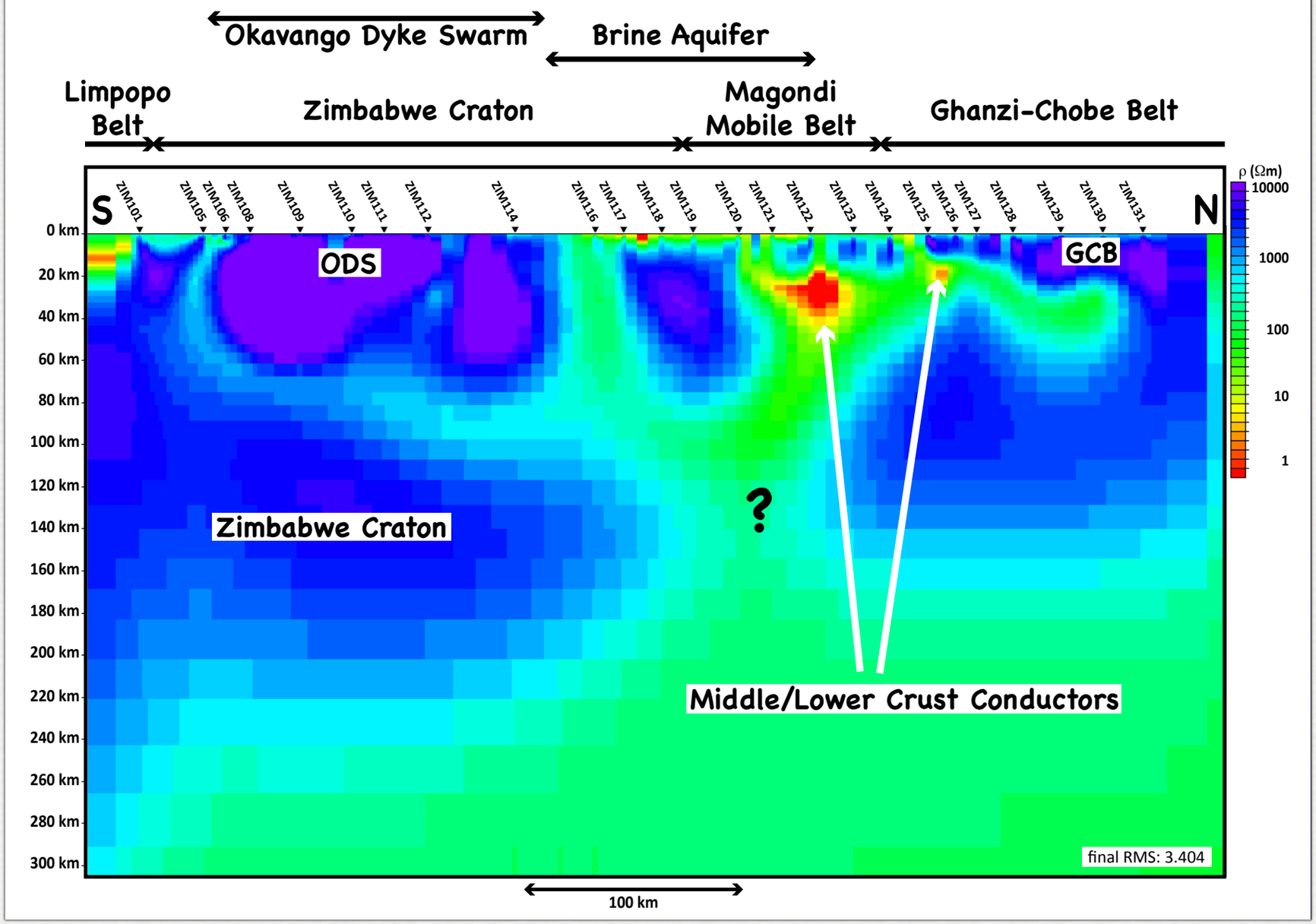
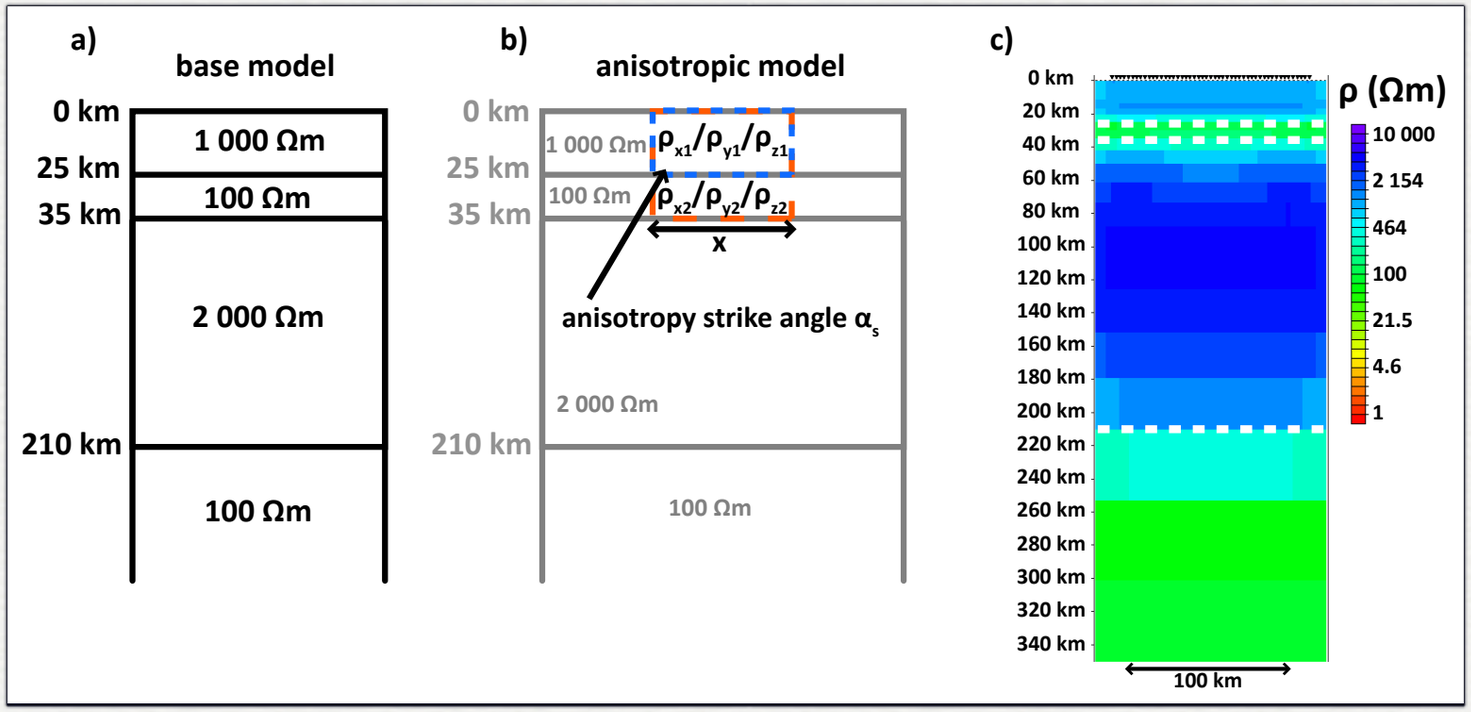
Motivation

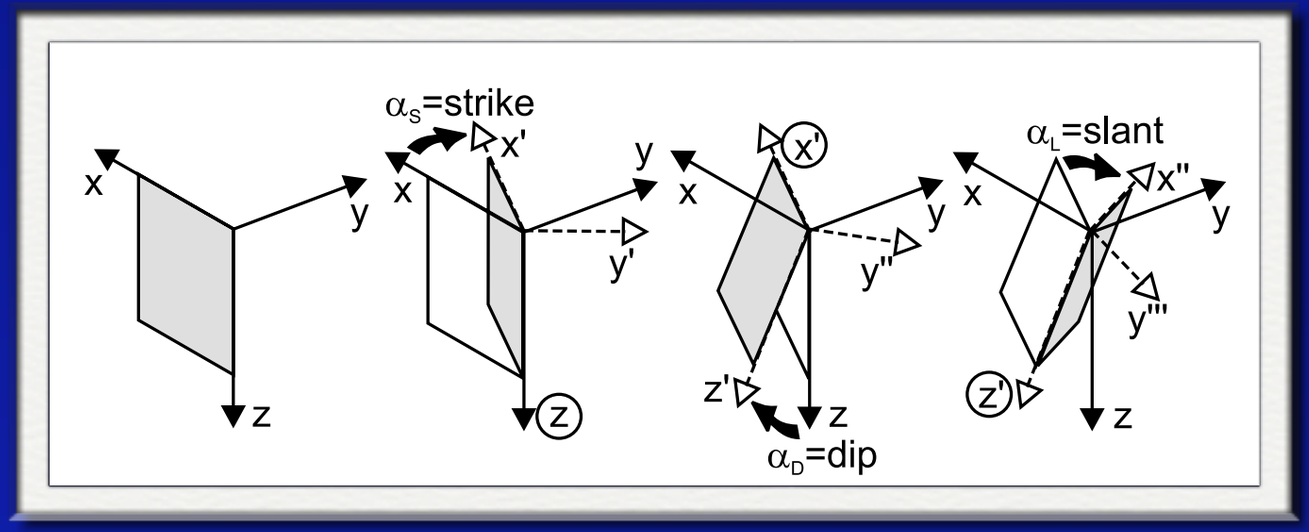


2D profile in NE Botswana

highly resistive dykes of 17 m average width -> anisotropic structure for MT scale

Synthetic test model





simple layered background

anisotropy block representing dyke swarm

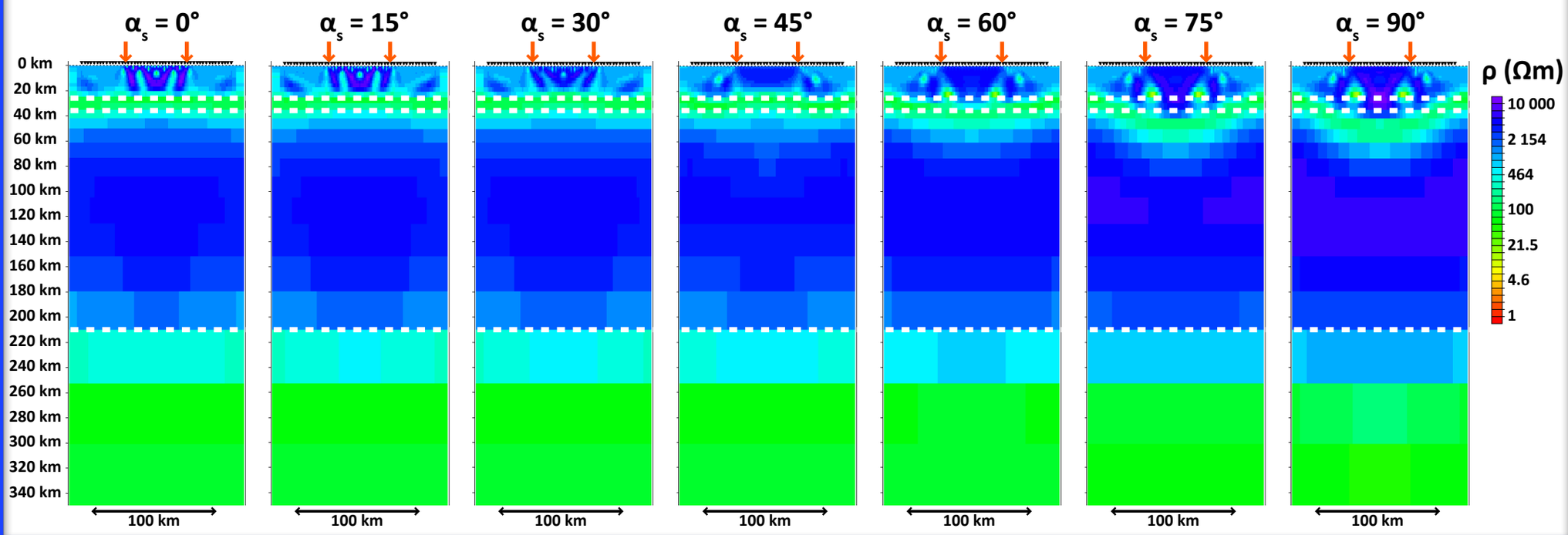
two scenarios - top layer and both layers

varying anisotropy strike direction & width of block

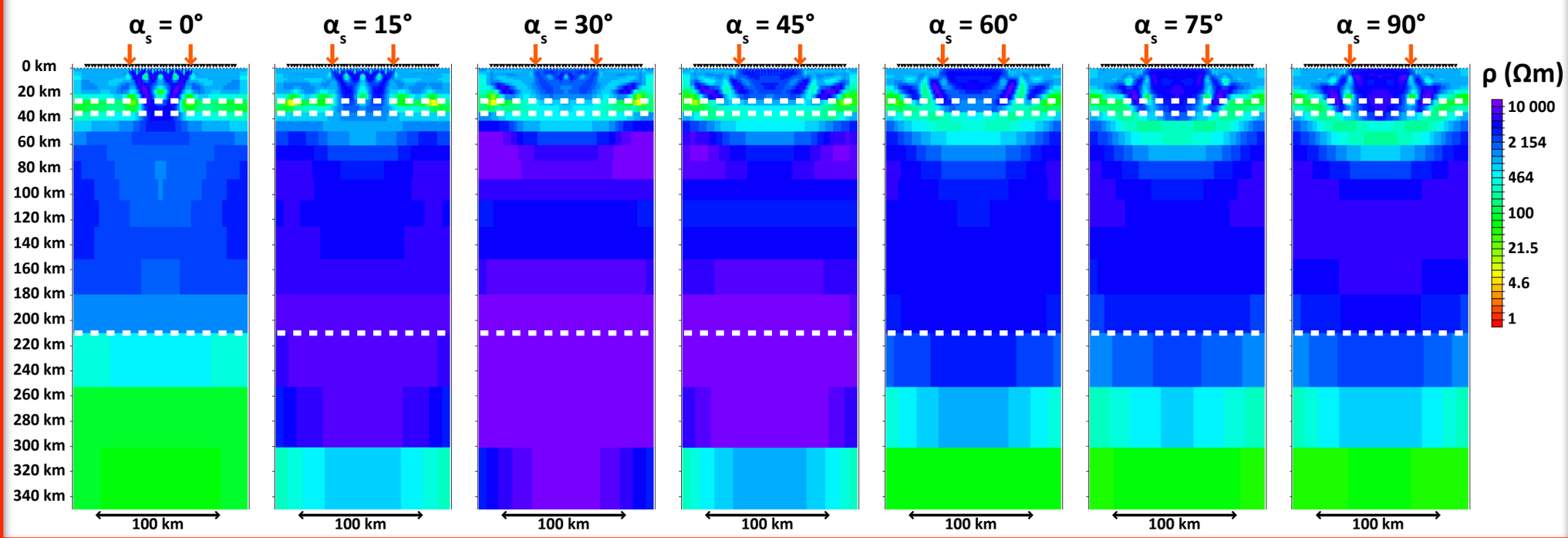
dip and slant angle zero

Isotropic Inversion Results

Top layer

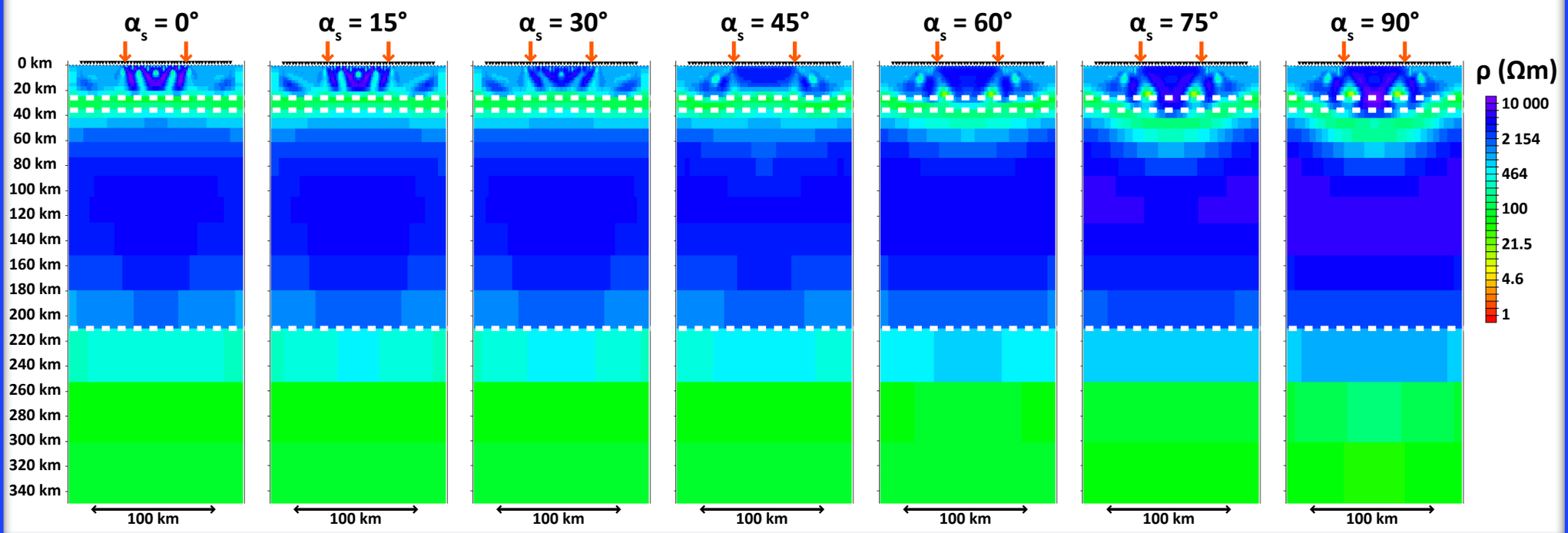


Both layers

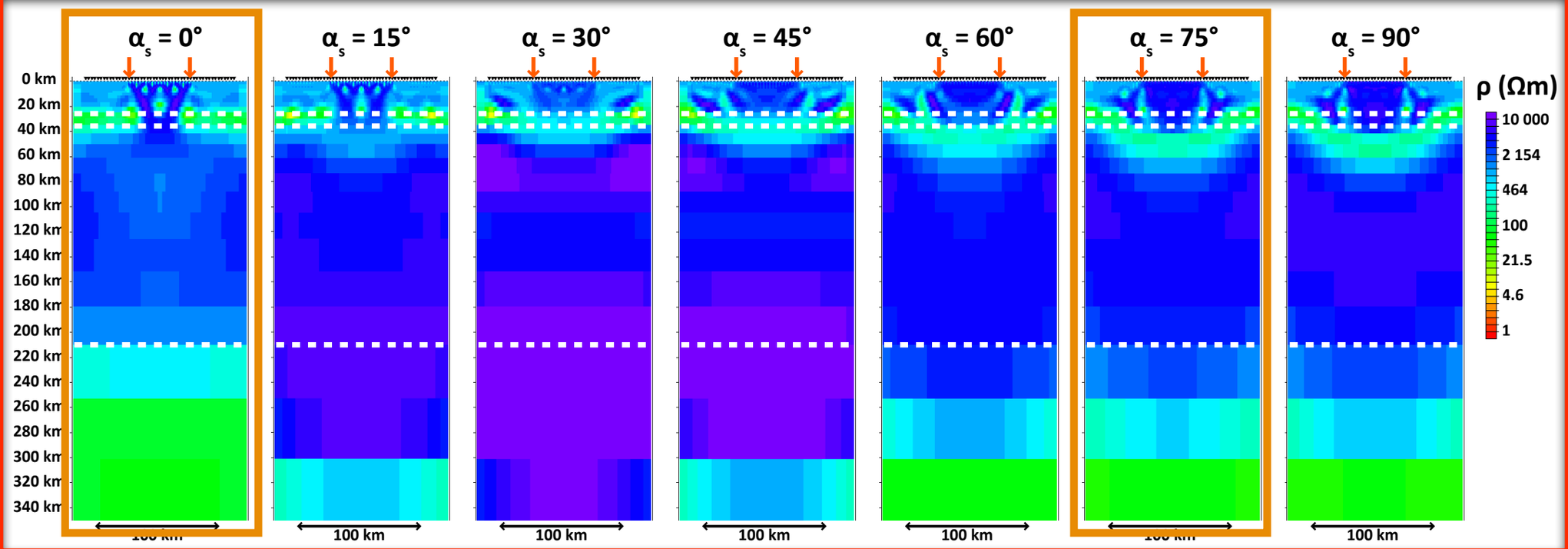


Isotropic Inversion Results

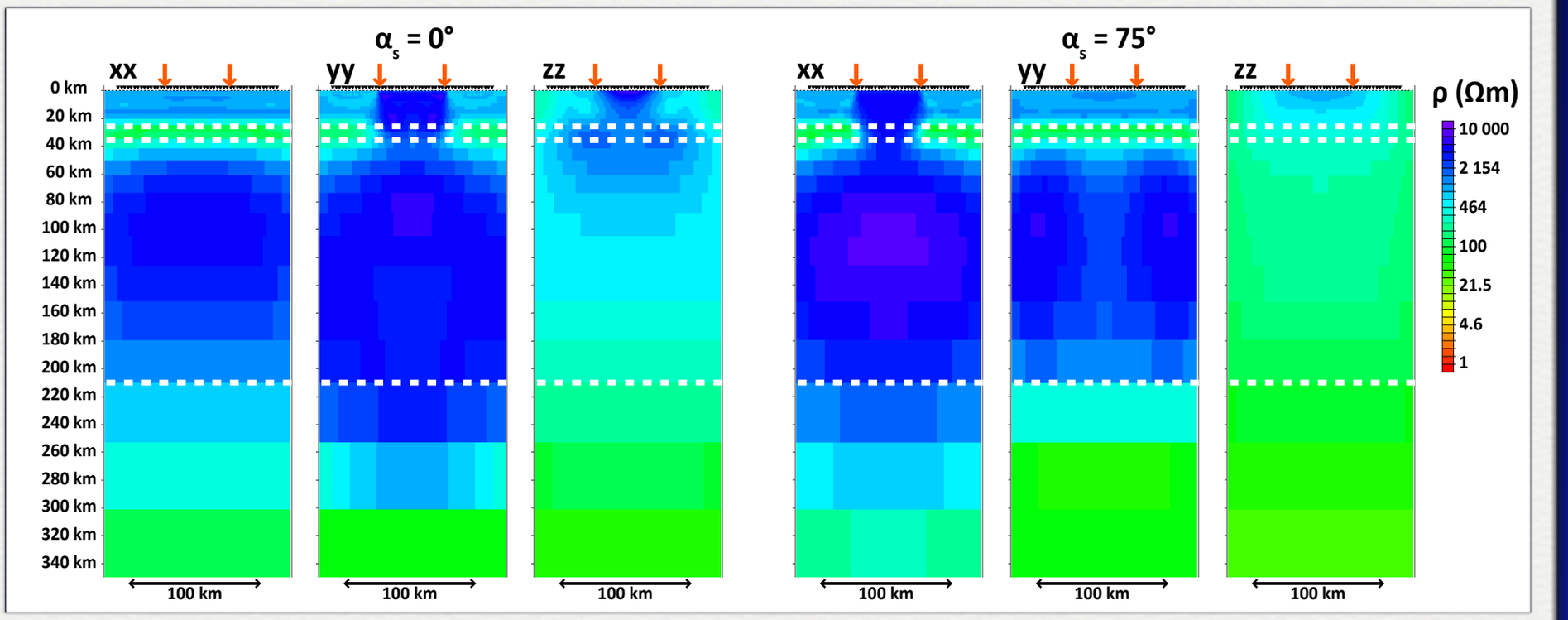
Top layer



Both layers



Anisotropic Inversion Results

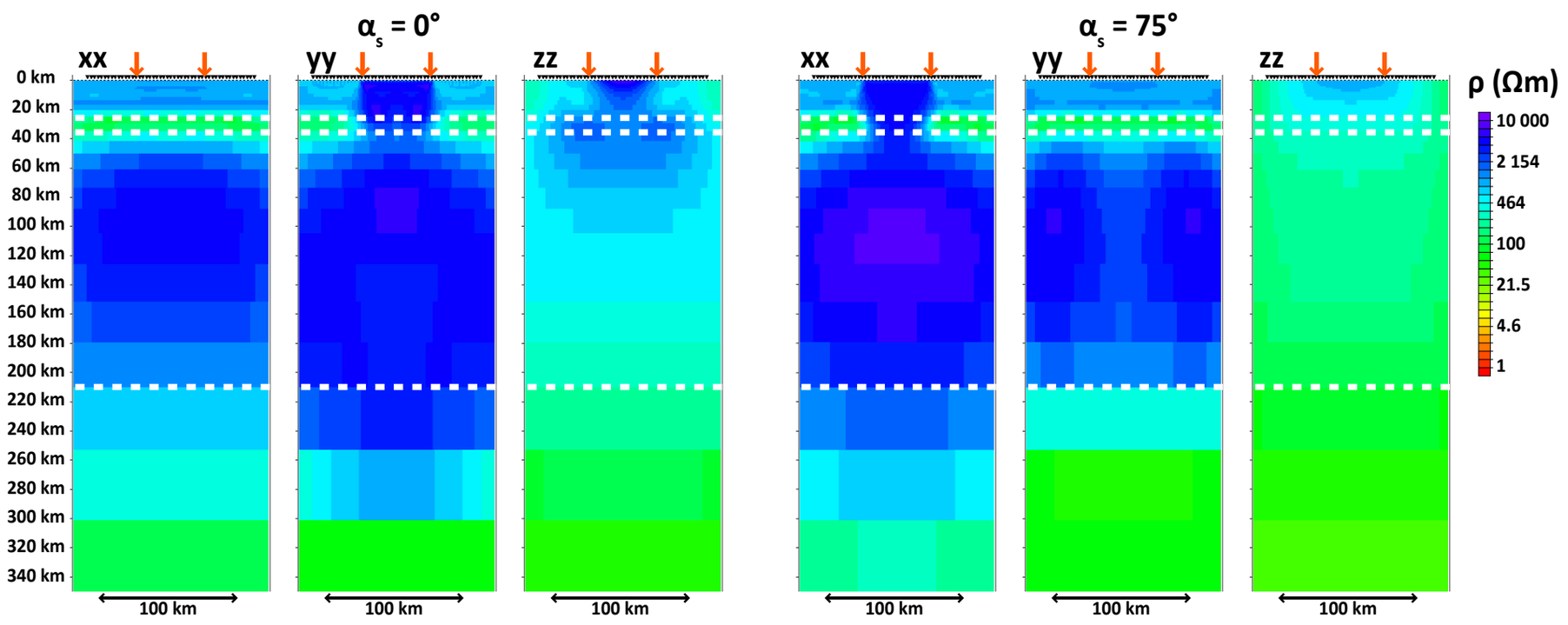


2D anisotropy inversion (Randy Mackie's code) - anisotropy aligned with axes

zz poorly resolved - no H/z information

simple structure well recovered

Anisotropic Inversion Results

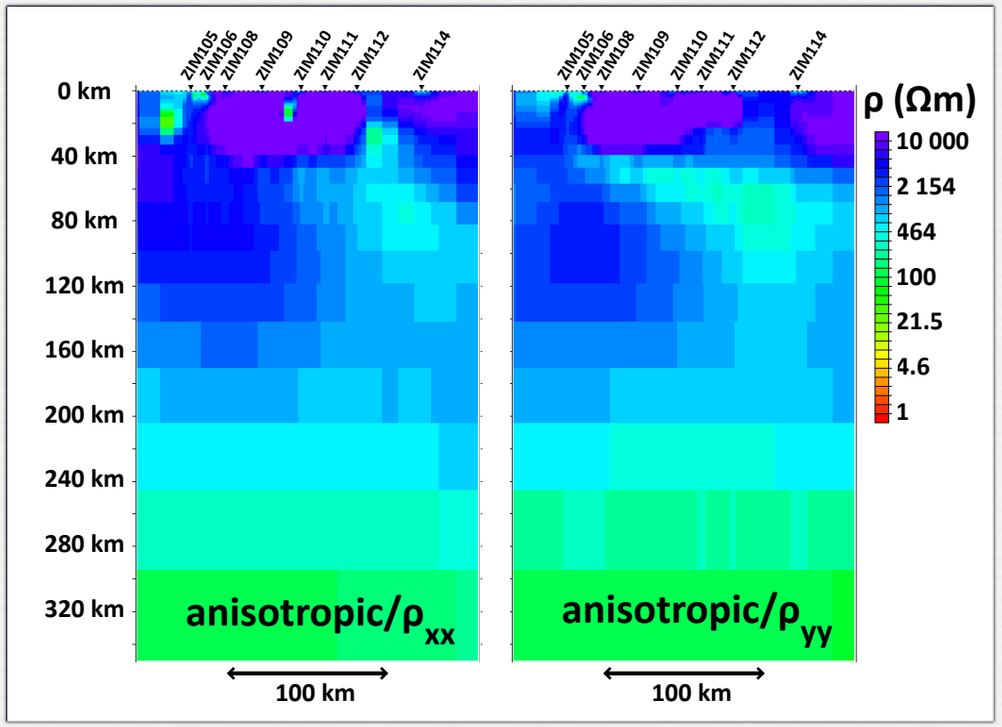


2D anisotropy inversion (Randy Mackie's code) - anisotropy aligned with axes

ZZ poorly resolved - no Y/Z information

simple structure well recovered

real data more complicated, but resistive structure is crustal feature



3D Anisotropic World

How wrong are we in 3D?

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How wrong are we in 3D?

Are 3D anisotropic approaches realistic?

2D anisotropy is already too complex, so assumption are applied to simplify (e.g. only 3 resistivities, but fixed 3 angles).