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The lithosphere across the Northern Tornquist Zone – southwestern edge of Baltic Shield

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The Tornquist Zone defines a major tectonic lineament across Europe. It extends from the Black Sea to the North Sea and separates old Precambrian cratonic units to the east and northeast from the younger Phanerozoic accreted terranes in Central and Western Europe. In the north, the tectonic lineament splits into two main parts, the Sorgenfrei-Tornquist Zone (STZ) and the Thor Suture (TS). The STZ, trending NW extends from the island of Bornholm across the northeaster part of Denmark to the Skagerrak, with Precambrian Baltic Shield to the northeast and deep sedimentary basins to the southwest.
Multidisciplinary geophysical studies reveal marked contrasts in crustal and upper-mantle structure across the STZ. From Baltic Shield areas in southern Sweden to deep basins in the Danish and adjacent areas, we observe marked crustal and lithospheric thinning, increase in surface and upper-mantle heat flow and differences in the characteristics of gravity and magnetic field anomalies. Recent teleseismic tomography studies outline a marked Upper-Mantle Velocity Boundary (UMVB) which, from being close to the STZ in Danish areas, extends northward into and across southern Norway. It defines a deep, narrow zone between shield areas with high upper-mantle seismic velocity, and basins, as well as most of southern Norway, with significantly lower velocity. This main boundary, extending to a depth of 200-300 km or more, with P- and S- velocity contrasts of up to $\pm$ 2-3%. It is also clearly reflected in the VP/VS ratio, with generally low values in shield areas to the east and higher values in basin areas to the southwest and in southern Norway.
These results clearly emphasizes the importance of the Northern Tornquist Zone as a very deep structural boundary, separating old, thick cratonic Baltica lithosphere in southern Sweden from reworked and attenuated Baltica lithosphere in Denmark and in southern Norway as well.