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Interior of an ice stream: 3-D geometry of distorted radar stratigraphy of upstream NEGIS and vicinity.

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The North East Greenland Ice Stream clearly stands out in the surface velocity field of the ice flow of Greenland, with its sharp and narrow shear margins visible in the flow field almost up to the central divide. While the current extent and strength of the streaming can be determined from remotely sensed velocities of the ice surface, it is less known how the ice stream is affecting the deeper layers of ice in its catchment area, and how it may have evolved over time. The deformation of the ice due to streaming can be made visible by mapping the distortion of the isochronous stratigraphy of the ice. This has been done by an airborne radar survey centering on the location of the EGRIP drilling camp, carried out with the ultra wide band radar system (AWI UWB). The dense grid of profiles arranged mainly perpendicular to the ice flow reveals the imprint that the strong shearing leaves within the layering of the ice. Although the layers are tightly folded and distorted within the shear zones, it is possible to continuously trace reflections within the upper half of the ice column throughout the entire survey area. It can be shown that the intensity of the folding is linked to the strain rate field derived from the surface velocities, and that the deformation history of the ice is preserved in the folded layers, even after it is no longer affected by high strain rates. The advection patterns of the mapped stratigraphic features reveal how the streaming of the ice and the resulting local changes of surface topography may have affected the inflow into the stream and the position of the shear margins over time.