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Imaging regional denudation and deposition patterns of the Norwegian Barents Sea and along the Northeast Greenland margin

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The main objective of this study is to resolve the off- and onshore erosion and subsidence history of the Norwegian Barents Sea and along the Northeast Greenland in a spatial and temporal context. The results were illustrated as maps displaying the evolution spanning the period between the late Devonian until the present day.
To reach this aim, published and accessible literature of the last ∼twenty years dealing with the subsidence and exhumation histories of both study areas were compiled. The compilation was screened for data in the context of changing tectonic, erosion and subsidence settings. The data were extracted acting as a base for the subsequent interpolation process. In addition, the extracted data were classified in order to assess their reliability for further interpretation. Previously published low-temperature thermochronological data from onshore areas were re-modeled to create a consistent data base of the thermal evolution of relevant sediment source areas considering the latest analytical approaches and geological constraints.
The new thermal models of the Norwegian Scandes mountains revealed similar time-temperature paths for all samples for the time between the Paleozoic and the late Mesozoic. Afterwards, thermal histories from coastal and inland samples are diverging. The inland areas mostly experienced a relatively pronounced cooling until the late Carboniferous to the early Permian followed by slow cooling until the early Cenozoic. For the Norwegian coastal samples, a heating event is observable between the Late Cretaceous and the Early Paleogene. The observed heating was probably related to rifting occurring at that time.
Regarding the onshore areas of Northeast Greenland, thermal re-modeling showed that published thermochronology data are consistent with recently suggested periodic uplift events independently derived from geological and geomorphological observations. These comprise significant cooling during the Late Carboniferous and Mid Jurassic as well as in the Late Cenozoic. The magnitude of these thermal events seems to be more pronounced in the East Greenland areas and is weakening towards the north. The interpolation process integrates the accessible deposition and denudation data from the Norwegian Barents Sea and Northeast Greenland shelf showing an analogue depositional pattern during the Paleozoic until the end of the Middle Triassic. During the Late Triassic, both areas show a differential evolution with subsidence of the Norwegian Barents Sea and denudation of Northeast Greenland. Denudation affecting NE-Greenland until the Middle Jurassic weakened and was then replaced by subsidence lasting until the Late Jurassic. During the Cretaceous, subsidence in the NE-Greenland increased whereas the pattern of the Norwegian Barents Sea changed from subsidence to denudation affecting nearly the whole area. From the Mesozoic-Cenozoic transition until around the Late Eocene both areas were subsiding. From the Oligocene onwards, the Norwegian Barents Sea was generally affected by denudation lasting until the end of the Middle Miocene, where offshore NE-Greenland shows enhanced subsidence. From the Late Miocene on, both areas experienced strong subsidence until the present day. However, onshore NE-Greenland, the Scandes and Svalbard show an opposite pattern where denudation prevailed during the latest Neogene and Quaternary.