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The Jurassic of North-East Greenland

Edited by

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Cover

Eastwards-dipping Middle–Upper Jurassic sandstones (yellow) and interbedded marine mudstones (dark) at the base of the coastal cliffs along the south-east coast of Traill Ø. The Jurassic succession is described by Vosgerau *et al.* (this volume). It is disconformably overlain by poorly exposed Cretaceous siltstones with numerous volcanic intrusions that form ledges towards the top of the c. 1050 m high cliff. Photo: Lars Stemmerik.

Frontispiece: facing page

Middle Jurassic and Lower Cretaceous sandstones exposed on the western slopes of Steensby Bjerg, Hold with Hope, viewed towards the north-east with Finsch Øer in the centre and Clavinger Ø in the far distance. On Hold with Hope, a more than 500 m thick sedimentary succession of Triassic–Cretaceous age is exposed in the north-facing coastal cliffs. The Jurassic succession, which was not recognised until field work in 1996, is preserved in the downfaulted hangingwall blocks of a series of rotated half-grabens formed during the main East Greenland rifting phase in the latest Jurassic to earliest Cretaceous. Lower Cretaceous sandstones, up to 170 m thick, unconformably overlie the rift succession. Photo: Michael Larsen.

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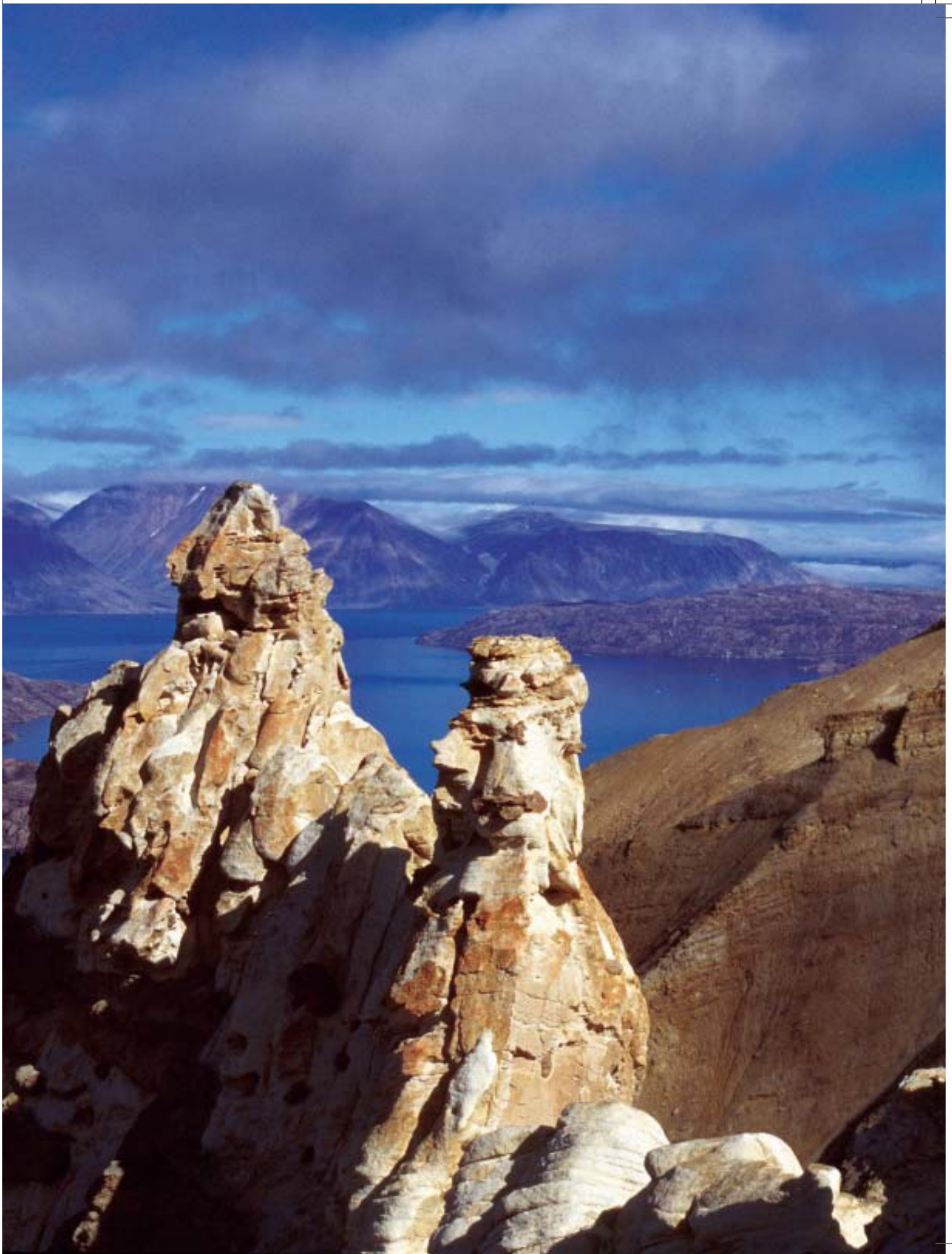
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Preface

The Jurassic sedimentary succession in East and North-East Greenland reflects deposition during the early stages of rifting between Greenland and Norway. Jurassic sediments are exposed over a distance of more than 600 km, from Jameson Land in the south to Store Koldewey in the north (Fig. 1), and form one of the best-known exposed ancient rift successions. The sediments have been intensely studied over the last 25 years and a synthesis of the Jurassic System in Greenland was recently given in Geological Survey of Denmark and Greenland Bulletin 1 (Surlyk 2003).

This collection of papers deals with stratigraphic and depositional aspects of the Middle–Upper Jurassic sediments from isolated and less well-known localities outside the main outcrop areas, and thus adds to the tremendous amount of new data generated from the classical Jurassic successions of Jameson Land and the Wollaston Forland area (Ineson & Surlyk 2003). Most papers are based on fieldwork in 1996 and 1997, carried out within the framework of the project ‘Resources of the sedimentary basins of North and East Greenland’ supported by the Danish Research Councils (see Stemmerik *et al.* 1997). Papers dealing with the Jurassic at Store Koldewey and Hochstetter Forland are based on material collected during regional mapping in 1989 (Stemmerik & Piasecki 1990).

During Middle–Late Jurassic times, rifting took place along major N–S-trending synthetic faults that delimited wide westwards-tilted fault blocks (Surlyk 1977, 2003). This resulted in the development of elongated marine embayments with major rivers entering from the north and dominantly axial sediment transport towards the south (Surlyk 1978, 2003; Engkilde & Surlyk 2003). The Jurassic syn-rift succession on south-eastern Traill Ø is an exception to this general pattern (Vosgerau *et al.* 2004a, this volume). Sedimentation took place on an eastwards-tilted fault block; the succession shows an eastwards proximal–distal decrease in sandstone–mudstone ratio, reflecting increasing water depths to the east. On the adjacent fault block to the west, a new lithostratigraphic unit, the Bristol Elv Formation, has been erected to describe a succession of fluvio-lacustrine sediments at the base of the Middle Jurassic rift succession (Therkelsen & Surlyk 2004, this volume). The non-marine succession is overlain by shallow marine sandstones of the Pelion Formation (Upper Bajocian), succeeded in turn by 25–30 m of black silty mudstones of the Fossilbjerget Formation

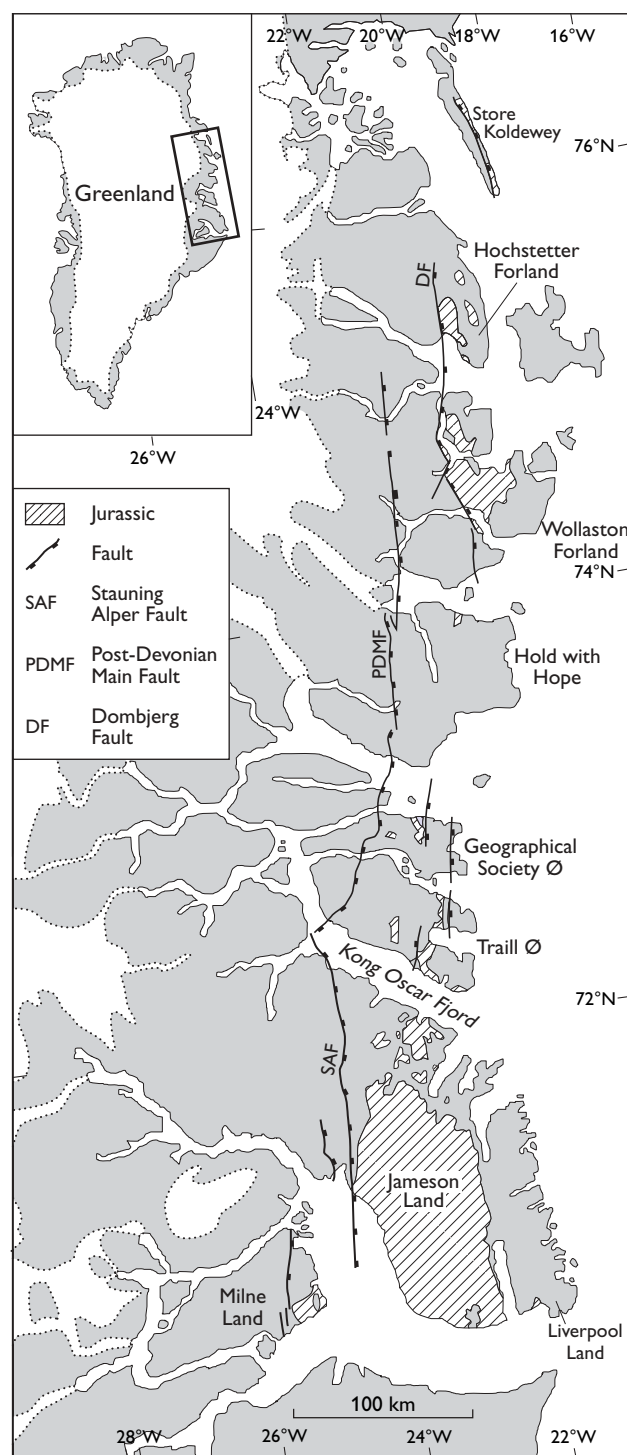


Fig. 1. Simplified geological map of East and North-East Greenland showing the distribution of Jurassic sediments. Modified from Surlyk (2003).

(Alsen & Surlyk 2004, this volume). The presence of the Fossilbjerget Formation on southern Traill Ø indicates complete drowning of the sandy Pelion system during maximum Middle Jurassic transgression (Alsen & Surlyk 2004, this volume).

A new Middle–Upper Jurassic succession was found in the hangingwalls of small fault blocks at Hold with Hope during fieldwork in 1996 (Stemmerik *et al.* 1997). The up to 360 m thick succession and its stratigraphy are described in detail by Vosgerau *et al.* (2004b, this volume) and Piasecki *et al.* (2004a, this volume). The succession resembles that seen at Wollaston Forland and Kuhn Ø. The Hold with Hope area was flooded during late Middle Jurassic time; Lower–Middle Callovian shallow marine sandstones of the Pelion Formation overlie Lower Triassic sediments (Vosgerau *et al.* 2004b, this volume). The overlying sandstones of the Payer Dal Formation are of Middle–Late Oxfordian age. The uppermost part of the succession belongs to the Bernbjerg Formation. The youngest sediments are of Late Oxfordian – Early Kimmeridgian age based on dinoflagellate cysts (Piasecki *et al.* 2004a, this volume). Dinoflagellate cysts have also been used to date the scattered outcrops of Middle–Upper Jurassic sediments at Hochstetter Forland and Store Koldewey further to the north (Piasecki & Stemmerik 2004, this volume; Piasecki *et al.* 2004b, this volume). The dinoflagellate cyst assemblages of these northern outliers are readily correlated to assemblages described from the Middle–Upper Jurassic further to the south in East Greenland, and also show some resemblance to assemblages described from North Greenland (Piasecki *et al.* 2004b, this volume).

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