2019 年度第 1 回砂岩分科会講演会（日本堆積学会と共催）のご案内

この度、deep-waterの堆積環境を中心とした堆積学の分野で世界をリードし続けている Leeds 大学の David Hodgson 教授が来日されます。来日をアレンジされている千葉大学の伊藤慎教授および Hodgson 教授のご厚意により東京でも講演をして頂けることになり、日本堆積学会と共催で下記の講演会を開催いたします。

記

- 日 時：2019 年 9 月 11 日（水）15:30~
- 場 所：国際石油開発帝石㈱赤坂 Biz タワー36 階セミナールーム
- 講演者：David Hodgson 博士 （英国 Leeds 大学教授）
- 演題：Karoo Basin, South Africa: a natural laboratory for deep-water sedimentology and stratigraphy research（講演要旨は次項以降を参照）

*講演会参加には、事前登録が必要です。

参加希望の方は、**9 月 4 日（水）まで**に、砂岩分科会座長までご連絡ください。登録された方には、後程、赤坂 Biz タワーより入館に関するご案内を致します。

**講演会終了後、会場近傍にて懇親会(18:00~19:30、会費 4,000 円程度を予定)を開催致します。懇親会の出欠も併せてご連絡頂けましたら幸甚です。

砂岩分科会座長

戸田数馬（石油資源開発㈱／kazuma.toda@japex.co.jp）

小林博文（国際石油開発帝石㈱／hirofumi.kobayashi@inpex.co.jp）

以上

Karoo Basin, South Africa: a natural laboratory for deep-water sedimentology and stratigraphy research

David Hodgson, University of Leeds, UK

The Slope (15 years) and Lobe (12 years) Joint Industry Programmes (JIPs) have produced unique digital and physical data sets of deep-water systems for application during exploration, appraisal, and development stages, and provided the basis for training both industry professionals and researchers. Both consortium projects are founded on outcrop-based data collection and analysis from the Permian deep-water strata exhumed in the Karoo Basin, South Africa. The Karoo Basin is one of the most important examples of exhumed deep-water systems in the world due to the extensive high-quality exposures, and the scale of systems meaning it is an appropriate analogue for many subsurface systems (Fig. 1, 2). As such, study of this region allows for quantitative data collection across a range of scales within well constrained stratigraphic framework.
The Slope JIP has run for 4 phases since 2003. In that time we have employed and trained 4 research fellows, 8 PhD students, 7 research boreholes (~1.5km core) have been drilled, and ~24 papers published. Some of the highlights of the research programme that have direct application to the industry are:

- A detailed depositional architecture of two juxtaposed submarine channel-levee systems, with identification of an exhumed internal levee succession.
- Recognition criteria to discriminate between different thin-bedded sedimentary environments on the submarine slope, including channel margin, external levees, bypass-dominated zones, and internal levees.
- Identification of the bounding surfaces to slope valleys being highly time transgressive, and mapping of multiple systems from slope valleys, through channel-levee systems to basin-floor lobe complexes.
- This lead to an explanation for the repeated observation of progradation of deep-water systems – the base sand in a submarine fan gets younger basinward.
- The first quantification of sediment volumes and sand percentage in channel-levees versus basin-floor fans, suggesting more sediment is stored in levees and that flows are strongly density stratified.

The Lobe JIP has run for 2 phases, with a third phase starting in 2018, and we have employed and trained 2 research fellows, 4 PhD students, ~7 research boreholes (~2km core) have been drilled, and ~12 papers published. Some of the highlights of the research programme that have direct application to the industry are:

- Development of a hierarchy of lobe elements, which have been successfully exported to other systems, and demonstration of compensational stacking across multiple scales of hierarchy
- The quantification of lobe geometry and volumes for the first time, and the demonstration that the scales of lobes do not vary significantly across systems helping to constrained correlation length scales
- Recognition criteria for intraslope lobes, proximal lobes, and channel-lobe transition zones (including sediment waves and scour-fills), and for frontal vs. lateral lobe fringe settings
- Analogues for basin-floor stratigraphic traps in different palaeogeographic positions, and their close association with injectite networks

The quality and utility of the deliverables, whether conceptual and quantified, can have direct economic impacts on business decision-making during exploration, appraisal, and production stages of reservoir development. This is not only about reducing risk and improving prediction, but understanding how deep-water systems work, and providing quantitative data. This body of work also provides a basis for new research questions, which are further informed by the ongoing interactions with industry users of the data.

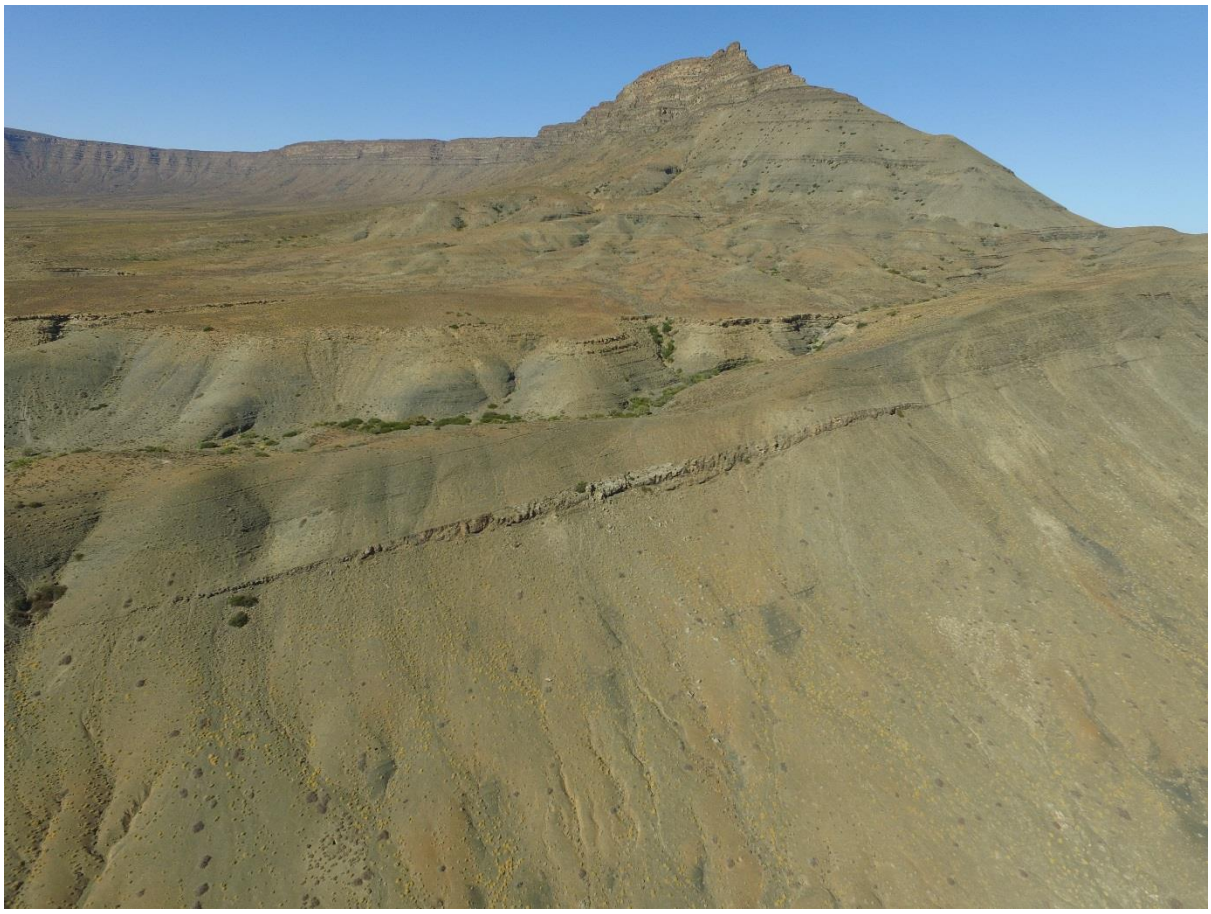

Figure 1: Example of the distal Tanqua Karoo system. Photograph taken by a UAV.

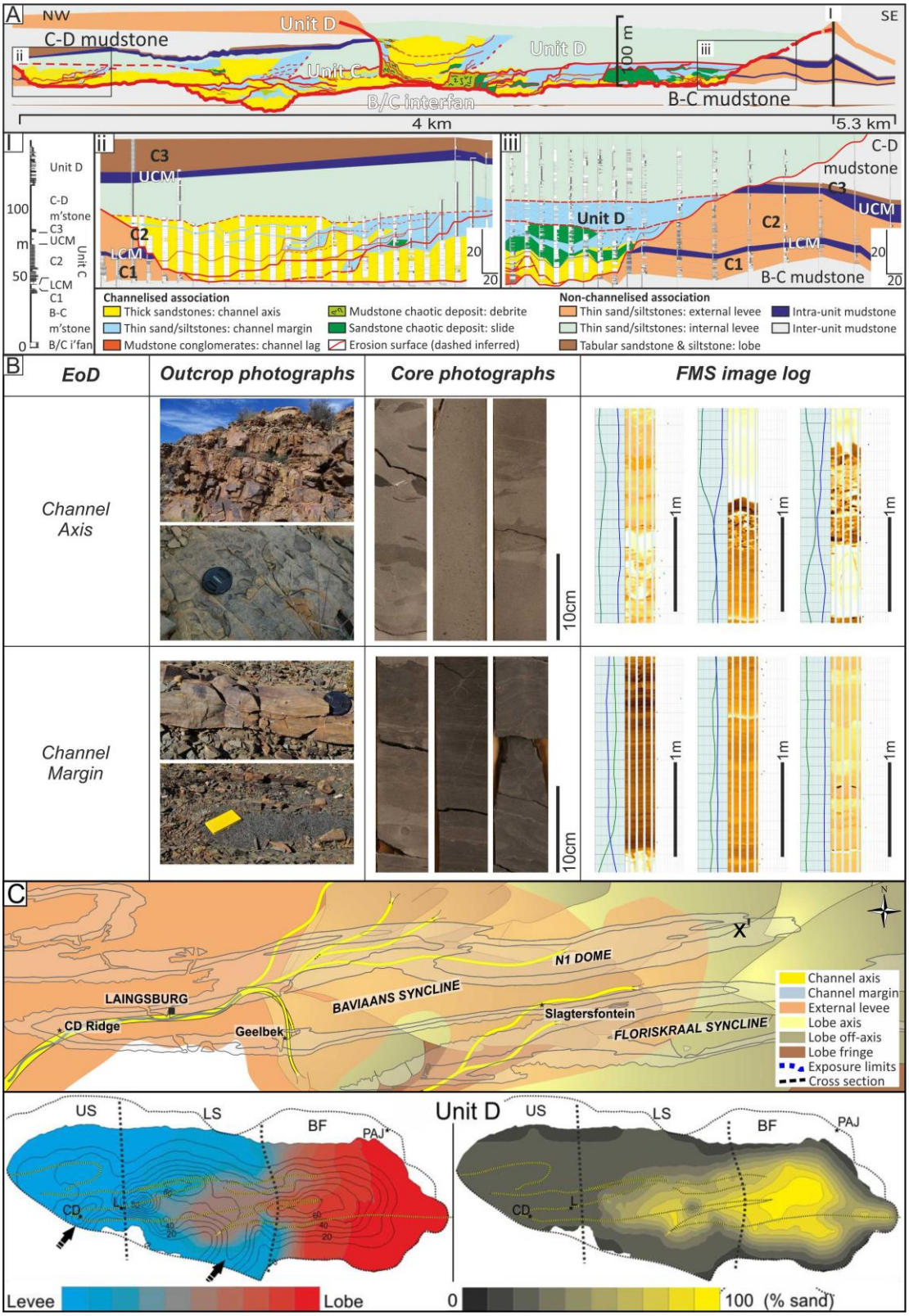

Figure 2: The impact of a long-lasting programme. (A) Outcrop-based correlation panel of two juxtaposed slope valley systems constructed during Slope 2. (B) During Slope3, we returned to this outcrop to drill a series of research boreholes to provide important production scale information. (C) Slope 3 and 4 allowed the distribution of sand (and environments of deposition) to be placed in an exploration-scale context, and in a 3D geological model.