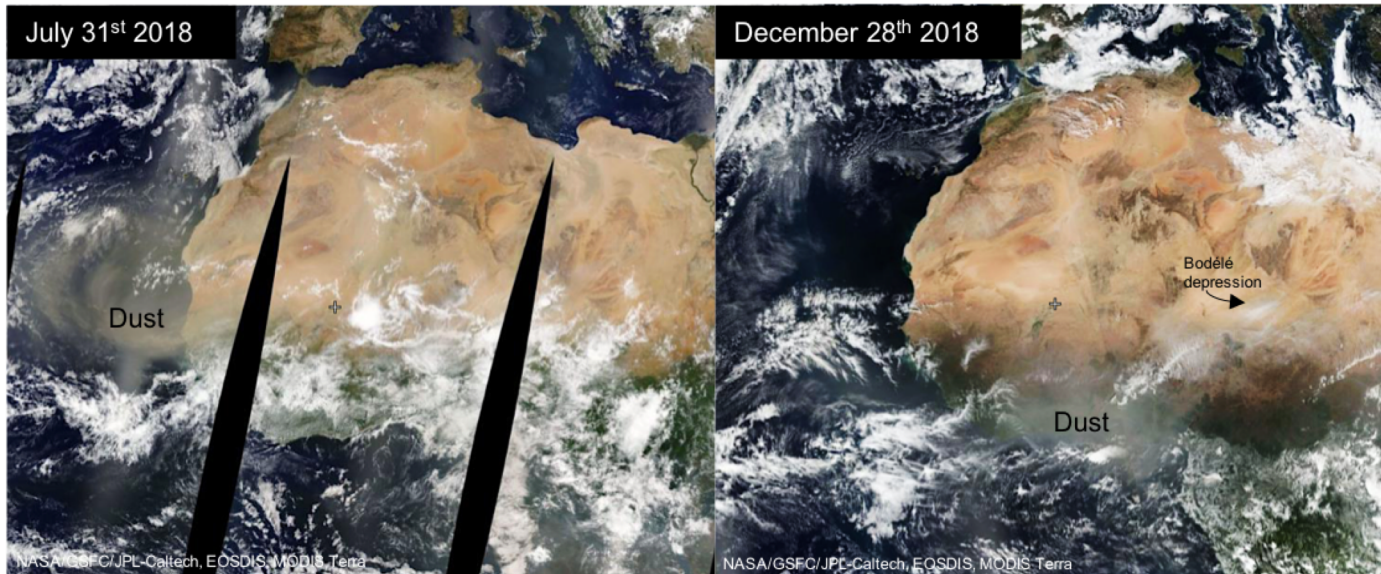


Provenance of the Saharan Winter Dust Plume

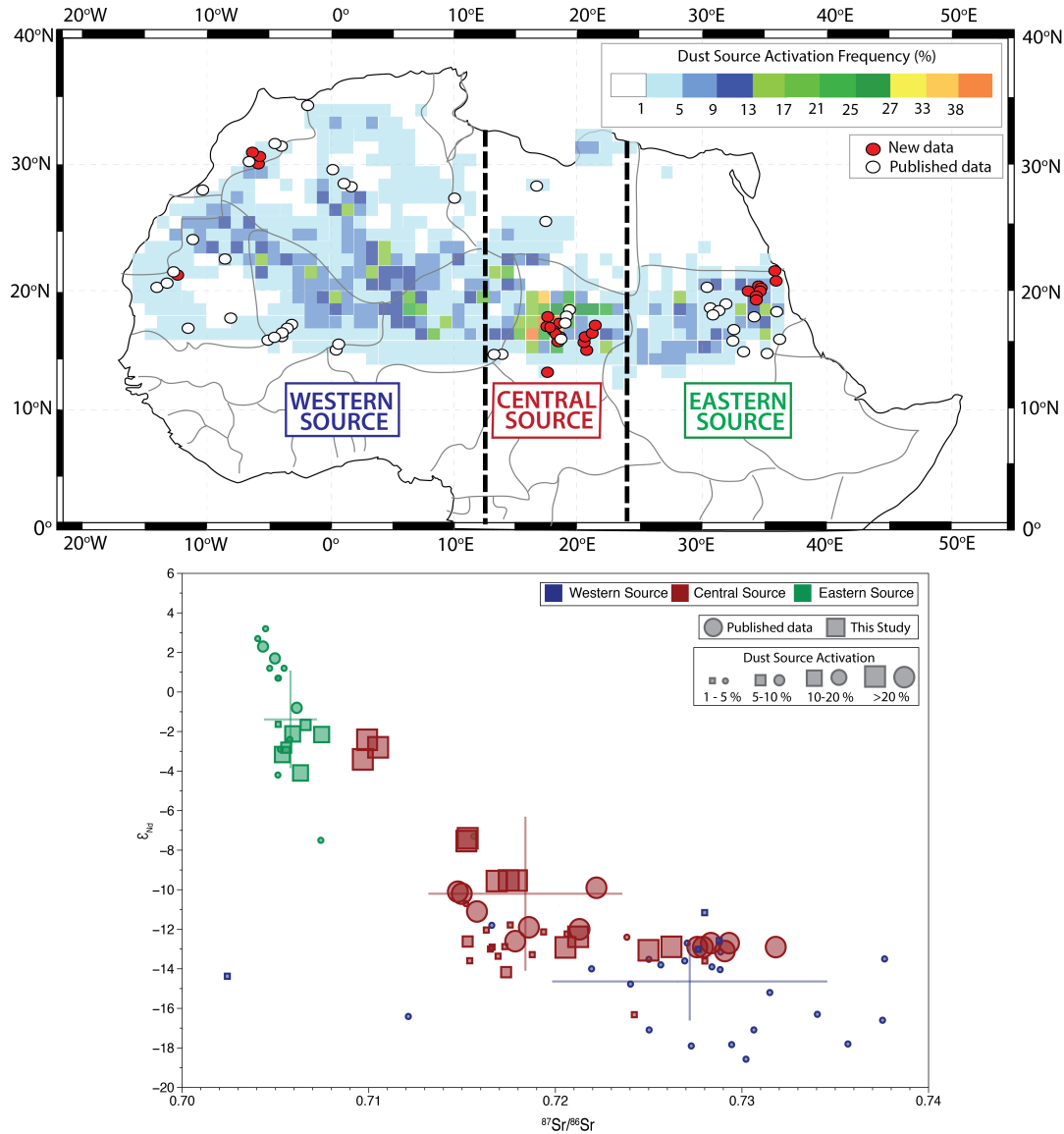


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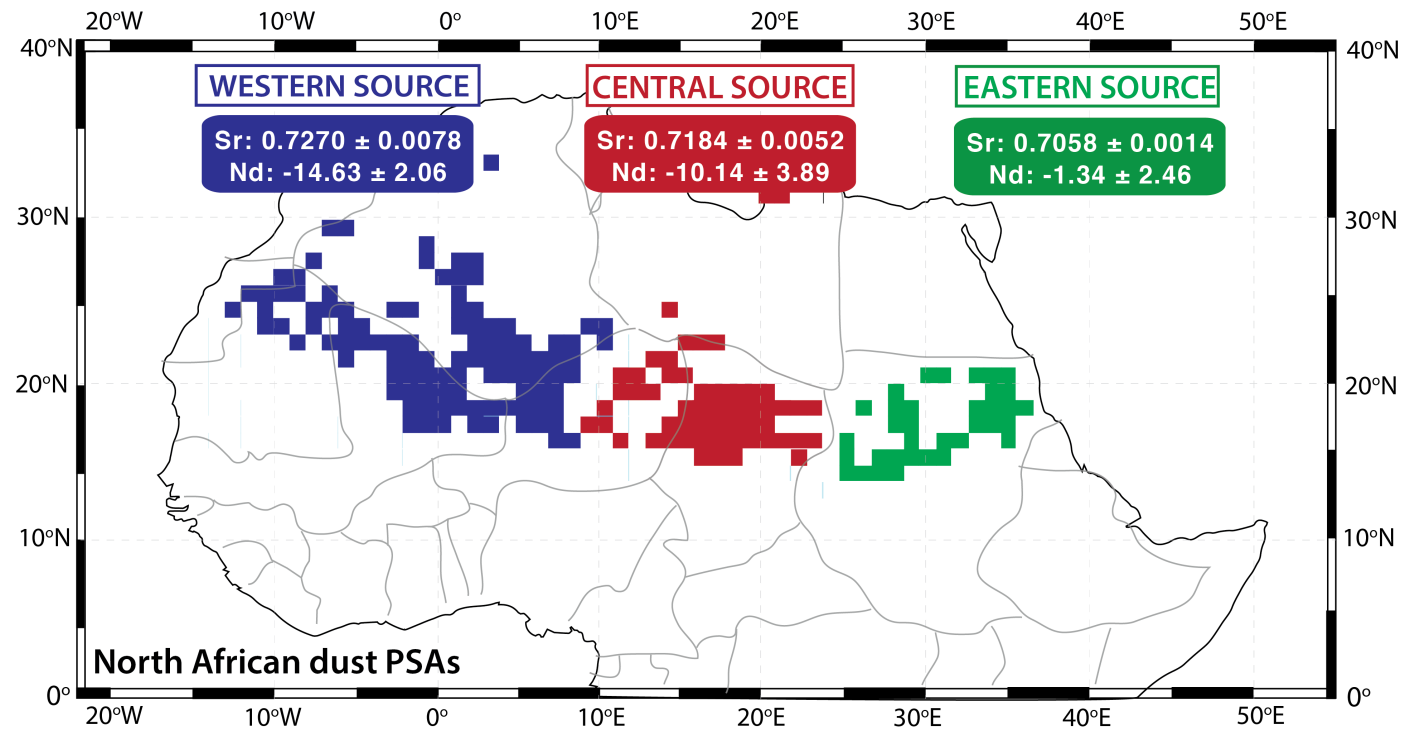
Amy M Jewell¹, Will Burton¹, Tereza Kunkelova¹, Anya J Crocker¹, Ursula Röhl², Matthew Cooper¹, Rachael James¹, Chuang Xuan¹, Alistair Pike³, Natalie Bakker⁴, Nick Drake⁴, Charlie Bristow⁵, Paul A Wilson¹

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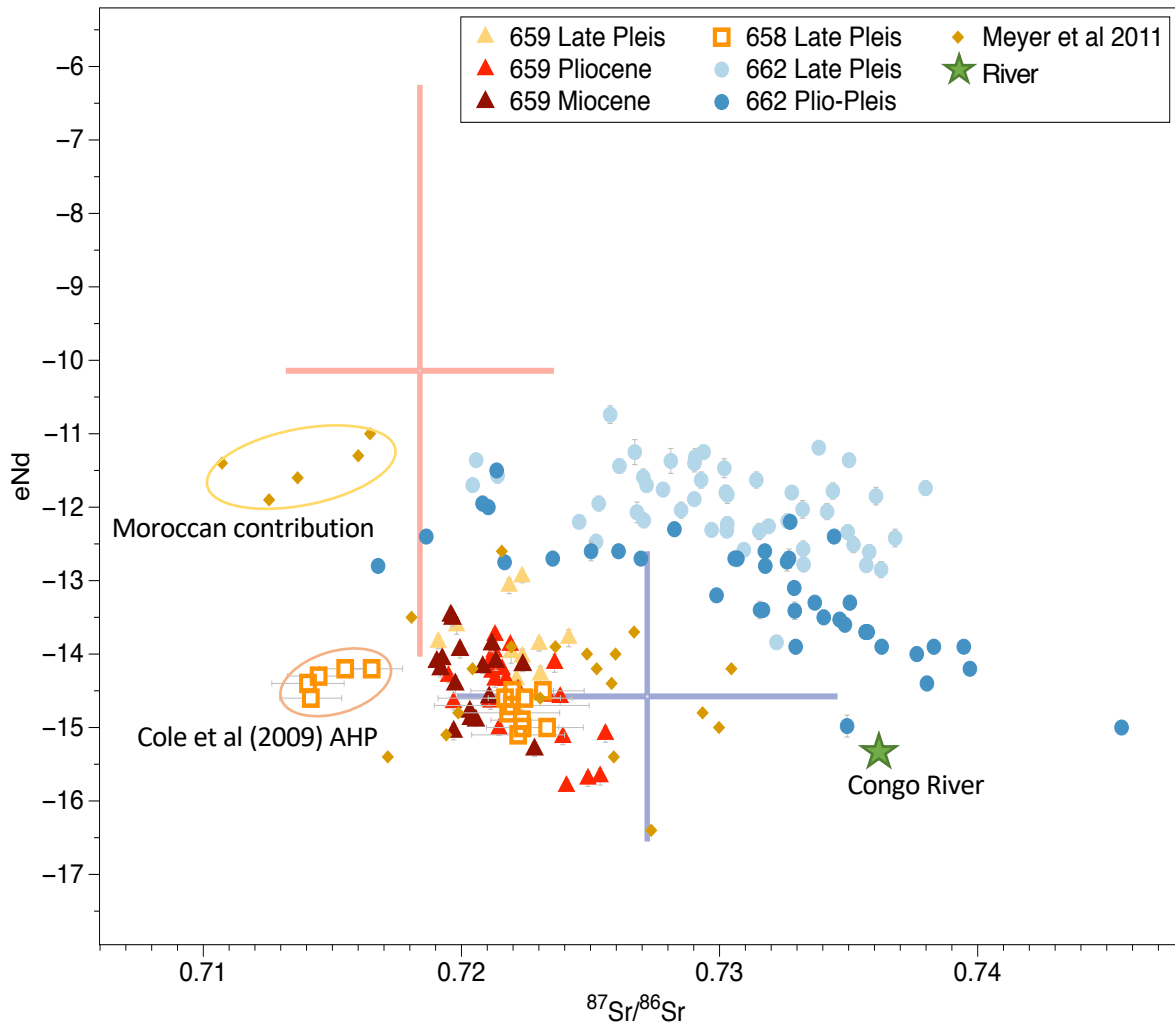
North African Dust Sources



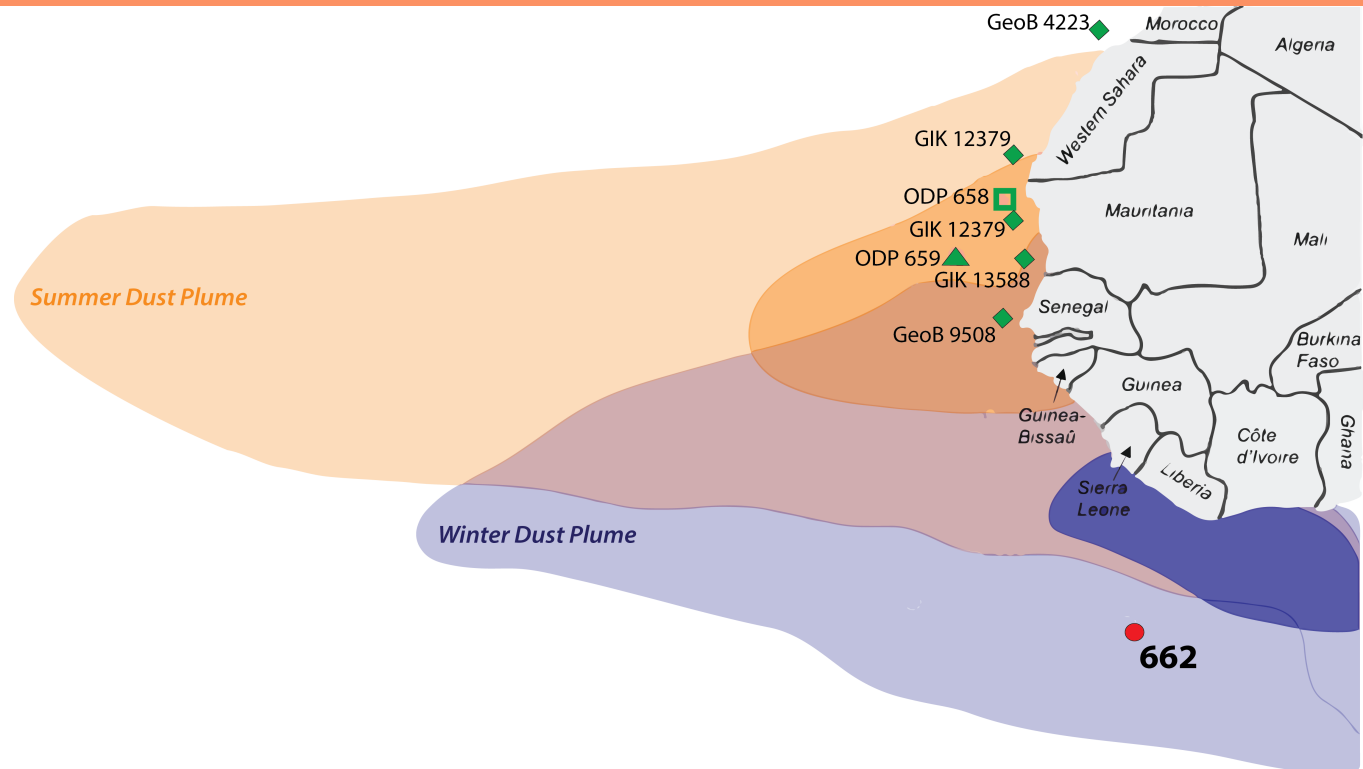
- We define three preferential source areas (PSAs) for North African dust using the dust source activation map of Schepanski et al., (2012). We geochemically characterise them using Sr and Nd isotopes:
 - Our data show a clear Nd and Sr isotopic distinction between PSAs.
 - We find extreme geochemical heterogeneity in the region surrounding the Bodélé Depression (palaeolake Mega Chad).



Provenance of the Saharan Winter Dust Plume



Marine sediment Sr-Nd data from winter plume site ODP 662 (this study, blue). Also Sr-Nd data from several summer plume (warm colours) sites: ODP 658 (Cole et al, 2009) & 659 (Crocker et al, in review), and from NW African margin transect from Meyer et al (2011). Errors (2SE) shown by grey bars. Large crosses denote weighted mean PSA fingerprint (blue = western, red = central)



- We find isotopic distinction between dust transported via the summer route and the previously overlooked winter dust route.
- The central PSA is the primary source of dust to the winter route. Site 662 also likely receives terrigenous material from the Congo River.
- The distinct sources of the winter and summer dust routes provide a means to study regional hydroclimate through the palaeo-record.

Dust plumes defined using Meng et al (2017)

Please don't hesitate to contact me if you have any question/comments regarding the Saharan Winter Dust Plume ☺



Provenance of the Saharan Winter Dust Plume

Key Findings:

1. Three isotopically distinct preferential source areas (PSAs) for North African dust (Western, Central and Eastern source areas).
 - This improves capability to fingerprint the provenance of dust exported from North Africa, to a) study its role in fertilising primary productivity in the North Atlantic or the Amazon rainforest, and b) to reconstruct the palaeoclimate history of the African continent.
2. The primary source of the winter dust plume is palaeolake MegaChad, in the Central source region. It's contribution becomes more important throughout the Plio-Pleistocene, and varies on orbital timescales.
 - Dust accumulating in marine sediments situated beneath the winter dust plume provide an opportunity to study the palaeo-hydroclimate of Chad, home to Earth's largest dust source (Bodélé Depression) and some of the oldest hominin fossils.

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