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Torbjörn E. Törnqvist<sup>1</sup>, Jakob Wallinga<sup>2</sup>, Freek S. Busschers<sup>3</sup>, Henk J.T. Weerts<sup>4</sup> (1) University of Illinois at Chicago, Chicago, IL (2) Delft University of Technology, NL-2629 JB Delft, Netherlands (3) Free University, NL-1081 HV Amsterdam, Netherlands (4) 4. Netherlands Institute of Applied Geoscience TNO – National Geological Survey, NL-3508 TA Utrecht, Netherlands

**High-Resolution Chronostratigraphy of a Late Quaternary Compound Paleovalley Fill (Rhine-Meuse System, The Netherlands)**

The late Quaternary potentially provides the most ideal sedimentary record for accurate and precise radiometric dating of paleovalley fills. Five >35-m-deep cores from the paleovalley succession of the Rhine-Meuse system, oriented parallel to the present Dutch coast, predominantly contain stacked units of sandy to gravelly fluvial channel-belt deposits from the last two glacials (oxygen-isotope stages (OIS) 2-4 and 6). Optical dating of some 30 quartz samples allows a chronostratigraphic subdivision of these strata, commonly with a resolution of 10-20 kyr. Identification of the sequence boundary associated with the sea-level fall of the last glacial is far from straightforward. Only one of the cores provides an unconformity of >50 kyr that unequivocally separates strata from OIS 2-4 and OIS 6, respectively. In the other two dated cores, resolving the last sequence boundary is problematic. In these cases a fluvial falling-stage systems tract (OIS 4) immediately overlies highstand estuarine channel deposits from OIS 5. A large volume of preserved strata was deposited during OIS 4 and 3, i.e., during sea-level fall, and our study area was well outside of the realm of eustatic control during most of the last glacial. We conclude (1) that the most recent glacio-eustatically controlled sequence boundary in this setting corresponds to the OIS 5/4 transition (~80 ka), i.e., the onset of pronounced sea-level fall associated with the last glacial; (2) that the falling-stage systems tract is an important component of this paleovalley fill; and (3) that stacking patterns during the last glacial were upstream (climate) rather than downstream (sea level) controlled.