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A provenance study of the Mesozoic North Celtic Sea Basin and eastern sector of the Upper Devonian Munster: insights from detrital zircon U-Pb ages.

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This study is the first to use detrital zircon geochronology to determine the source of sediments that make up sedimentary rocks of the eastern part of the Devonian Munster Basin and the Mesozoic North Celtic Sea Basin (NCSB) of southern Ireland. It forms part of a broader project that aims to determine the source of sediment in a number of onshore and offshore sedimentary basins in and around southern Ireland. These basins have developed in basement of peri-Gondwanan affinity with the Iapetus suture marking the boundary between this and the Laurentian craton to the north. The peri-Gondwanan terranes Avalonia and Ganderia are recognised in the detrital zircon record as having a major late Neoproterozoic component with very few zircons of other ages. This detrital component is completely absent in typical Laurentia-derived sediments. Instead, these are marked by significant zircon populations of Archean, Palaeoproterozoic and Mesoproterozoic age.

U-Pb and Pb-Pb ages of detrital zircons were obtained by LA-ICP-MS for seven samples from the eastern Munster Basin and seven samples from the Jurassic and Cretaceous NCSB. Early depositional units in the eastern part of the Munster Basin have major detrital zircon components in the late Cambrian to Middle Ordovician. These zircons are likely sourced from granites associated with the Grampian orogeny or from Ordovician lavas or from both. Laurentian basement has also made a significant contribution to sediment input in these units. Neoproterozoic zircons are also present and likely represent some input from a peri-Gondwanan source or recycling of Cambrian sediments in the Leinster Massif which are known to be derived almost entirely from Avalonia/Ganderia. Detrital zircons from units deposited stratigraphically higher in the eastern Munster Basin sequences shows major input of sediment derived from Laurentian basement. With the exception of one formation, these younger units show very few to no detrital zircons of Neoproterozoic age. Late Cambrian to Ordovician components are also present in these units. Petrographic evidence indicates input from a proximal granitic source for the majority of eastern Munster Basin samples. However, the youngest detrital zircon ages indicate that the most proximal granite, the Leinster Granite, did not contribute to the detrital zircon populations in these sediments.

Detrital zircon ages from the Jurassic NCSB indicate inputs from both Laurentia and peri-Gondwanan terranes and also some early Palaeozoic source. With the exception of one sample, the Cretaceous NCSB sediments contain detrital zircons that indicate an ultimate peri-Gondwanan source of sediment with input from Palaeozoic sources and, to a lesser extent, an ultimate Laurentian source. Neoproterozoic zircons in the NCSB may have been sourced from axially upstream in the Avalonian or Ganderian

terrane or from recycling of Cambrian sediments such as those in the Leinster Massif. The most likely source of detrital zircons of Laurentian affinity is the Munster Basin. Therefore, at least some of the sediment in the NCSB was sourced from the Munster Basin.

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