In the juvenile stage, the European eel (Anguilla anguilla) still has a transparent skin – hence the name “glass eel”. Photo: European Eel Foundation

A natural navigational system guiding eels towards Europe

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European eels (Anguilla anguilla) take three years to migrate from the spawning grounds in the Sargasso Sea (east of Florida) to the coasts of Europe, where they grow to maturity. En route, they are guided by subtle local differences in the Earth’s magnetic field. This was shown by Eawag scientists, together with colleagues from the US and UK, in experiments involving juvenile eels. The animals were exposed to various magnetic fields typical of locations along their migratory route, and their orientation responses were observed. This swimming direction data was then fed into simulations using an ocean circulation model. It was found that eel larvae have a “magnetic map”, which guides them first towards the Gulf Stream (southwest of the Sargasso Sea). This natural navigation system then aids them in swimming in a northeastward direction. The simulations showed that “oriented swimming” increased the number of eels entering the Gulf Stream by around 50 per cent on average, compared with passive drift – the mechanism previously assumed to be responsible for larval transport. According to the researchers, sensitivity to magnetic map information could also explain why the American eel (Anguilla rostrata) does not follow the Gulf Stream like its European cousin, but migrates northwards along the east coast of North America, although both species spawn in the Sargasso Sea.

Video

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The magnetic fields created for the experiments determine which outer section of the tank juvenile eels swim into. Source: Lewis Naisbett-Jones

Original publication

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