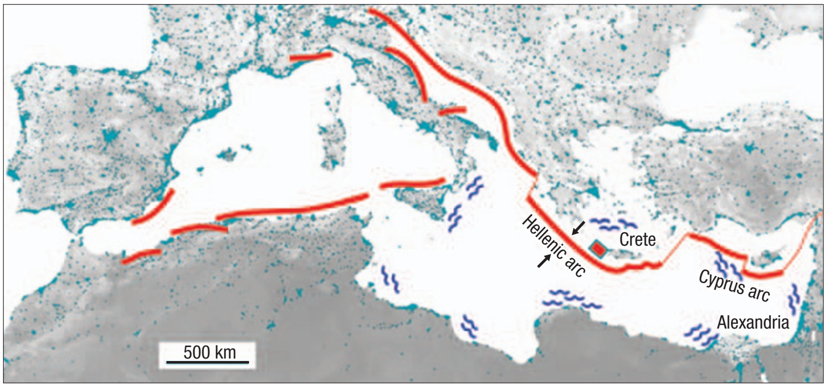

Figure 1 Tsunami sources and Mediterranean population targets. Simplified potential tsunami source regions (red lines)[11,12,17] and the modest inferred source region for the magnitude 8.5 earthquake in western Crete (rectangle) whose tsunami destroyed coastal communities in AD 365. Arrows indicate Africa/Aegean convergence. The blue wavy lines symbolize coastal tsunami arrivals. Turquoise spots on the map correspond to village and city lights that are here used as a proxy for population density (night luminosity imagery from http://visibleearth.nasa.gov/view_detail.php?id=1438). Huge populations are preferentially concentrated along the coast and are expected to grow rapidly in the next few decades[3].

of tsunami as they ripple around the Mediterranean Sea. Alarmingly, many transit times of tsunami to close-by coastal populations are unforgivingly short — some less than 15 minutes[11,12,17]. Within 30 minutes of the AD 365 earthquake, the coast of North Africa had received a broadside volley of damaging waves. Simultaneously a northward-travelling wave had swamped the southern coasts of a dozen Aegean islands and Greece. Thirty minutes later, waves with amplitudes of up to 5 m had reached Italy, Sicily and southeast Turkey. And an hour later, the coasts of the Nile delta, the Levant and Cyprus had all been overwhelmed. Calculations of run-up of the AD 365 tsunami require detailed coastal slope data that have yet to be incorporated[12], but it is likely that the wave surged onshore with maximum depths of ~5 m in many locations[17].

With tectonic sources and target populations facing each other throughout the Mediterranean region (Fig. 1), the first warning for many coastal citizens of Middle Earth following a future megaquake may well be seismic waves, rather than the wail of sirens. However, for the largest tsunami, with distant reach and damaging amplitude, more than an hour of warning may be available. Either way, nobody doubts that tsunami will recur.

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GEOMORPHOLOGY

Muddying the waters

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The annual migration of salmon upstream is a spectacular sight to tourists and hungry bears alike (see image). Their arduous swim is largely seen as the response to an internal drive to reproduce, but the effects of the journey go beyond the procreation of this predatory fish.

Once the salmon have arrived at their upstream spawning areas, hard-working female fish use their fins and bodies to mobilize sediments lining the streambed, digging small holes, or redds, of up to 50 cm deep in which they lay their eggs. In particularly popular mating areas, the redds can disturb the entire channel bed.

Although the hummocky surface of the nests is readily visible from August to May, the impact of the redds on overall sediment transport within salmon-filled streams has been unclear. Marwan Hassan at the University of British Columbia, Canada, and colleagues therefore used bed-load traps and magnetically tagged particles to analyse the effects of salmon activity in the Fraser River basin, Canada (*Geophys. Res. Lett.* **35,** L04405; 2008).

In individual watersheds, salmon were responsible for up to 60% of sediments mobilized each year, mainly in the form of clays, silts and sands, which are easily resuspended by the digging fish. On average, salmon moved over half as much of these sediments as flood events did during the five years of the study. In years with minimal flooding, salmon were actually the primary drivers of sediment movement.

In their quest to dig a home for their offspring, salmon become a first-order control on sediment transport in their home streams. The relationship between habitat and biology is clearly not a one-way street.

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