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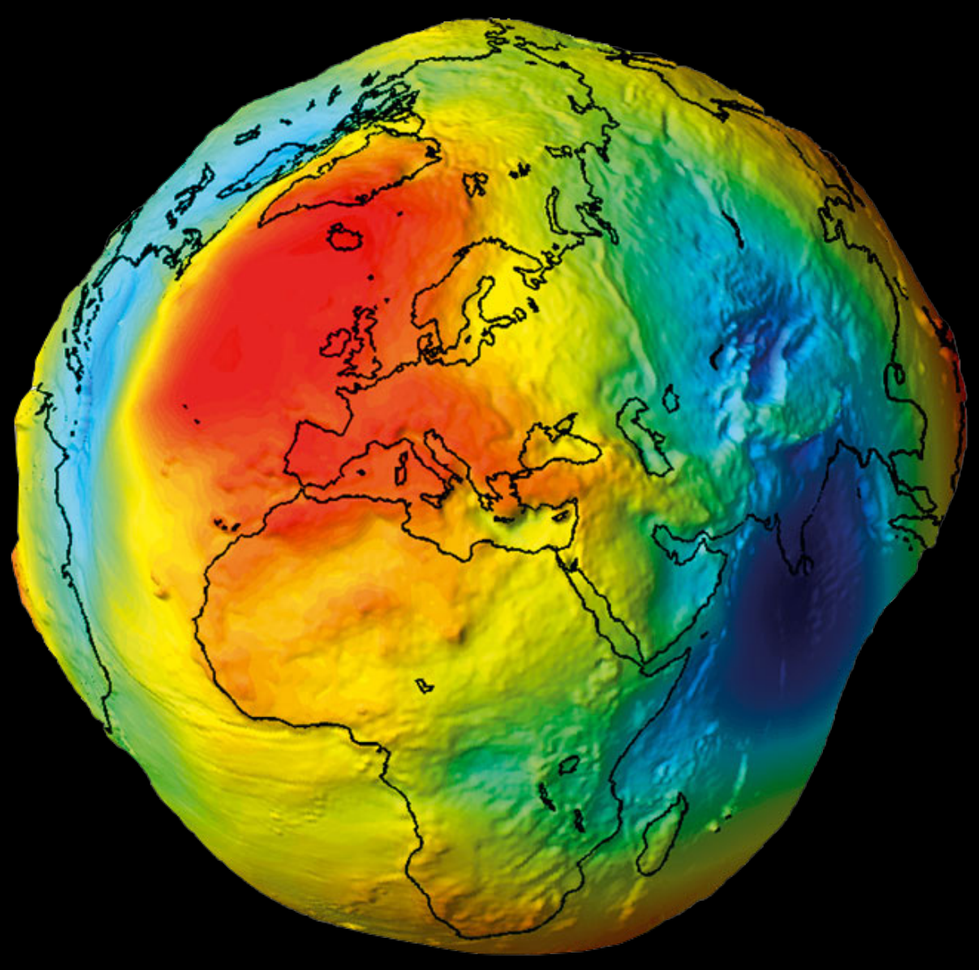
since 1919 Oceans 100

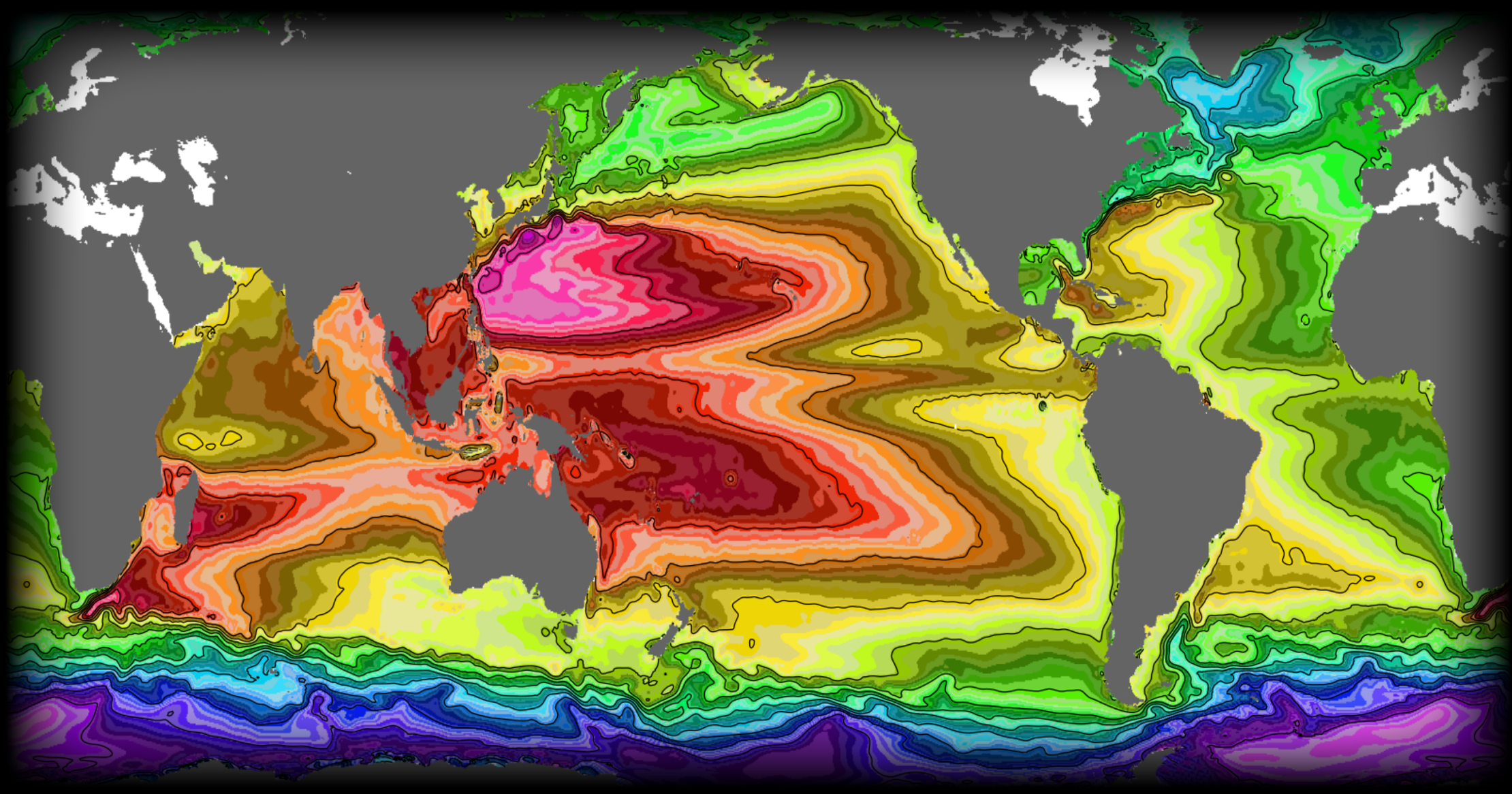
Physics: from orbits to ocean currents



The GOCE satellite that has been used to map the Earth's gravitational field.

Slopes in the sea surface cause ocean currents, but to know the slopes we first need to know how level the sea surface is. Mapping the Earth's gravitational field shows us how deep- sea mountain ranges and trenches affect the level of the sea surface.

The map to the left shows a level surface, measured by the GOCE satellite. This surface can vary by almost 100 metres above and below a smooth ellipsoid.



The picture above shows the sea surface height relative to the level surface. Pink is very high sea surface, purple very low. There is a 3 metre difference in the sea surface height between Antarctica and the area southeast of Japan.

Water does not flow down a sea surface slope due to the Earth's rotation. Instead currents flow around areas of high or low sea surface, like the flow in a stirred cup of tea. The same effect explains why wind blows around weather systems.

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