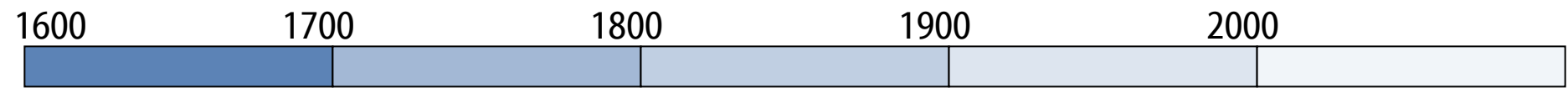


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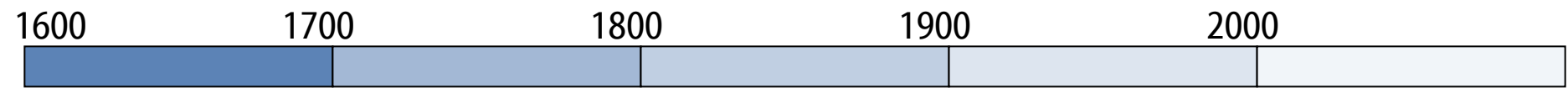
12.001 Introduction to Geology
Spring 2008

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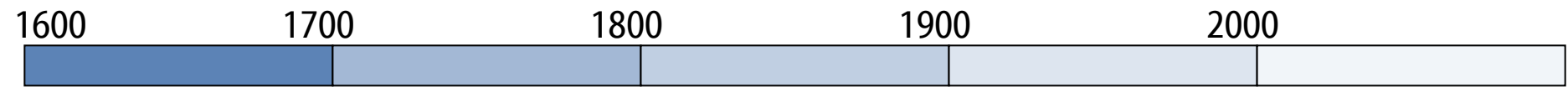
1610 (two years after the invention of the telescope)
Galileo discovers four moons orbiting Jupiter

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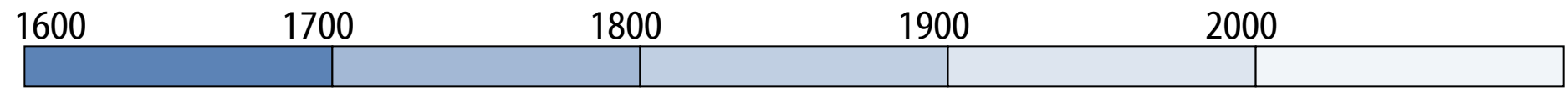
1658: Archbishop Ussher says the Earth is 5,562 years old (it was formed the night before Oct. 23rd, 4004 B.C.)

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1669: Nicolas Steno publishes *Prodromus*, in which he describes the principles of superposition and original horizontality

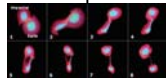
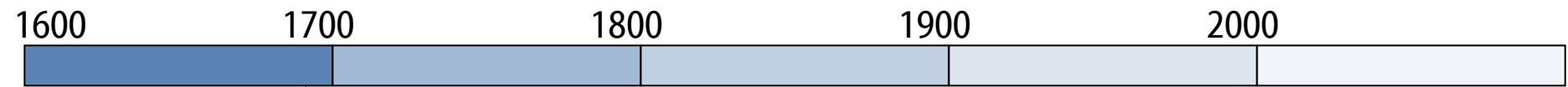
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1693: Leibnitz suggests that the Earth was once molten

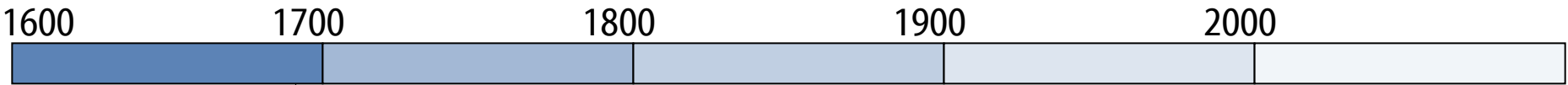
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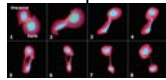
1795: James Hutton
suggests Earth is very old;
“plutonists” vs.
“neptunists”

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Hutton Unconformity at Siccar Point, Jedburgh, Scotland,
illustrated by John Clerk in 1787 with a recent
photography (2003) by Keith Montgomery.



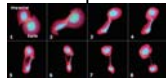
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1807: Motivated by the notion of an initially molten Earth, Joseph Fourier develops theories of heat conduction and introduces the notion of an irreversible process.

$$\frac{\partial Q}{\partial t} = -k \oint_S \nabla T \cdot dS$$

Heat transfer through a material is proportional to the negative gradient in the temperature and to the area at right angles to that gradient, through which the heat is flowing.

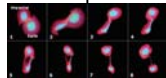
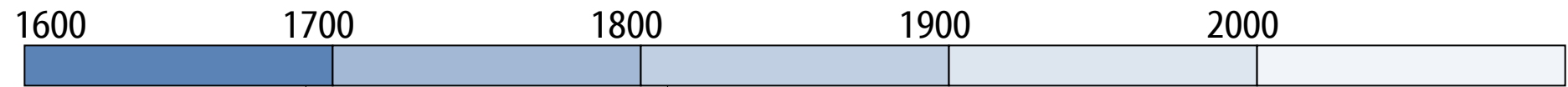


$$\frac{\partial Q}{\partial t} = -k \oint_S \nabla T \cdot dS$$

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1830s: Charles Lyell publishes *Principles of Geology* and moves us into the “world of the non sequitur.”

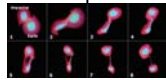
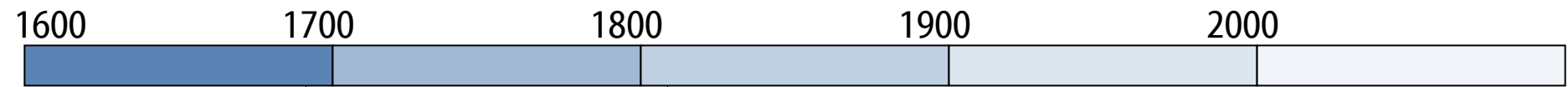
William Whewell invents the terms *scientist*, *uniformitarianism*, and *catastrophism*.



$$\frac{\partial Q}{\partial t} = -k \oint_S \nabla T \cdot dS$$

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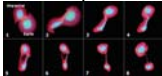
1890: Lord Kelvin calculates that the Earth is between 20 and 40 Myr old. What was he missing in his calculations?



$$\frac{\partial Q}{\partial t} = -k \oint_S \nabla T \cdot dS$$

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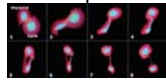
1910: Norman Bowen develops theories to explain the compositions of igneous rocks



$$\frac{\partial Q}{\partial t} = -k \oint_S \nabla T \cdot dS$$

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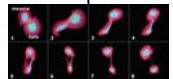
1959: The Soviet Union launches *Luna 2*, the first manmade object to reach the Moon



$$\frac{\partial Q}{\partial t} = -k \oint_S \nabla T \cdot dS$$

Images removed due to copyright restrictions.

1960s: The plate tectonics revolution



$$\frac{\partial Q}{\partial t} = -k \oint_S \nabla T \cdot dS$$

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How does the inside of the Earth work?

How hot will the greenhouse world be, and can we control it?

What is the nature of glass?

How do planets form?

What causes ice ages?

Why does the Earth's magnetic field reverse?

Can we predict earthquakes?

Is there life beyond Earth?

What causes extinctions, and can we prevent them?