Full of value: Nanoparticles prevent cotton fibers in textiles from becoming wet or soiled.

The Intertwined Earth

When the Air Turns the Oceans Sour
Human society has begun an ominous large-scale experiment, the consequences of which will not be foreseeable for some time yet. Massive emissions of man-made carbon dioxide are heating up the Earth. But that’s not all: the increased concentration of this greenhouse gas in the atmosphere is also acidifying the oceans. Scientists at the Max Planck Institute for Meteorology in Hamburg are researching the consequences this could have.

Tracing the Noxious Five
For many years now, a phenomenon that threatens both humans and the environment has been moving to the center of attention: the “noxious five” – nitrogen dioxide, sulfur dioxide, ozone, carbon monoxide and particulate matter. Researchers at the Max Planck Institute for Chemistry in Mainz are studying these substances with a view to clarifying the large-scale atmospheric processes associated with the bad air.

Earth’s Breath
The amounts of carbon dioxide and other trace gases that vegetation and soil exchange with the atmosphere affect the climate in a variety of ways. Scientists at the Max Planck Institute for Biogeochemistry in Jena are analyzing this complex structure – with the aid of a global network of measuring stations and new data analysis methods.

ON THE COVER: The Earth is a perfect ecosystem and the best place in the universe that we know of for life. The complex interaction of the elements earth, water and air – land masses, oceans and atmosphere – is finely balanced and works very smoothly. But the delicate interplay can easily tip. Researchers are only gradually tracking down the factors that upset the balance of our interwoven planet.
FOCUS
18 When the Air Turns the Oceans Sour
24 Tracing the Noxious Five
32 Earth’s Breath

SPECTRUM
40 Country Bumpkins Have More Enthusiasm for New Things
40 Chaos with Unfamiliar Swirling
41 … and now for the weather on Mars
41 Charcoal in the Ocean
41 Revealing Games behind Bars
42 Herbarium Turned History Book
42 New Keyboard for Touchscreens
43 Mysterious flashes in the Sky
43 Resilient Harlequin
44 Fountains at the Heart of a Galaxy
44 Mobility in the City
45 Preference in Mating
45 A Good Wire for Nanoelectronics
45 Chlamydia Wreaks Havoc in Genetic Material

PHYSICS & ASTRONOMY
46 Physics Has a Core Problem
Precise measurements of the proton radius yield a value that differs significantly from the value previously considered to be valid. The difference could point to some gaps in physicist’s picture of matter.

BIOLOGY & MEDICINE
54 More than Just Sweet
When they hear the word sugar, the first thing most people think of is candy. Some may also think of diabetes. Researchers, in contrast, want to use sugars to develop more effective drugs and vaccines. It is hoped that these will benefit primarily poorer countries.

MATERIAL & TECHNOLOGY
60 A Virtuoso with Molecules
Personal Portrait: Nuno Maulide

CULTURE & SOCIETY
68 The Body According to Leonardo
A new look at Leonardo da Vinci’s anatomical drawings shows what role the process of drawing – the genuine artistic act – played in the generation of knowledge.

FEATURES
03 On Location
06 Viewpoint – Peter Gruss
We Need a Living, Breathing System
76 Flashback
A Virologist between Two Worlds
78 Max Planck Community
78 Dinner with Nobel Laureates
80 A Celebration of Life
82 Top Ranking in the Competition for Starting Grants
83 Research Establishments
83 Imprint