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So what makes for a ‘good’ monsoon?

India had a great monsoon this year. Just how did it come about, asks S.Ananthanarayanan?

A first question is what brings on the monsoon to start with? Many of us may know the answer to this one – it is the warming of the northern hemisphere during the months of March to June. During these months, the earth positions itself so that the sun is shining more on the northern hemisphere than on the southern.

Convection Current

This causes the air in the northern hemisphere to rise and brings in cool air from the south, blowing for hundreds of kilometers over the sea and soaking up moisture. As these winds blow due north from the deep south, they veer towards the west due to the rotation of the earth, so long as they are in the southern hemisphere. As they cross the equator, they correct course towards the east and blow in, towards India, for instance, as the south-west monsoon.

This kind of wind arises mainly towards India because the Indian sub-continent is about the only land mass, in the northern hemisphere, which is located like this, presenting a straight face to winds from the south-west, and across an expanse of unbroken sea. Europe is sheltered by Africa and North America by South America. And the Asian continent is sheltered by India.

So that is how the monsoon comes about – by cool air from the south, laden with moisture, rushing in to take the place of warm air that is rising as the northern hemisphere warms in the summer sun. What happens to this air that rises? As the air rises to higher altitudes, it expands, because of the lower pressure, and in expanding it cools. We may have seen that air that is compressed in a bicycle pumps gets warm and the air that expands on being blown out through pursed lips cools on expanding.

Pile-up in the north

So air builds up at high altitudes over the northern hemisphere. In the southern half, as the air lower down has blown towards the north, air from higher altitudes sinks to take its place. This causes low pressure at high altitudes in the south. The air filling up at high altitudes in the north then blows towards the south.

We can see that the sun’s energy has set up a circular motion of air, towards the north near the sea and towards the south high up in the sky. It is, of course, a lot more complex than that, because of both the rotation of the earth as well as the uneven distribution of land and mountains, but basically, this is the way it is.

Over centuries and centuries, the perfectly regular cycle of the sun has created an almost equally regular cycle of motion of air, to the north in the ‘summer’ months, in the northern hemisphere, that is, and to the south during the ‘opposite’ end of the year. And a cycle of seasons almost as regular as the motion of the earth around the sun.

Sometimes off-beat

But the cycle is not exactly at the same rhythm, for many reasons. One important reason is that the things that made the geography of the earth what it is may have not been related to the motion of the earth around the sun. Irregularities of the motion of winds and ocean currents, compared to the movement of the earth around the sun, then build up, to be expended as storms and disturbances in the sky and the sea. Another reason is that the earth's landmass itself is not at rest and the shape of the continents and the bottom of the seas are still in the course of adjusting and settling down.

But every few years, the effects all add up and the monsoon comes in rich and abundant, like it did this year. Some years, the monsoon comes late, or stops early, or is scant. For all the computing power and information about winds and temperatures that we gather, weather has still been too complex to predict consistently.