

Rainbows

G. P. Können, Terschelling Diary 2009/1



Sun and rain: turn your back to the sun and you see the rainbow. He forms a circle with the shadow of your head as centre. So: the higher the sun in the sky, the smaller is the rainbow segment that pears over the horizon. In the summer you will never see a rainbow at midday, even if it pours rain – the entire bow is below the horizon. But in the afternoon it can be splendidly visible!

Just outside the bow you may notice the 2nd rainbow: it is weaker and its colours are reversed! This bow is the reflection of the 1st bow it the drop it selves: light undergoes not one, but two internal reflections at the wall of the drops. Between the 1st and 2nd rainbow the sky is darkest.



A rainbow is not a stand-alone phenomenon, but is the boundary between an area in the sky that is lit by a specific ray path through a drop. The closer one looks toward that boundary, the brighter is the sky – the outer boundary occurs for red light. Consequently it is brighter inside the 1st bow and outside the 2nd bow than in between. Painters which are familiar with this structure have often difficulties to realistically paint a rainbow.

(photo Ralf Pitchenender, München 8 July 2005)

A 3rd rainbow (yet another reflection) should also be possible, but that one appears at the sun facing side of the sky where the sky light is so bright that the bow submerges – you will never see it. However, occasionally one notices just within the 1st bow additional narrow bows, the so-called ‘supernumerary bows’. Their mutual distances relates with the sizes of the rainbow-making drops.



Within the 1st rainbow, the supernumerary bows are visible.

(photo Mike Nicholson, Papatoetoe, New Zealand 7 September 2007)

Rain during holidays: hardly any tourist is looking forward to that. But if it is doomed to happen, the beauty of a rainbow offers some comfort. And the longer one looks to it, the more beautiful it becomes! Therefore below a few extra pictures of remarkable rainbows:



A 'rainbow exote': the rainbow crosses its reflection bow, that is: the bow generated by the reflection of the sun in still water. Rare, but at still water, rain and low sun such a thing should occasionally be visible from the deck of a ferry crossing a shallow sea.

(photo Nicola Boll, Isfjord bij Spitzbergen 22 August 2006)



'Broken rainbow': the rainbow below the horizon is in sea water spray; the upper part in (fresh) rainwater drops. As the index of refraction of salt water is slightly larger, its rainbow is smaller. This picture proves the saltiness of seawater. Obviously you can also find out by just tasting the water

(photo J. Dijkema)



The answer to the frequently asked question 'Why is the rainbow round?' is simply: 'Because a raindrop is round!'

(photo Galen Rowell, Kauai Island, Hawaii 1993)