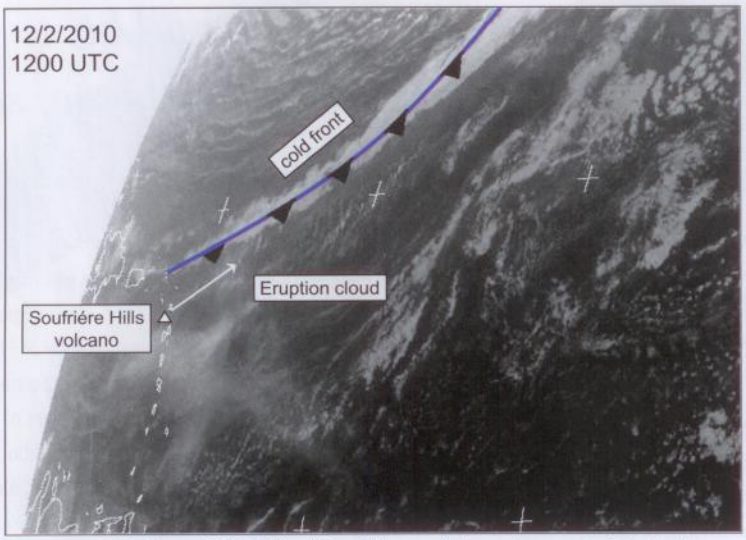
Volcanoes and storms

Two recent disastrous east Atlantic storms were exacerbated by the Soufrière Hills eruption, say Wyss Yim#, Judy Huang# and Johnny Chan#. Adler deWind has the story.*



Meteosat SEVIRI Channel 7 (8.3-9.1m infrared) image of the southern part of the North Atlantic Ocean on 12 February, 2010 showing the Soufrière Hills eruption cloud caught up within the warm sector of frontal system spreading in a northeasterly direction. Satellite image from www.sat.dundee.ac.uk.

The best time for achieving a better understanding of climate change is surely the present, because we have both instrumental records and satellite records for verification. It is therefore somewhat surprising that relatively few Earth scientists are involved in 'modern' climate change research.

Yim and colleagues have studied the possible connection between a volcanic eruption and successive disastrous east Atlantic winter storms during February 2010. Global warming has been argued as an important cause for the increase in intensity of tropical cyclones as the oceans warms[1,2,3]. Recently Bender[4], in a state-of-the-art computer model study, predicted that the number of strong storms in the western Atlantic could double by the end of the century through anthropogenic warming. However, the role of natural variability through volcanic eruptions, which are difficult to predict, has not been taken into consideration, the scientists believe.

On February 11, 2010 1635 UTC/GMT the Soufrière Hills volcano (latitude 16043'N longitude 62011'W) on Montserrat in the eastern Caribbean Sea erupted, sending an ash plume reaching 15.2km above sea level. On 12 February at 1200 UTC/GMT, Meteosat SEVIRI Channel 7 (8.3-9.1 m infrared, available from www.sat.dundee.ac.uk) shows the ash plume from the eruption was caught up within the warm sector of a frontal system spreading in a northeasterly direction (picture) towards Western Europe. This has provided insight into how volcanic eruption clouds become involved in generating of east Atlantic winter storms.

"During February 2010 there were two successive disastrous East Atlantic winter storms with torrential rain and high winds" says Yim. "Both were associated with active cold fronts and low-pressure areas in the southern part of the North Atlantic Ocean, moving northeastwards. These storms were bolstered by an unusually strong temperature contrast of the sea surface across the Atlantic Ocean. Abnormally warm waters were widespread off West Africa and extended into the eastern Caribbean Sea through the modification of surface wind circulation by the eruption plume. To the north of this warm surface water and air, relatively cold surface waters stretched between Western Europe and the southeastern United States."

On the morning of February 20 a severe storm from the southwest passed over the island of Madeira (maximum elevation 1862m, total land area 741km²). "This frontal activity was exacerbated by the orographic effect of the mountainous island, as well as by the volcanic ash and aerosols arising from the eruption about eight days earlier (which provided condensation nuclei). Between 0600 and 1100, torrential rain occurred on the southwesterly slopes of Madeira, with 165mm recorded at Pico do Areeiro. This is almost double the average rainfall for the whole of February at the weather station of the city of Funchal. Damage was confined mainly to the south of the island with widespread floods (picture overleaf) and mudslides, resulting in at least 48 fatalities and severe damage to infrastructure and property."

On February 26-28, yet another violent windstorm (named "Xynthia"), with maximum wind gust of 241km per hour and torrential rainfall, crossed Western Europe

Flooding in the city of Funchal on February 20, 2010. See http://en.wikipedia.org/wiki/2010_Madeira_floods_and_mudslides.

causing at least 63 fatalities and an estimated damage within the range of €1.3-3bn. In France, where damage was most severe, one million homes were left without power and cities like La Faute-sur-Mer, L'Aiguillon-sur-Mer and La Tranche-sur-Mer were flooded with water up to 1.5m deep.

Yim told *Geoscientist*: "The climatic effects of the volcanic eruption include the reduction of solar radiation causing cooling; interference of the 'normal' atmospheric circulation by the eruption cloud; interaction between the atmospheric circulation and oceanic circulation; condensation nuclei from ash and aerosols; transfer of moisture from the troposphere into the stratosphere; anomalously high precipitation including extreme floods and landslides, and acid rain."

"The formation of the volcanic plumes and the release of ash and aerosols are possible contributors to the complexity of storms and seem to have caused a dramatic increase in severity of these two east Atlantic winter storms."

References and further reading

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Http://en.wikipedia.org/wiki/2010 Madeira floods and mudslides
Http://en.wikipedia.org/wiki/Xynthia_(storm)

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Opinion

Blessed are the toymake

*...for they shall be palaeontologists too, says Dave Martill**

In 2003, the Geological Society, under the editorial guidance of Eric Buffetaut and Jean-Michel Mazin, issued Special Publication (217) *Evolution and Palaeobiology of Pterosaurs*. This valuable tome is a collection of papers presented at the Toulouse meeting of 2001 celebrating 200 years of pterosaur research. I remember being excited about this meeting, as never before had so many pterosaur specialists been assembled in one place and had so many new discoveries to discuss.

At this time hardly anything was known of the fabulous Chinese pterosaur-bearing deposits; but the Brazilian Santana and Crato formations were yielding exciting new taxa and revealing many previously unknown aspects of pterosaur soft tissue anatomy. Dino Frey and I, with Marie-Céline Buchy, announced to the world the discovery of a new genus and species of ornithocheirid we named *Ludodactylus sibbicki*. The specific epithet honours renowned palaeo-artist John Sibbick who has brought so many dinosaurs (and pterosaurs) alive for so many people; but the generic name is somewhat frivolous. *Ludodactylus* more or less translates to toy finger (*ludo* Gr. = game, plaything: *dactyl* L. = finger) and celebrates the animal's predicted existence - by a toy manufacturer.

Toy manufacturers are in the business of making money by entertaining. Some way down the list comes education - and a bit further down might come scientific accuracy. *Pteranodon*, the stereotypical giant, crested Late Cretaceous pterosaur of the Kansas chalk formations and star of numerous B movies (and A movies?) has always been a popular subject for model producers. But its lack of teeth has posed a bit of a problem; most manufacturers seem to think teeth are – if you will forgive me - essential selling points. For this reason it is not uncommon to find a '*Pteranodon*' model bearing a full set of dentures.