10.1071_ISSN0311-4546EC110p5

Looking into Malaysia's haze

In 1997, forest fires on the Indonesian island of Sumatra blanketed more than three million square kilometres of South-East Asia in a pall of choking white smoke.

Ten million hectares of rainforest were destroyed, and thousands of people in Indonesia, Singapore, Malaysia and Brunei suffered respiratory distress.

The event was billed as South-East Asia's worst environmental disaster since the Vietnam war, and was caused in part by the clearing of land for agriculture.

Further episodes of smog in 1999 and 2000 have raised tensions between Indonesia and her affected neighbours, who can do little but sit and wait for the smog to lift. Malaysia has been hardest-hit by the problem, with its air pollution index hitting 650 in September 1998, high above the hazardous level of 300–500.

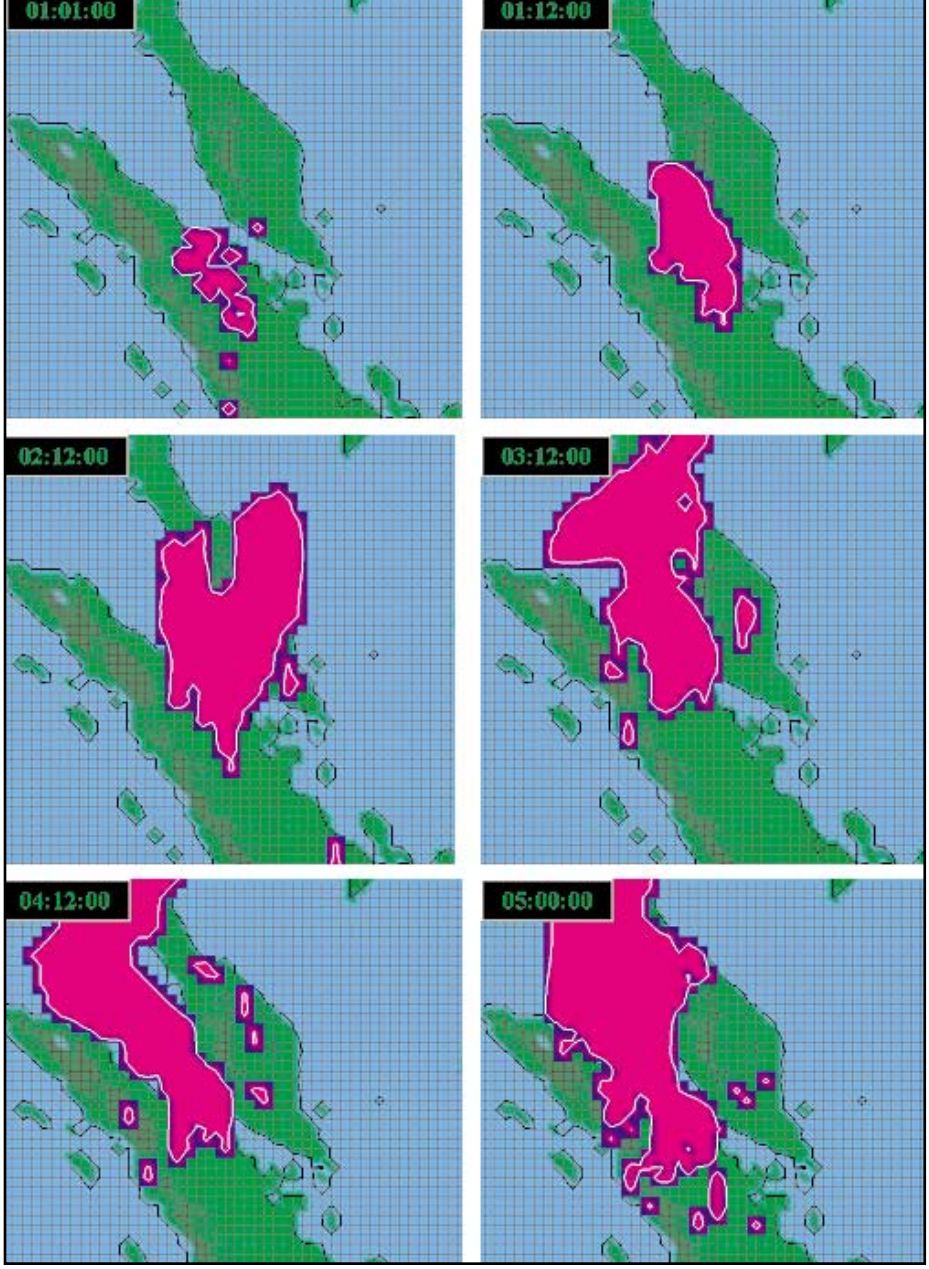
Between 1998 and 2000, an investigation into the cause of haze in Malaysia's Klang Valley was conducted by CSIRO Atmospheric Research, the Department of Environment Malaysia, the Malaysian Meteorological Service and Alam Sekitar Malaysia Sdn Bhd. The Malaysian Haze Study, funded by AusAID, measured the chemistry and light scattering ability of aerosol at two sites near Kuala Lumpur: Petaling Jaya and Gombak.

'First we took continuous direct measurement of light scattering by aerosol particles, and one day in every six we collected particles below 2.5 microns in size. These scatter light the most,' CSIRO scientist Dr Melita Keywood says.

'Then we looked at the chemistry of the particles to work out their sources.'

Using a 'chemical fingerprinting' method – which combines a knowledge of the chemical composition of particles from different emission sources with measurements of the actual chemical composition of the haze – the scientists identified three major contributors to the haze: smoke, vehicles and secondary (photochemical) aerosol production.

They also modelled the movement of pollution using the CSIRO air pollution model, TAPM (see *Ecos* 104).



The TAPM air pollution model was used in the Malaysian haze study to confirm that winds coming from Sumatra carried smoke across Malaysia during episodes of forest fire.

'Using TAPM we confirmed that winds coming from Sumatra were carrying smoke across Malaysia during forest fire episodes,' Keywood says. 'But even when there were no fires on Sumatra, there was a smog problem in Malaysia attributed to domestic fires, cars and secondary particle pollution.'

Little can be done to prevent pollution from offshore sources, although Malaysia is working with Indonesia on fire prevention.

But the study did produce several recommendations to help Malaysian authorities deal with their domestic problems. These include the development of policies to control biomass burning in Malaysia, and to reduce emissions from vehicles. Reductions in these primary pollution sources would in turn reduce oxides of nitrogen (NO_x), sulfur dioxide (SO_2) and VOC (volatile organic carbon) gases: species involved in the secondary photochemical production of fine particles.

Further research is likely to include the development of a photochemical smog model for the Klang Valley region, measurement of particle source chemical profiles for smoke and vehicle emissions, and the development of emission inventories for NO_x, SO_2 and VOC.

More about the haze study

Ayers GP Keywood MD Gras JL Boers R and Granek H (2001) Malaysian Haze Study: Final Report to AusAID and the Malaysian Department of Environment.

More information is available on the Malaysian Meterological Service website at www.kjc.gov.my.

Contact: Melita Keywood (03) 9239 4565, melita.heywood@csiro.au.

Wendy Pyper