

Novel Data Sources for Epi Modeling

- or -

Enhancing influenza surveillance by
monitoring age-specific trends
in emergency department
chief complaint data

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Workshop on the Epidemiology & Evolution of Influenza
DIMACS, Rutgers University, January 27, 2006

You're going to be told lots of things.
You get told things every day that don't
happen.

It doesn't seem to bother people...
It's printed in the press.
The world thinks all these things happen.
They never happened.

Everyone's so eager to get the story
Before in fact the story's there
That the world is constantly being fed
Things that haven't happened.

All I can tell you is,
It hasn't happened.
It's going to happen.

Influenza

OBJECTIVE

Characterize influenza season epidemiology
using emergency department
data by Age

Legal Mandate

Local health officers shall exercise due diligence in ascertaining the existence of outbreaks of illness or the unusual prevalence of diseases, and shall immediately investigate the causes of same.

New York State Sanitary Code,
10 NYCRR Chapter 1, Section 2.16(a)

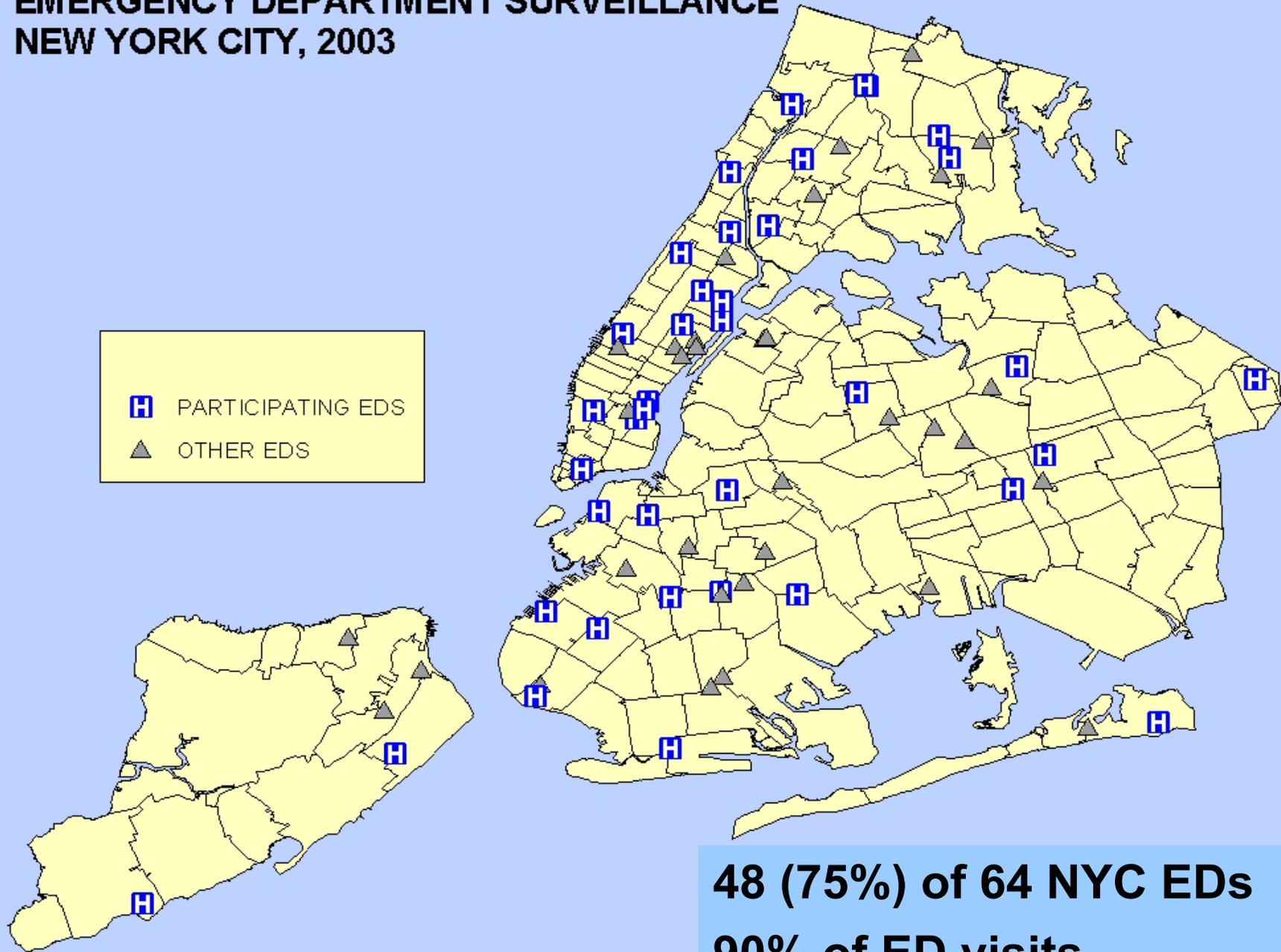
What is Syndromic Surveillance?

“Real-time” public health surveillance using data that is routinely collected for other purposes

What are its Goals?

- Early detection of large outbreaks
- Characterization of size, spread, and tempo of outbreaks once detected
- Monitoring of disease trends

EMERGENCY DEPARTMENT SURVEILLANCE NEW YORK CITY, 2003



**48 (75%) of 64 NYC EDs
90% of ED visits**

Coding chief complaints into syndromes

Respiratory illness

key words: cough, shortness of breath, URI, pneumonia

excludes: cold symptoms

Non-specific febrile illness

key words: fever, chills, body aches, flu/influenza, viral syndrome

Gastrointestinal illness

key words: diarrhea, vomiting

excludes: abdominal pain alone, nausea alone



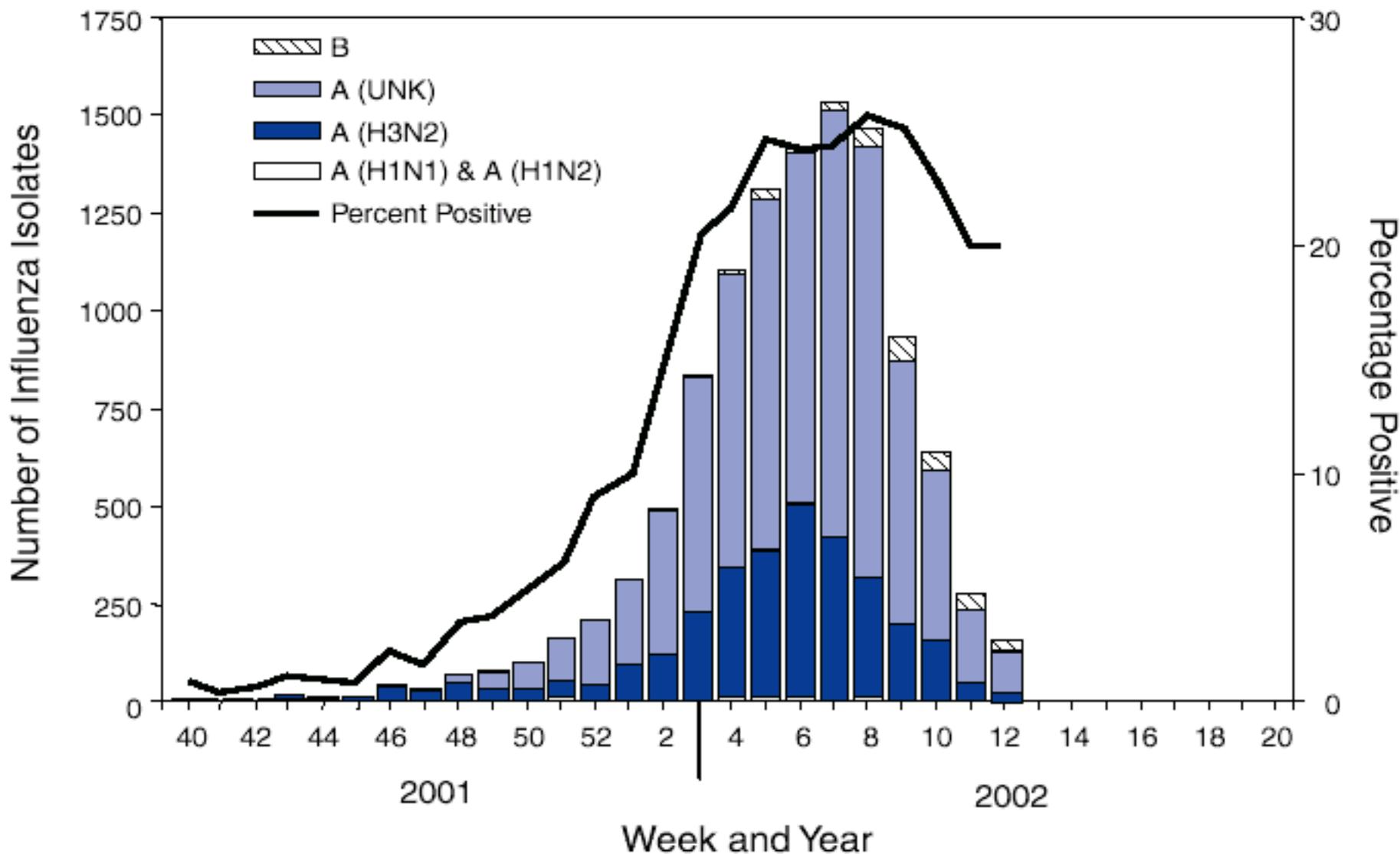
Update: Influenza Activity --- United States, 2001--02 Season

Although data collected from the four components of the CDC influenza surveillance system* are preliminary, national influenza activity appears to have peaked during the week ending February 23, 2002 (week 8). During the 2000--01 and 1999--2000 influenza seasons, peak activity occurred during week 4 and week 51, respectively. The viruses most commonly isolated during the 2001--02 season have been influenza A (H3N2). These viruses were well-matched antigenically by the 2001--02 influenza A (H3N2) strain in the vaccine. This report summarizes influenza activity in the United States[†] during September 30, 2001--March 23, 2002, and updates previous summaries from this season ([1,2](#)).

For the weeks ending January 26 (week 4) through March 23 (week 12), the period covered since the last report, the percentage of respiratory specimens testing positive for influenza viruses, a key indicator of the level of influenza activity, ranged from 17.6% (week 4) to 25.9% (week 8) ([Figure 1](#)). Since September 30, 2001, World Health Organization (WHO) and National Respiratory and Enteric Virus Surveillance System (NREVSS) collaborating laboratories in the United States tested 72,877 specimens for influenza viruses; 12,017 (16.5%) were positive, of which 11,599 (97%) were influenza A viruses and 418 (3%) were influenza B viruses. Approximately one third of the influenza B viruses were isolated in the Mid-Atlantic region of the United States. Of the 3,479 influenza A viruses that have been subtyped, 3,426 (98%) were H3 viruses, and 53 (2%) were H1 viruses.

CDC has characterized antigenically 391 influenza isolates collected in the United States since September 30. Of these, 279 were influenza A (H3N2) viruses, 14 were influenza A (H1) viruses, and 96 were influenza B viruses. Of the 14 A (H1) viruses, five were A (H1N1) viruses and nine were A (H1N2) viruses. These nine A (H1N2) viruses came from patient specimens collected in Wisconsin in December 2001. Two other A (H1N2) viruses were isolated from patient specimens collected during July and September in Texas and Nevada, respectively. The influenza A (H3N2) and A (H1) viruses were similar antigenically to the vaccine strains A/Panama/2007/99 (H3N2) and A/New Caledonia/20/99 (H1N1) viruses, respectively.

FIGURE 1. Number and percentage of specimens testing positive for influenza, World Health Organization and National Enteric and Respiratory Virus Surveillance System Collaborating Laboratories — United States, 2001–02 Season*



* As of April 3, 2002.

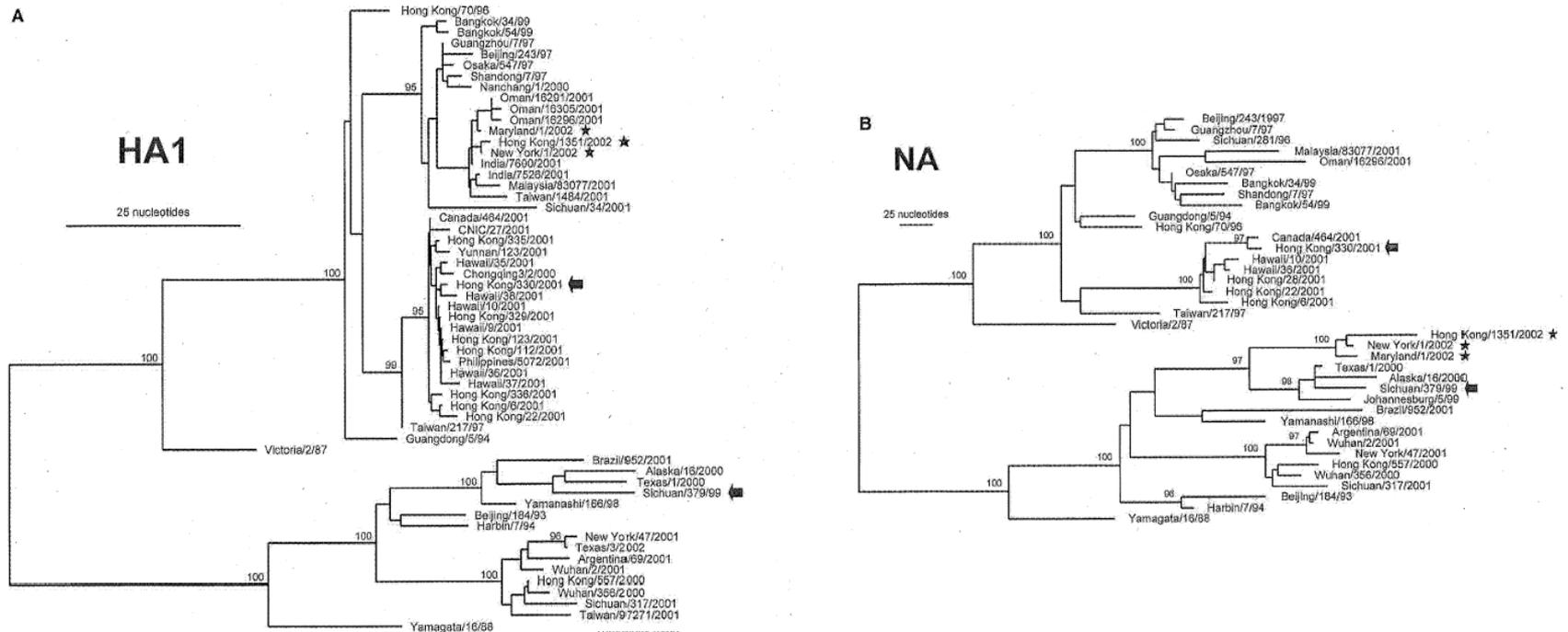
RAPID COMMUNICATION

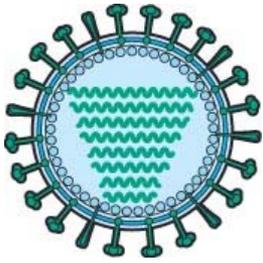
Reappearance and Global Spread of Variants of Influenza B/Victoria/2/87 Lineage Viruses in the 2000–2001 and 2001–2002 Seasons

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*Influenza Branch, Centers for Disease Control and Prevention, Atlanta, Georgia 30333; [†]National Microbiology Laboratory, Canadian Science Center for Human and Animal Health, Winnipeg, Manitoba, Canada R3E 3R2; and [‡]State of Hawaii Department of Health, State Laboratories Division, 2725 Waimano Home Road, Pearl City, Hawaii 96782

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Methods

Data

fever & respiratory ED visits
viral influenza isolates

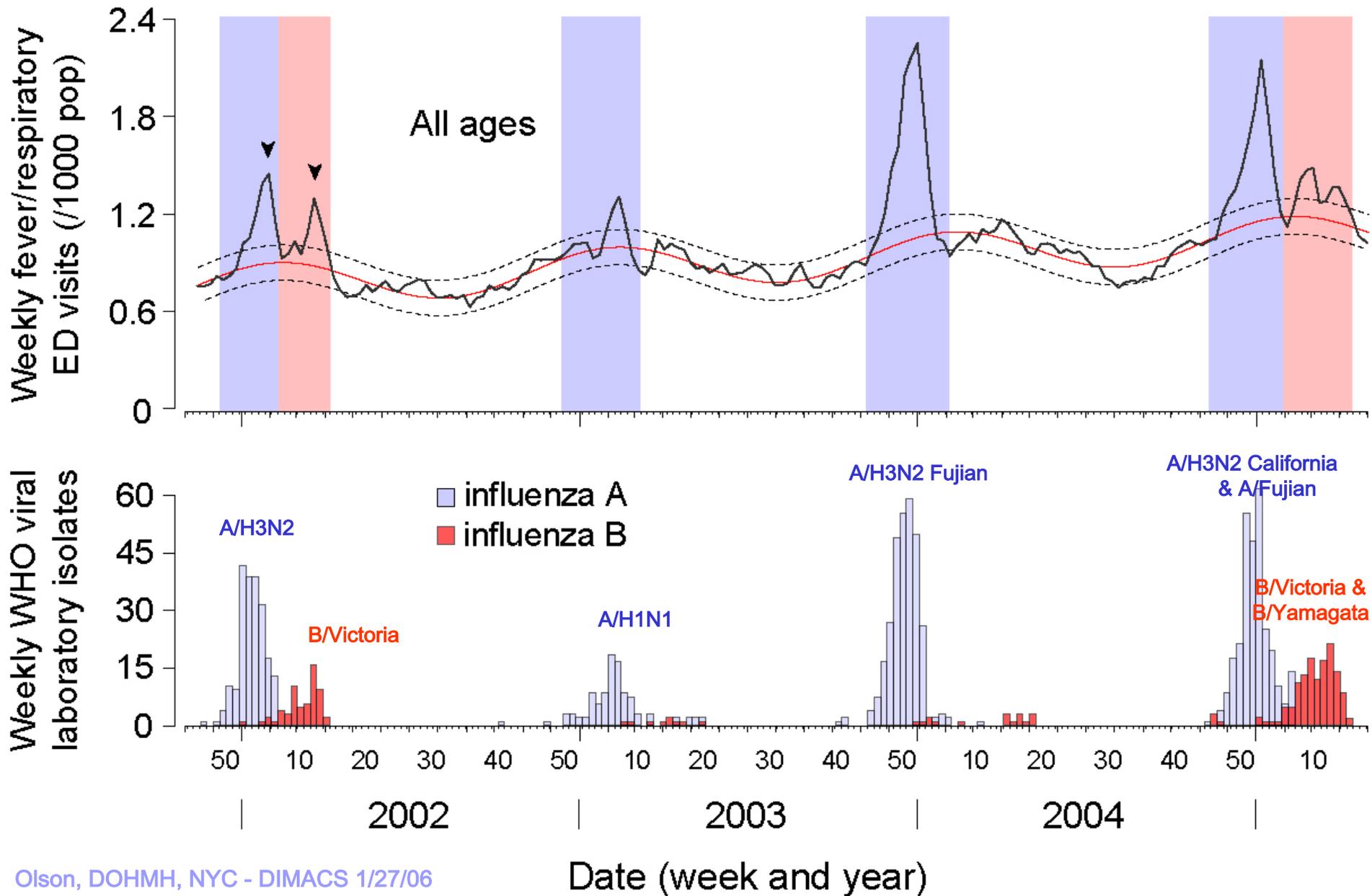
Statistical Approach

Serfling regression

Analytical Approach

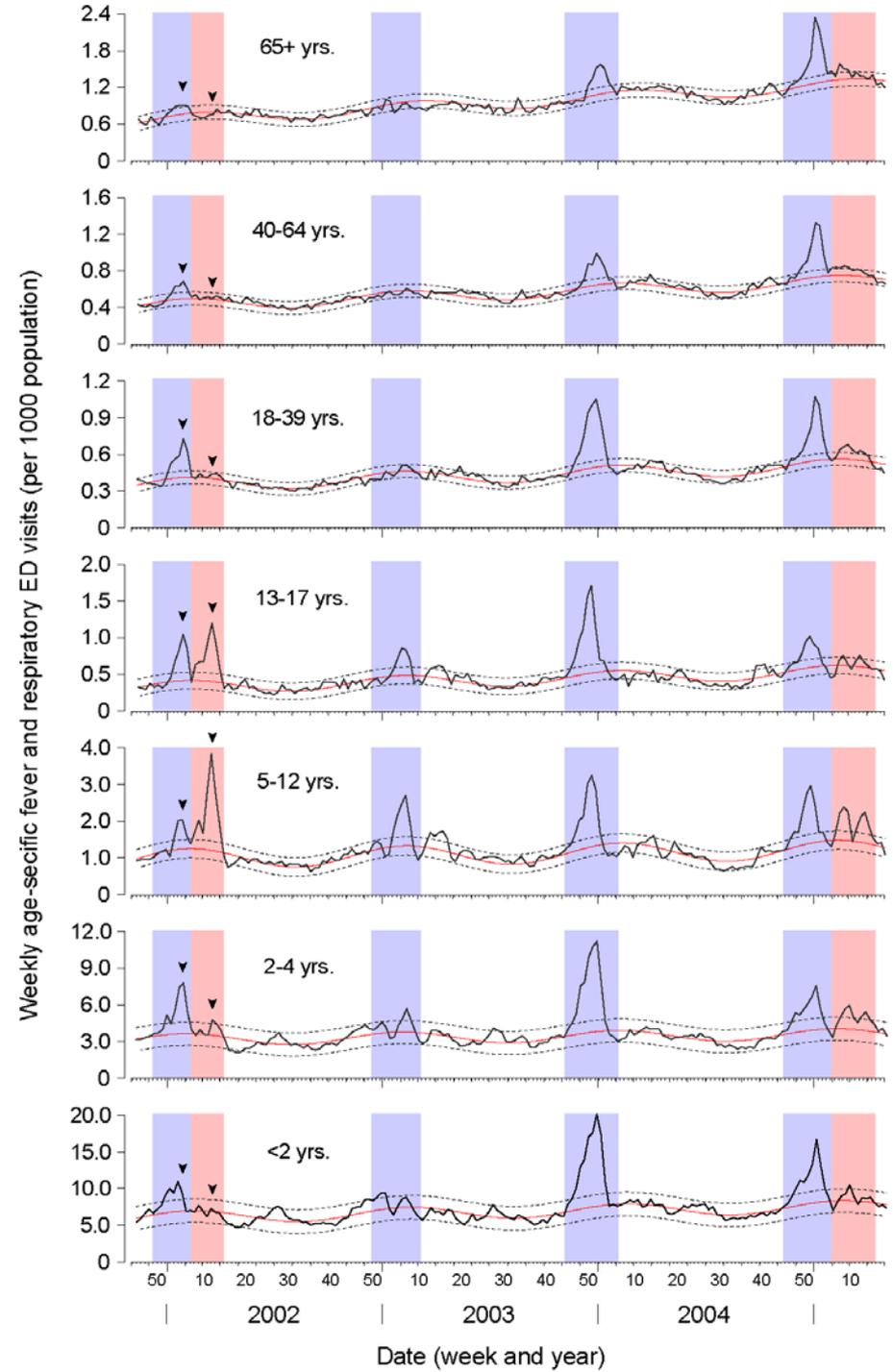
excess visits (observed – expected)
relative excess (observed / expected)
influenza type, subtype & strain “signatures”

ED fever/respiratory & viral data in NYC

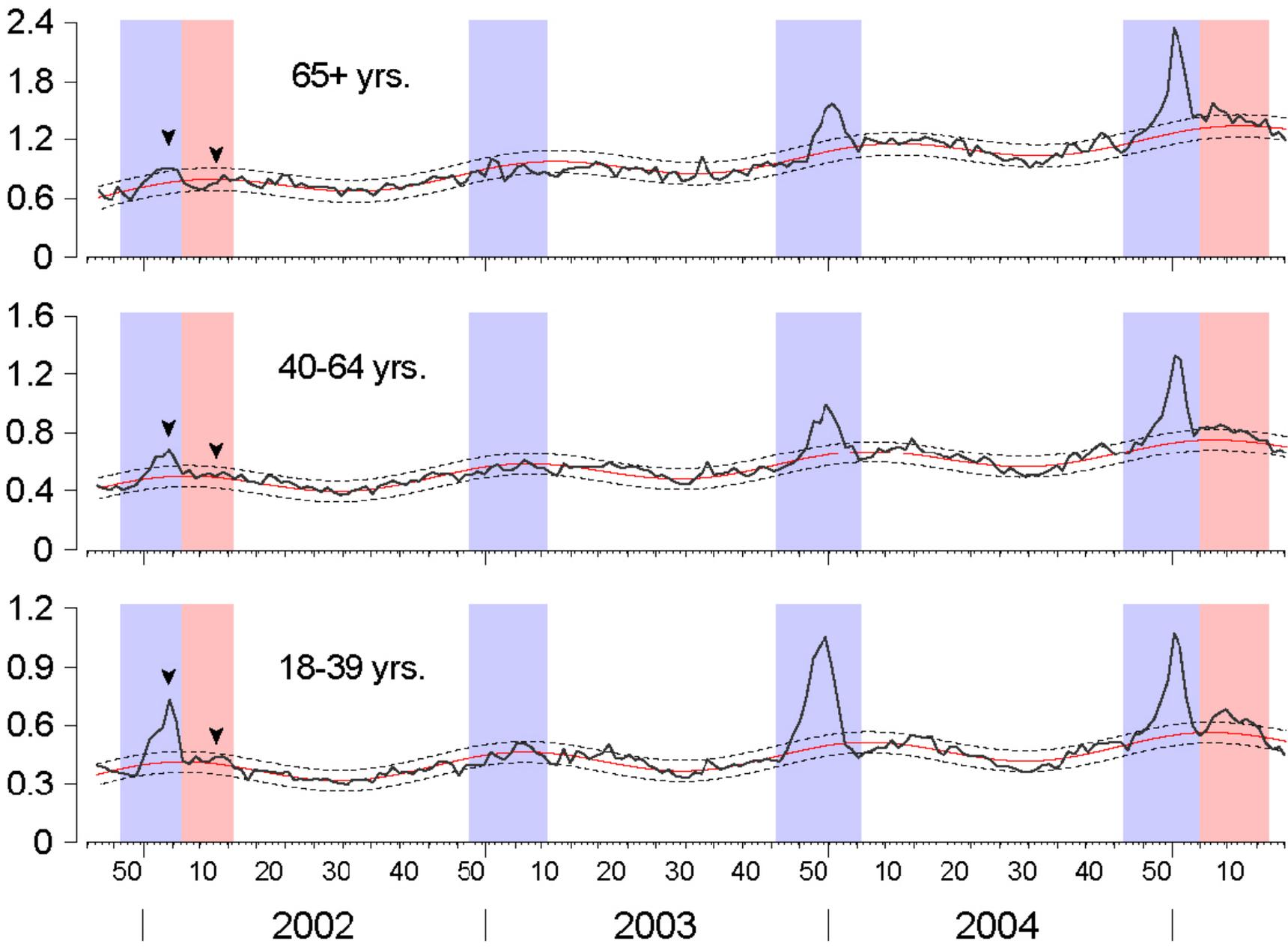


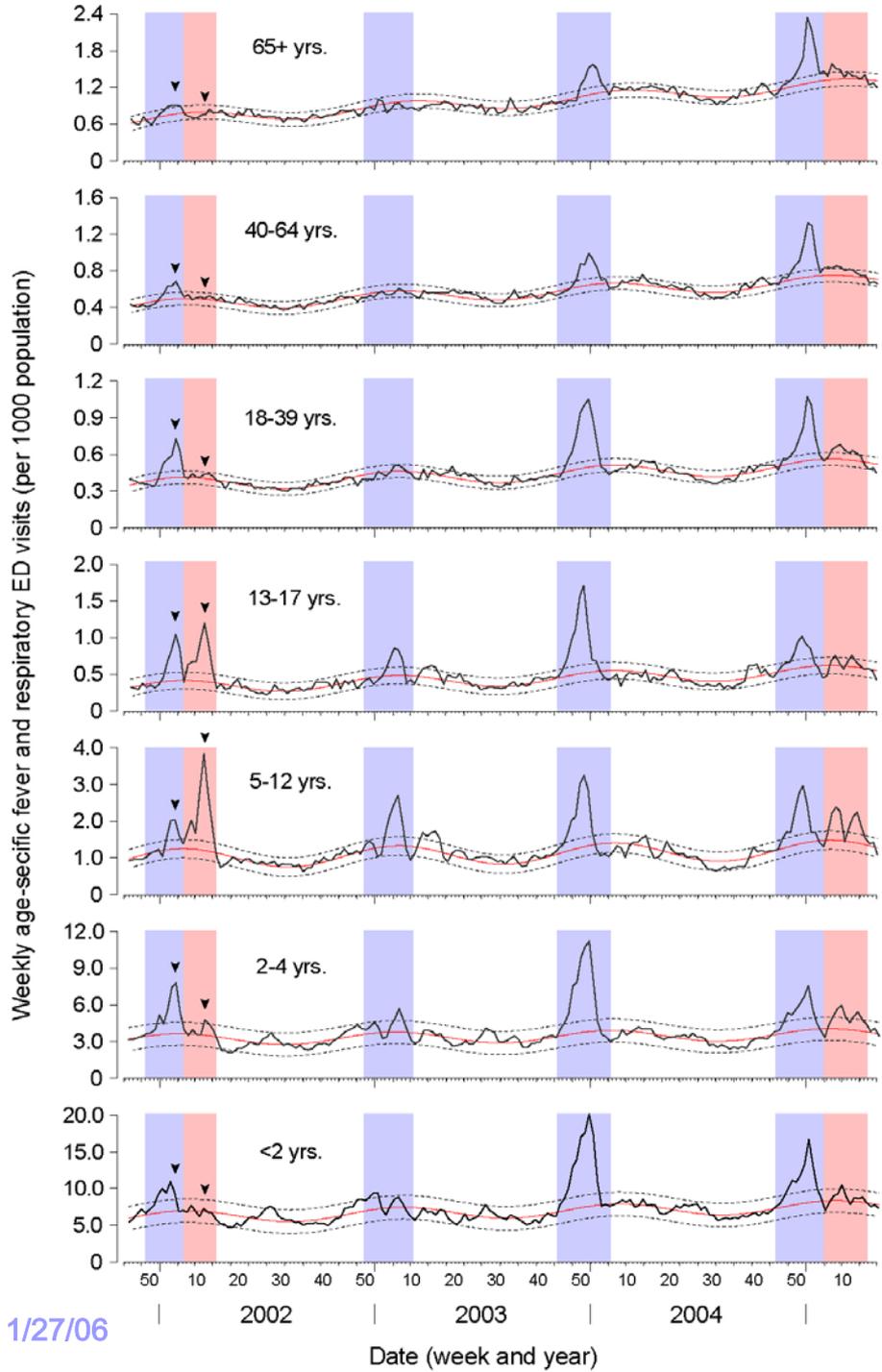
ED fever/respiratory chief complaint data in New York City

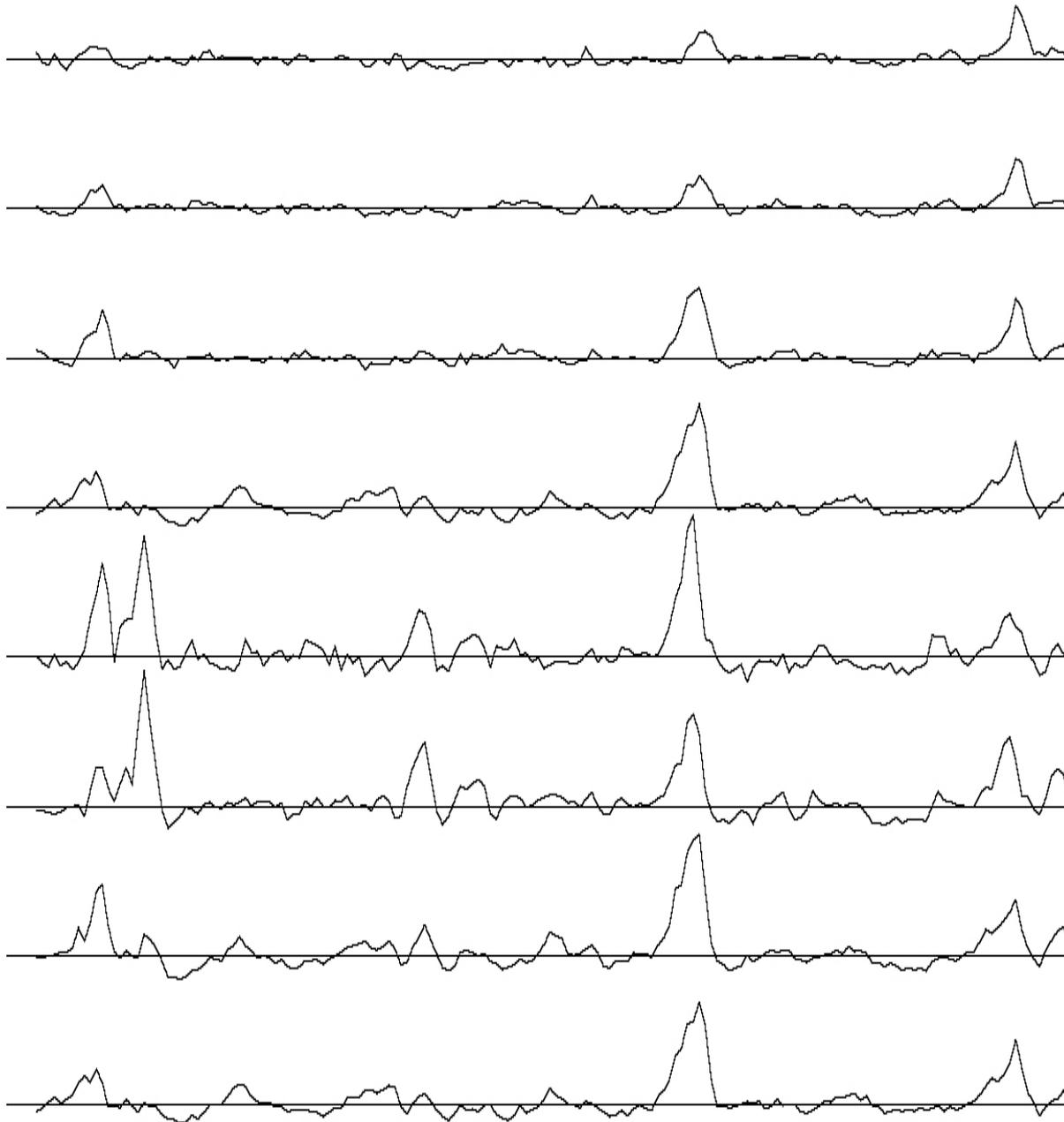
impact by Age



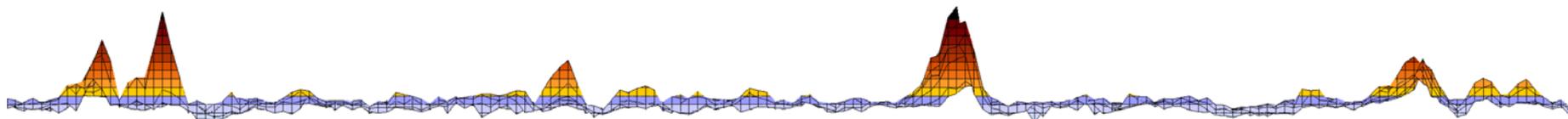
Weekly age-specific fever/respiratory ED visits
in NYC (rate per 1000 population)

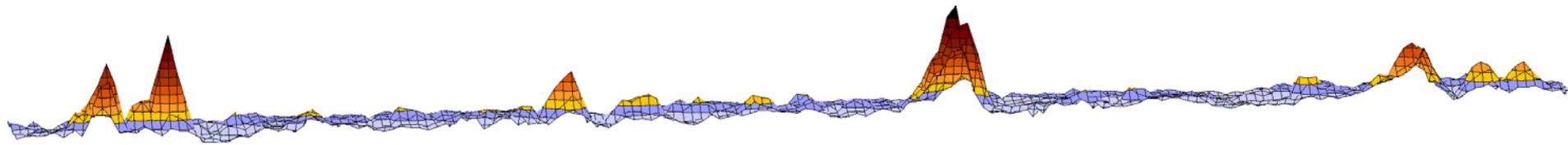


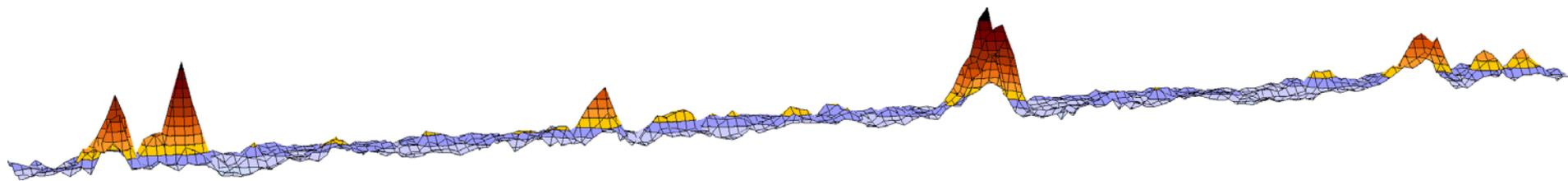


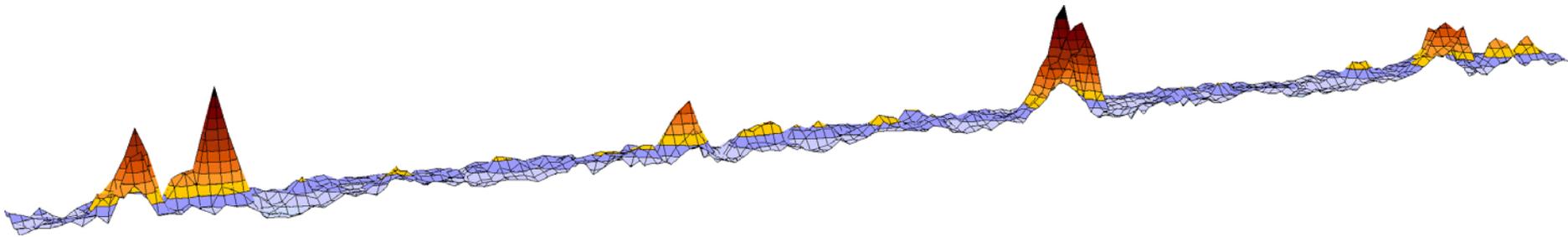


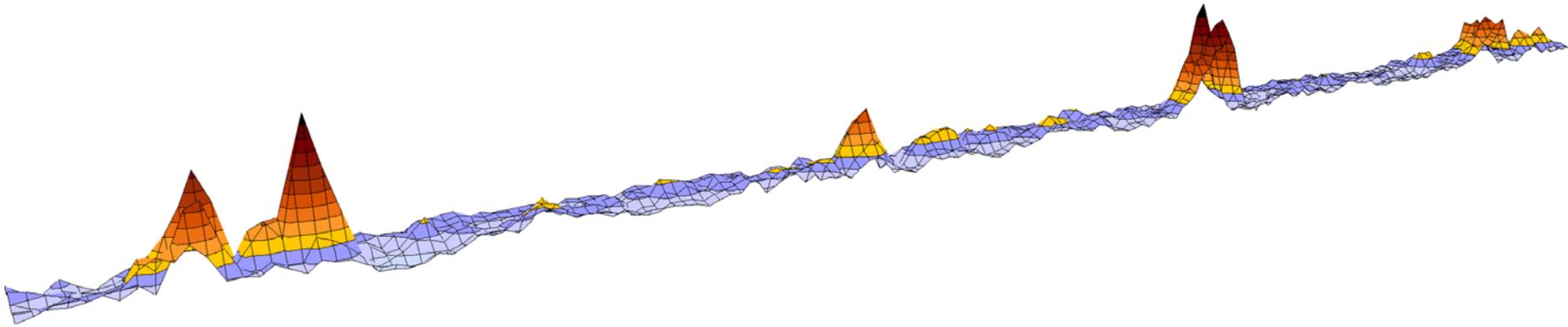


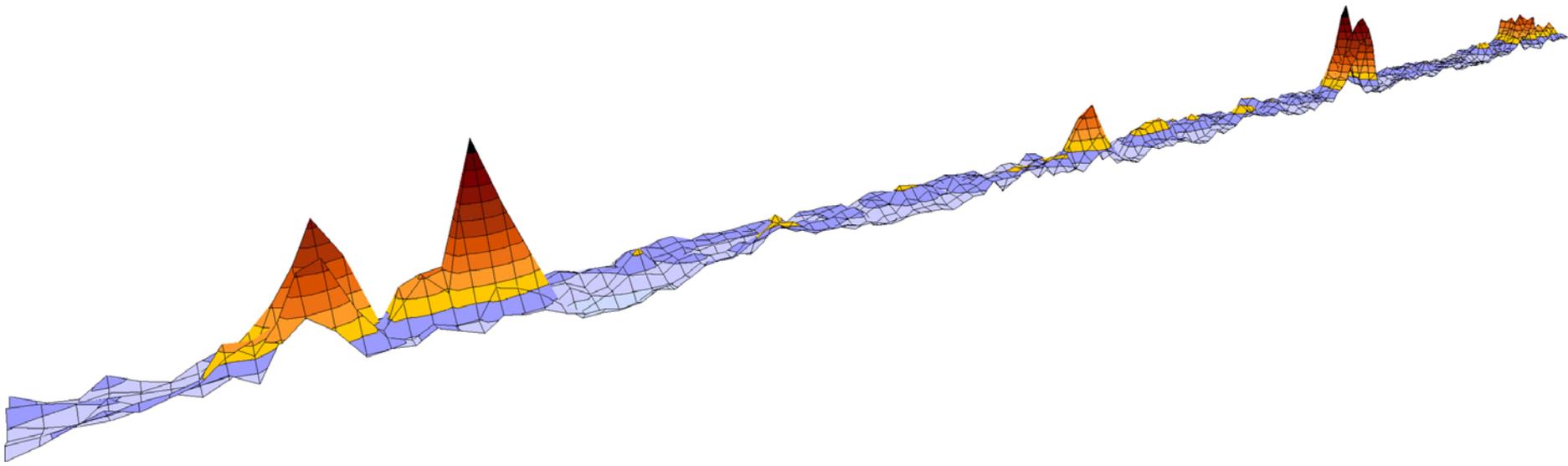


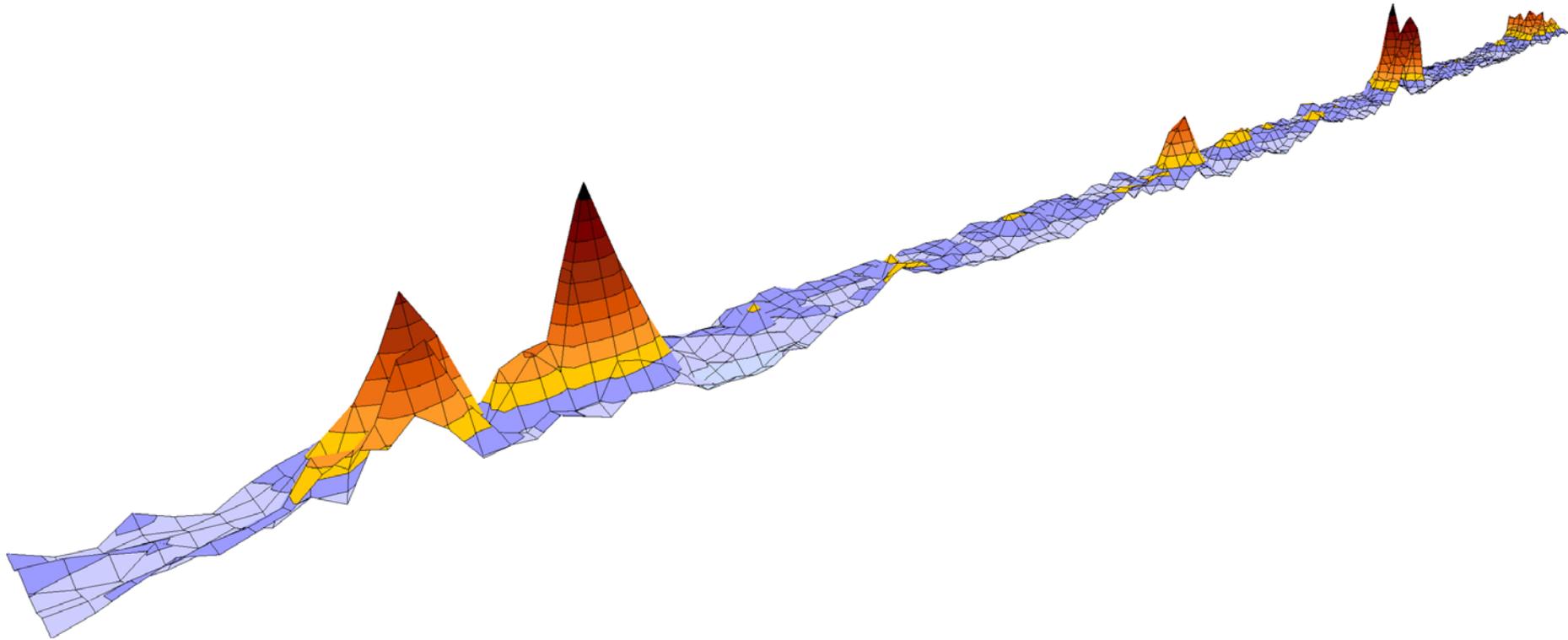


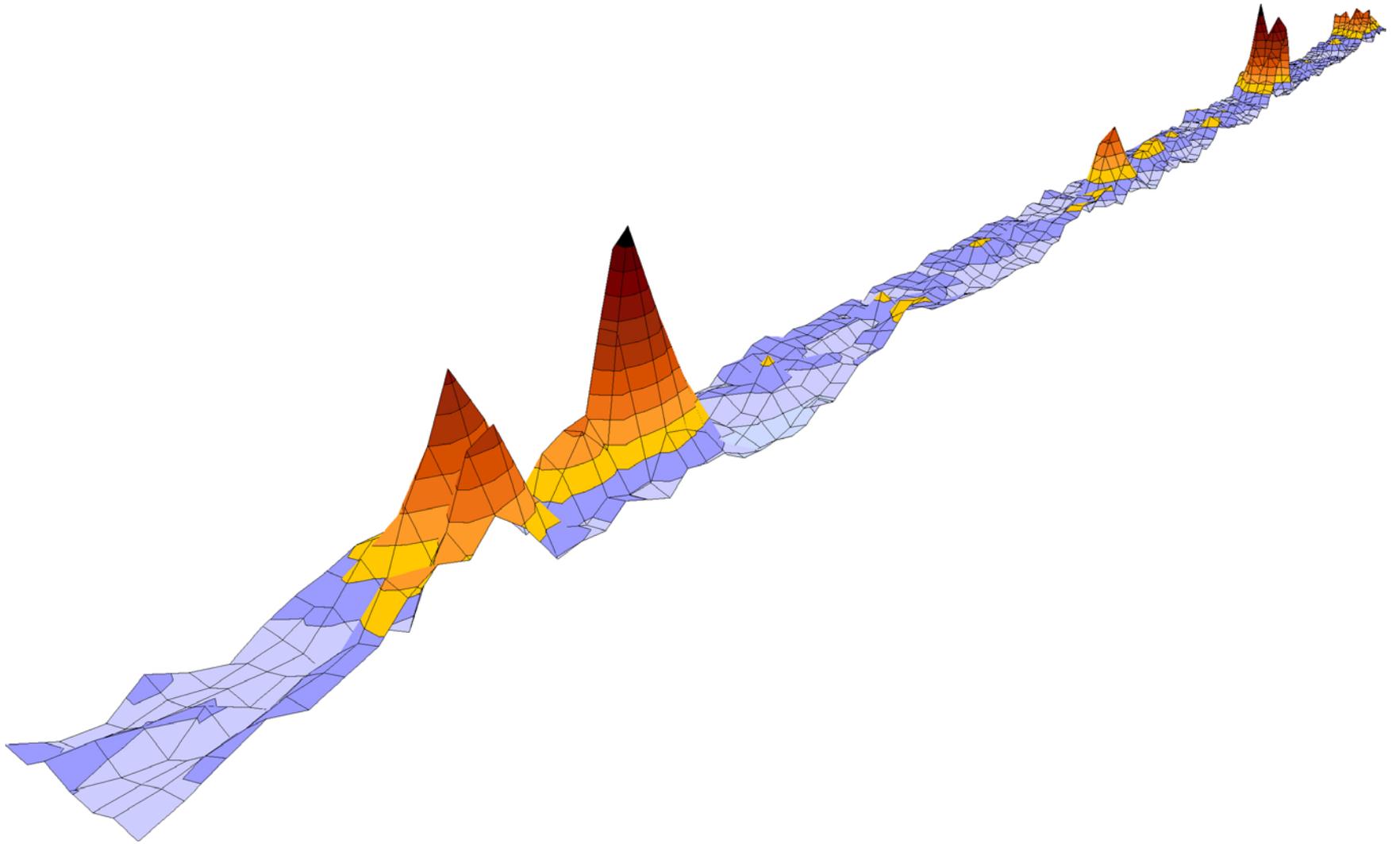


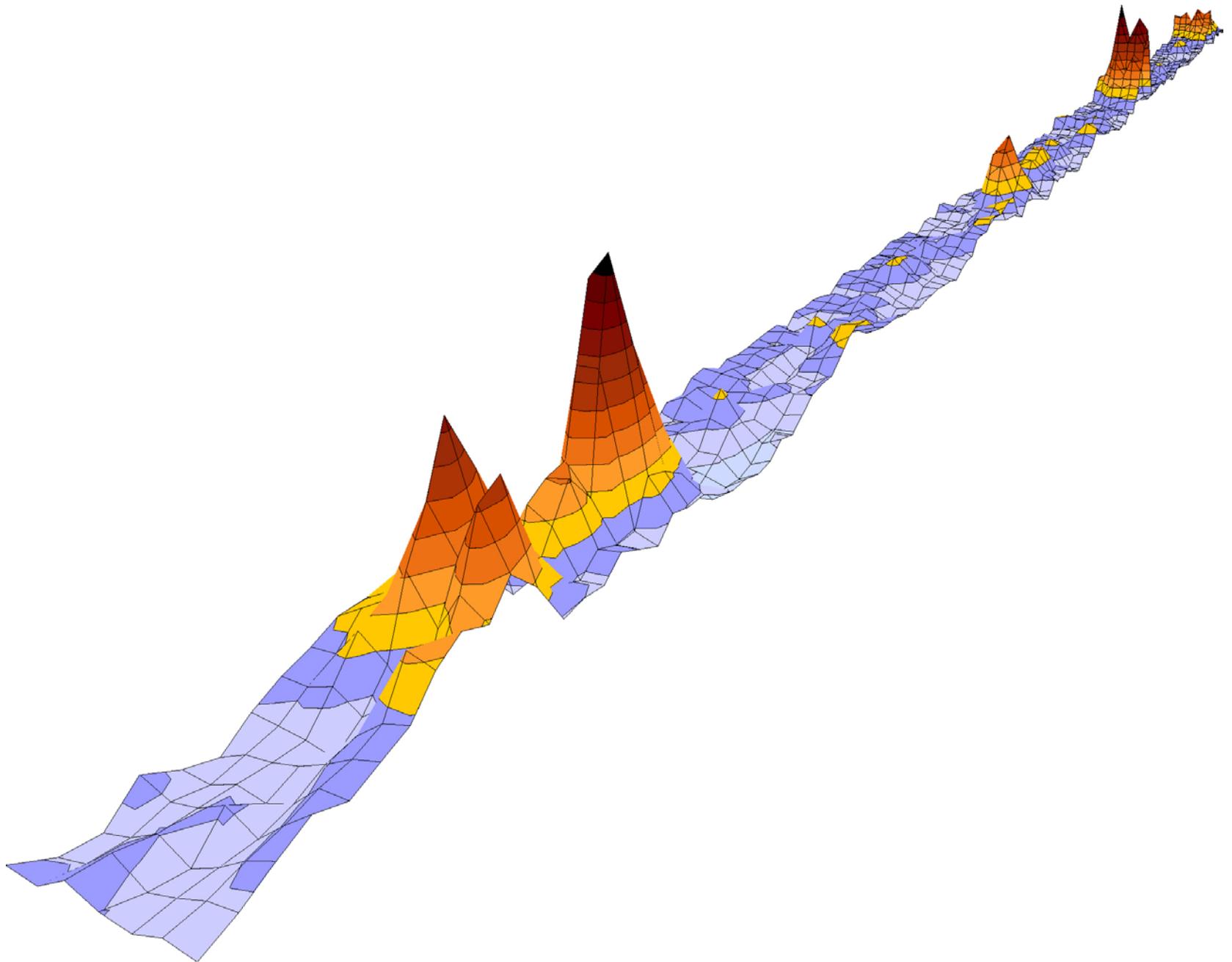


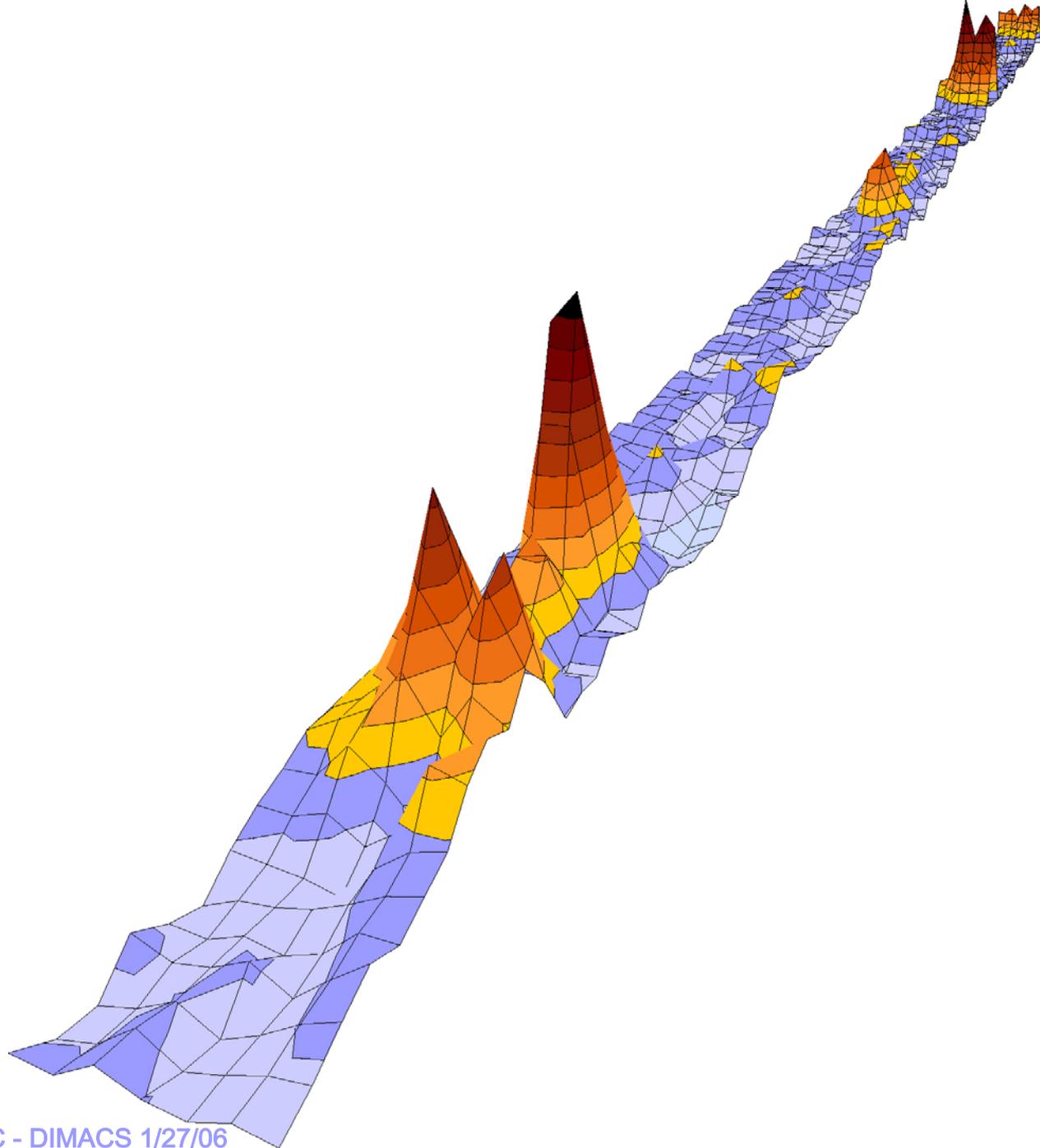


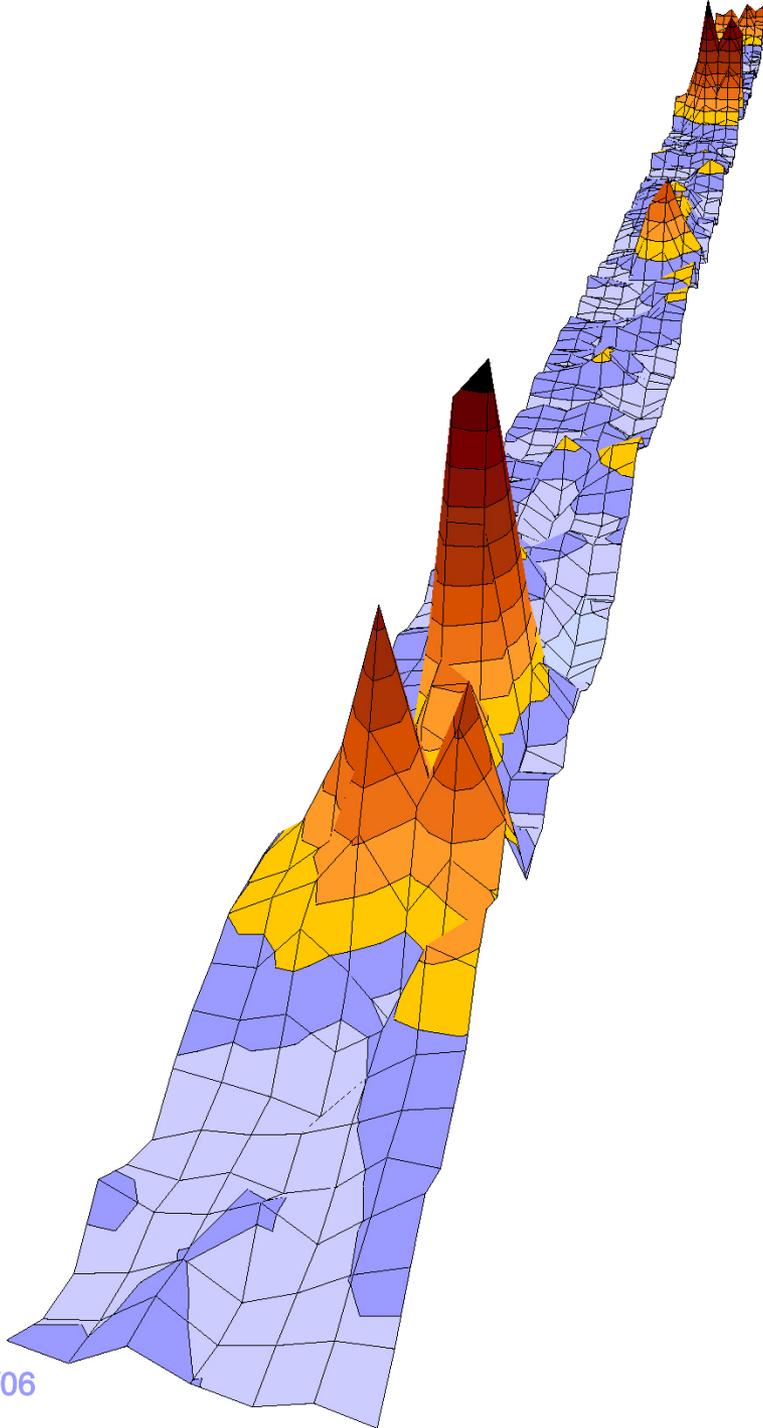


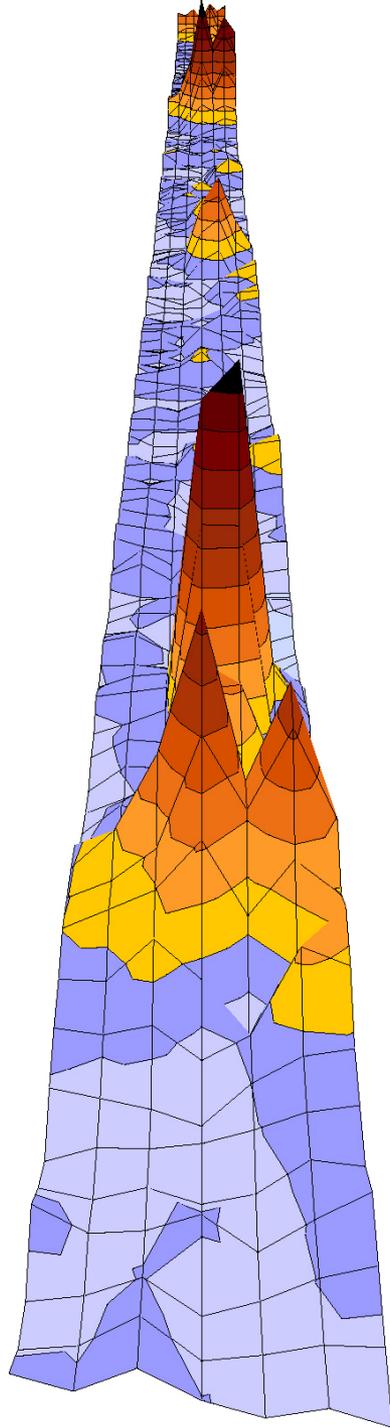


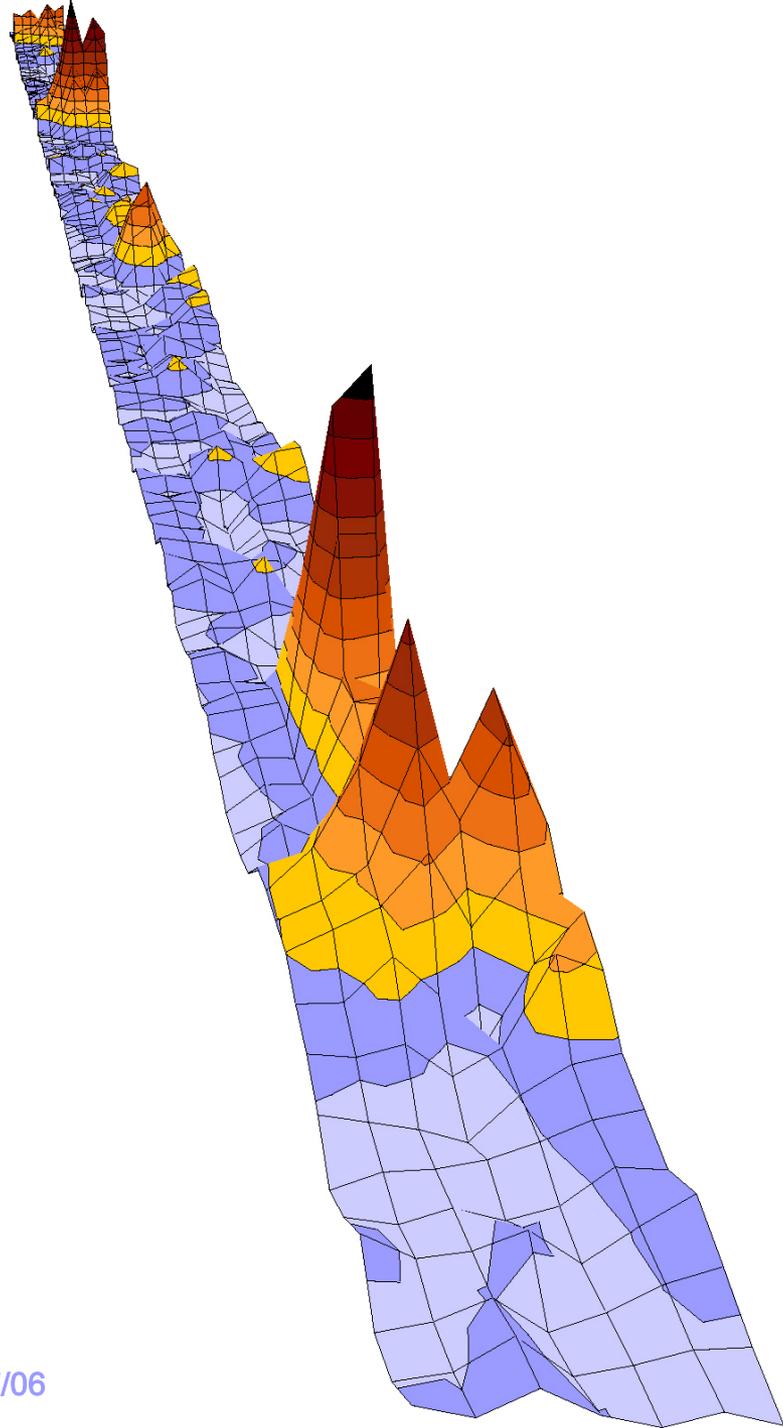


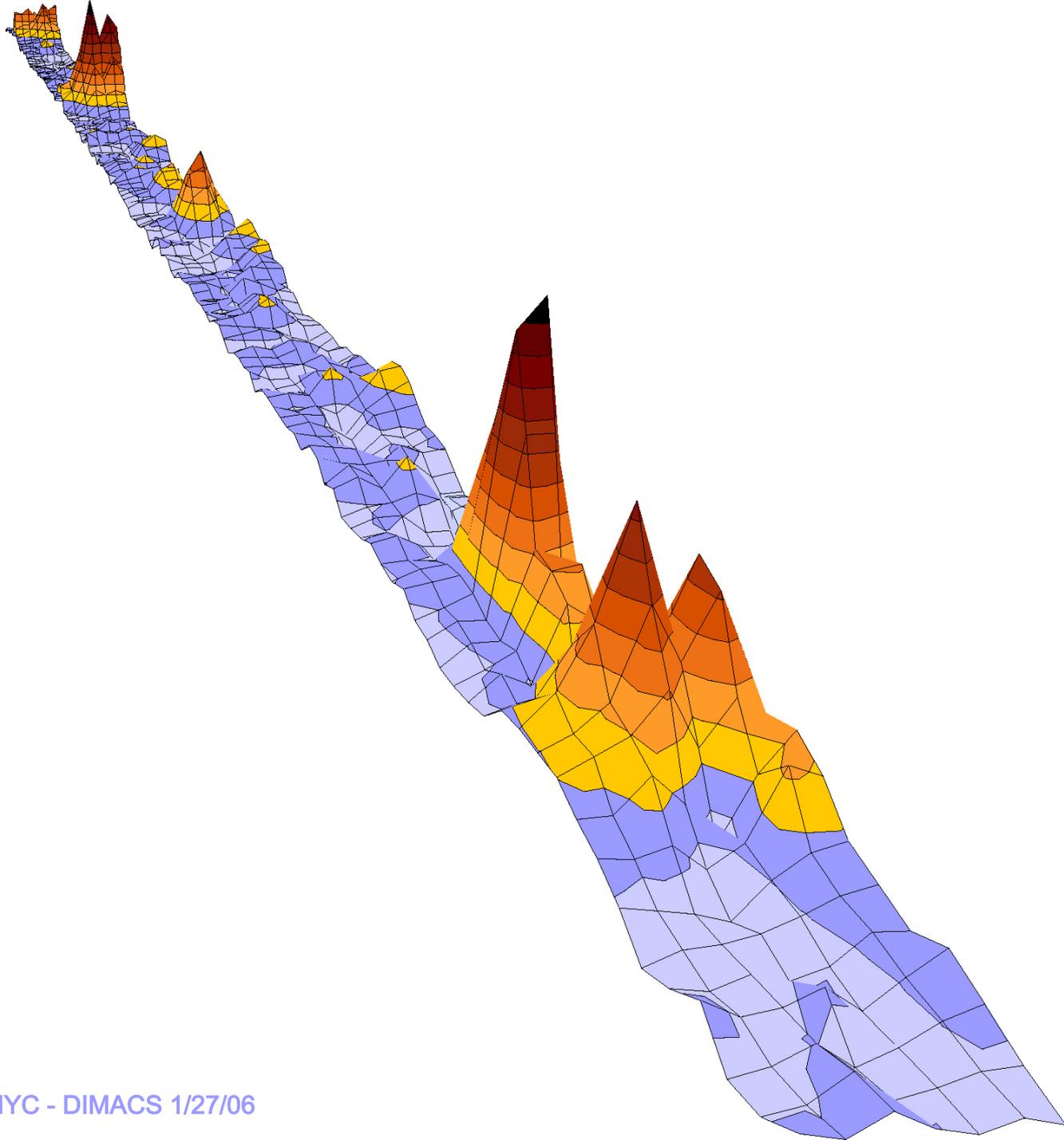


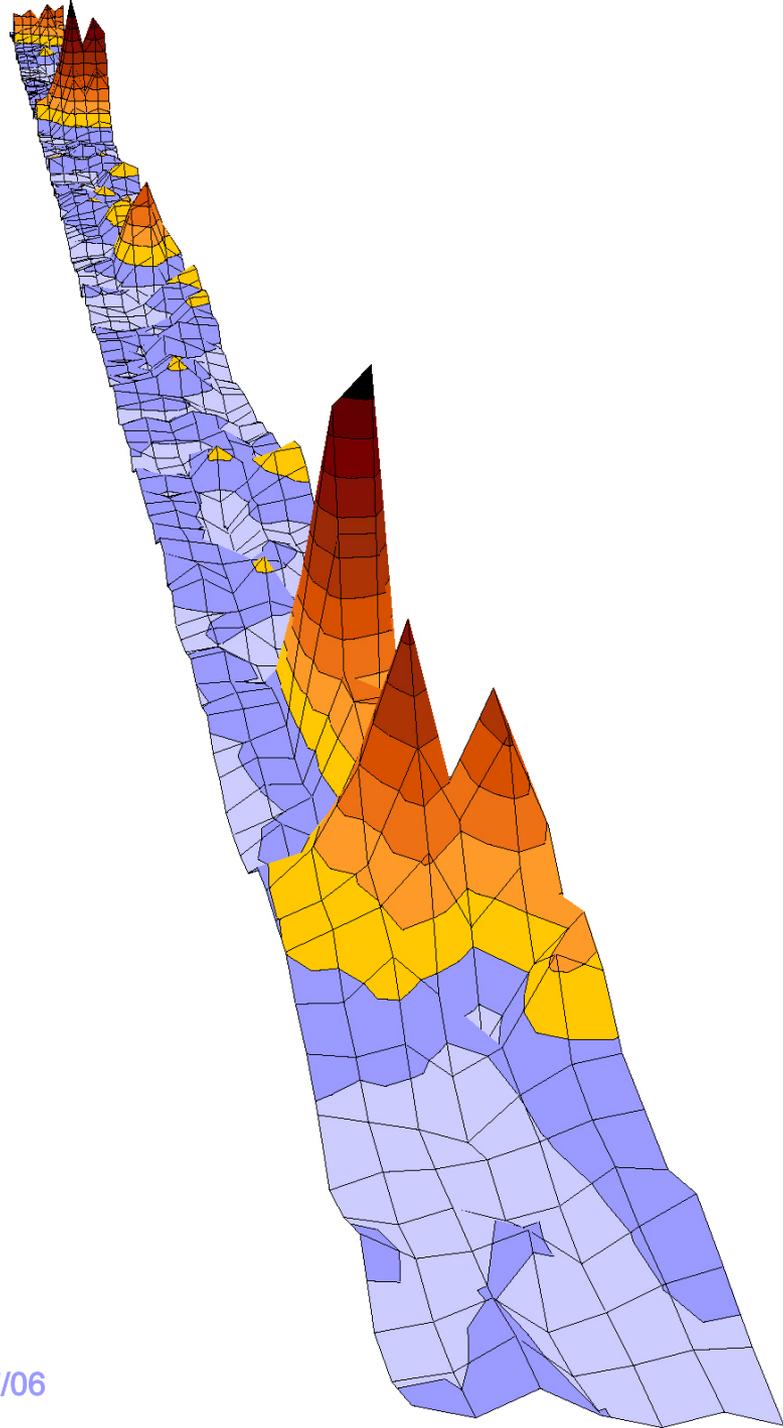


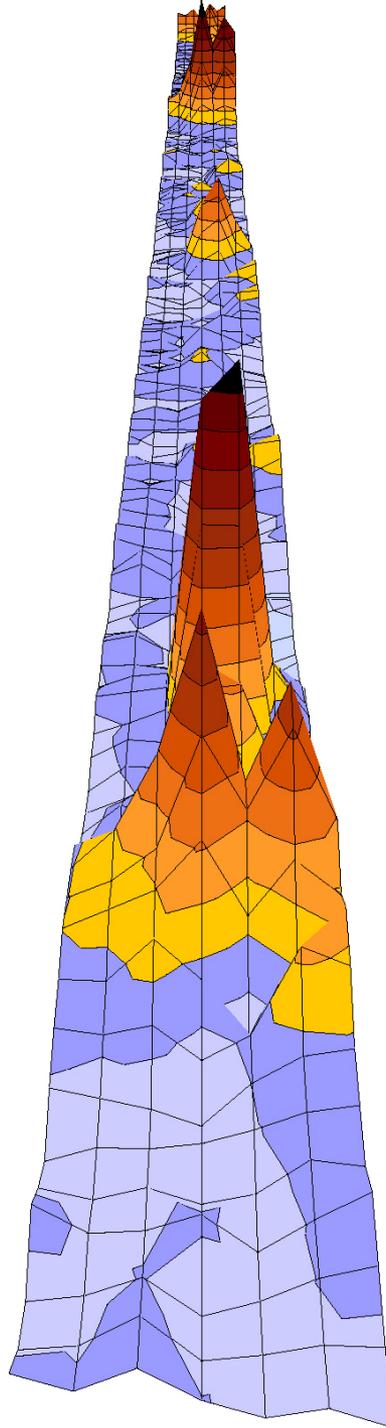


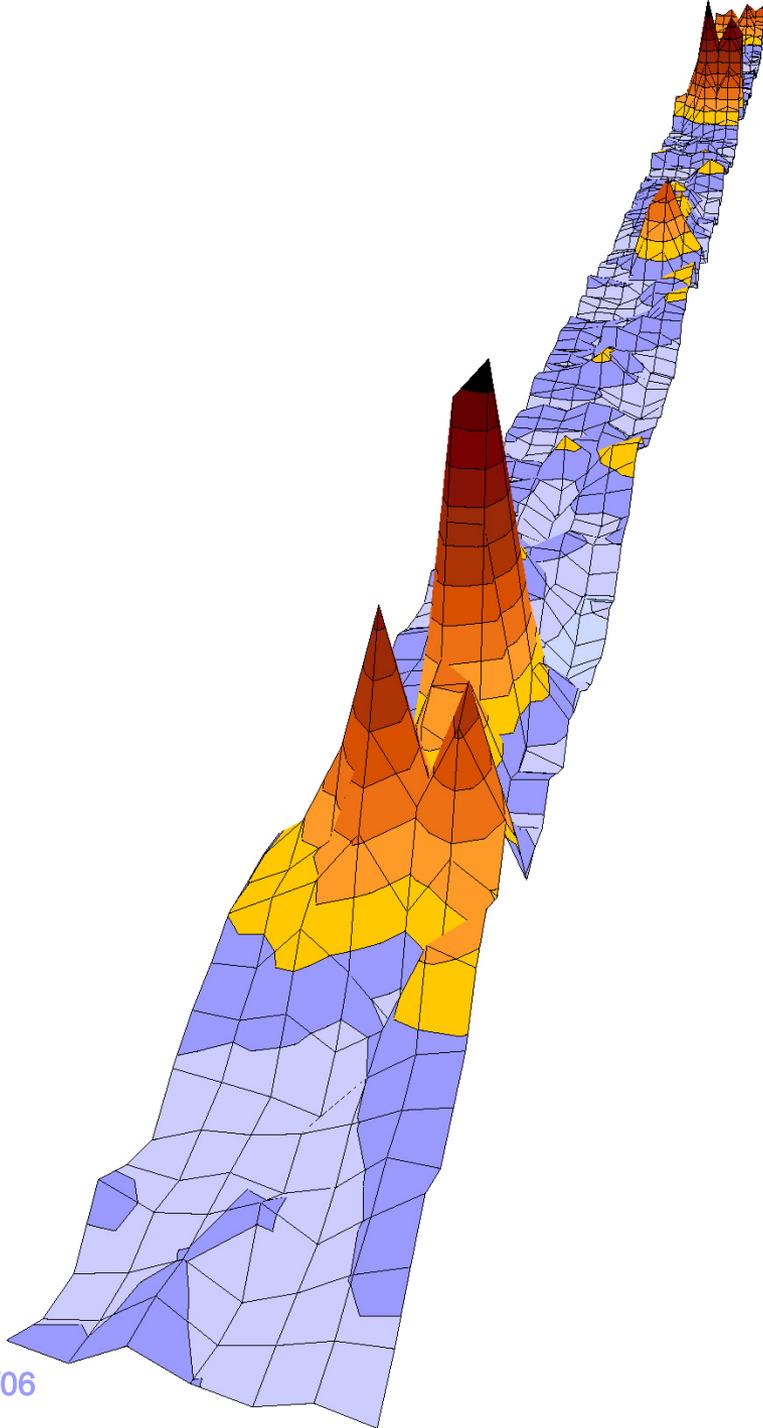


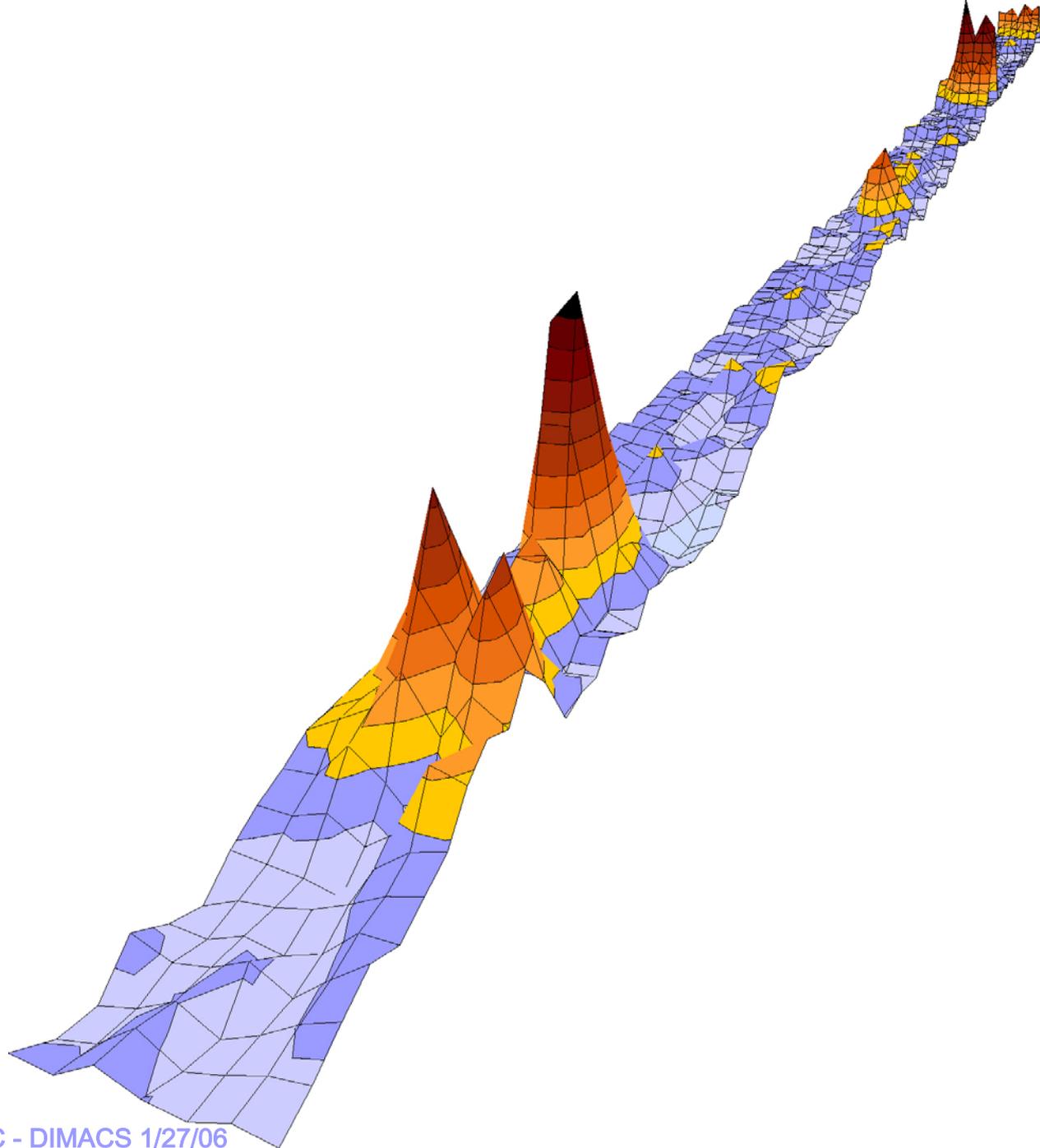


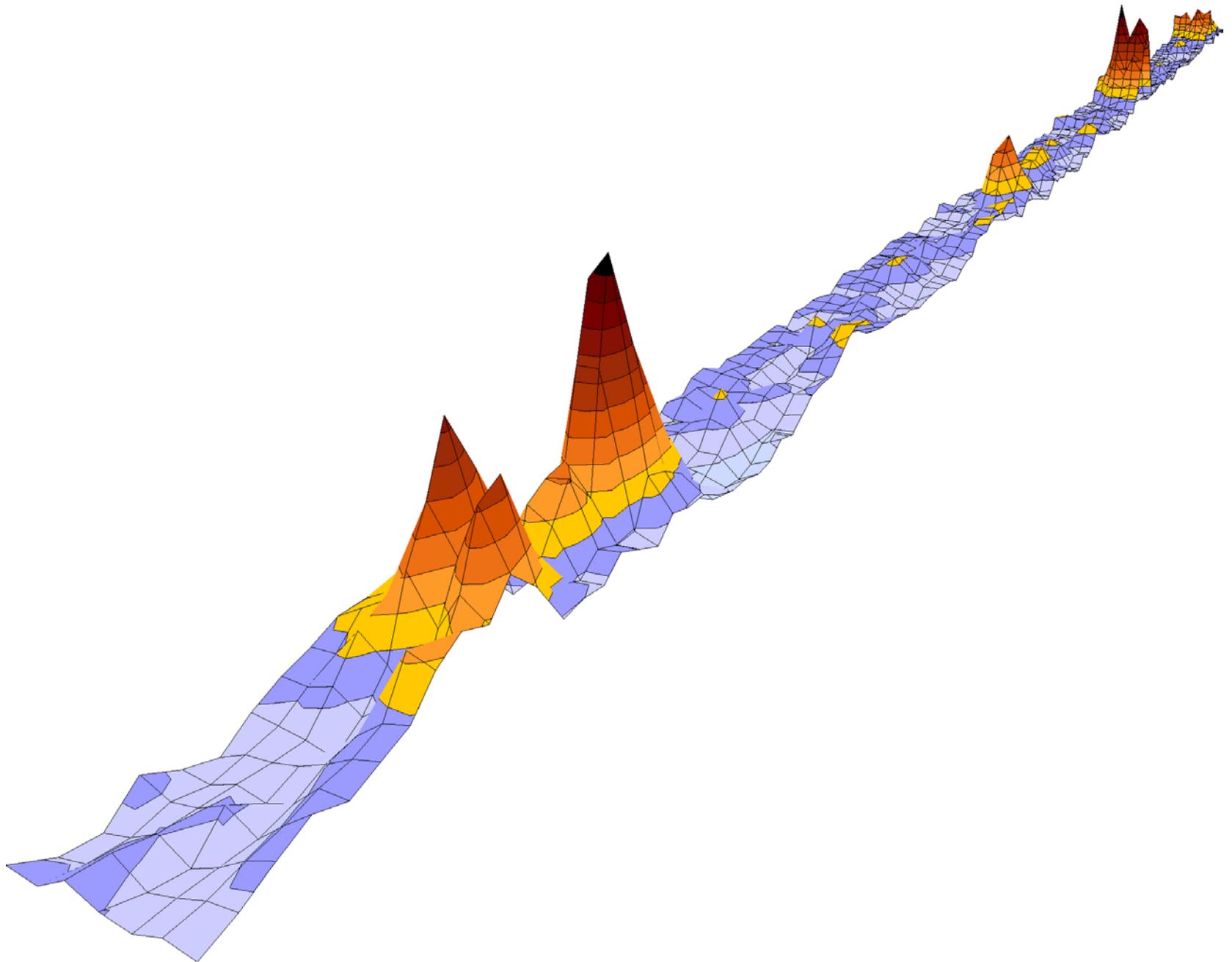


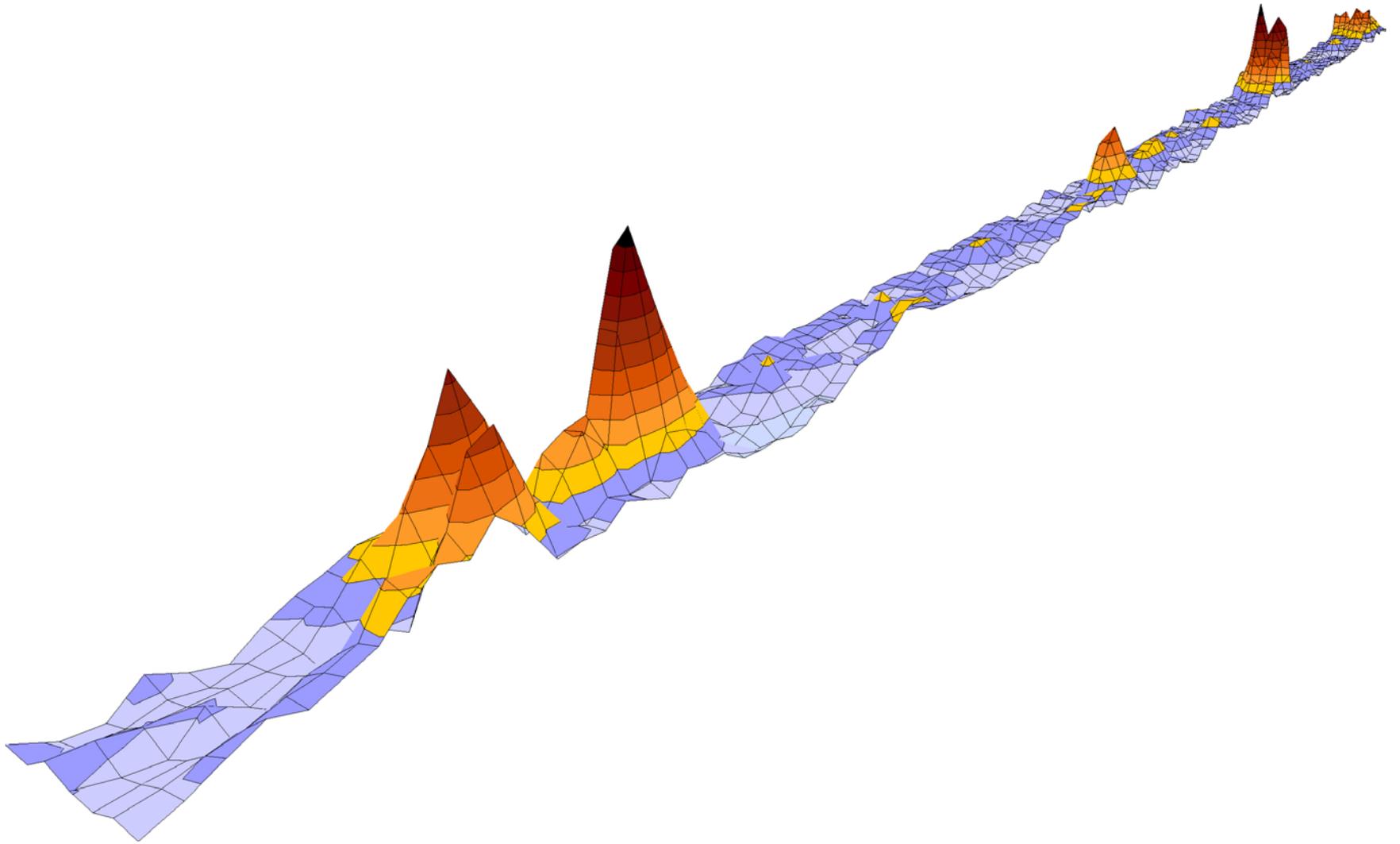


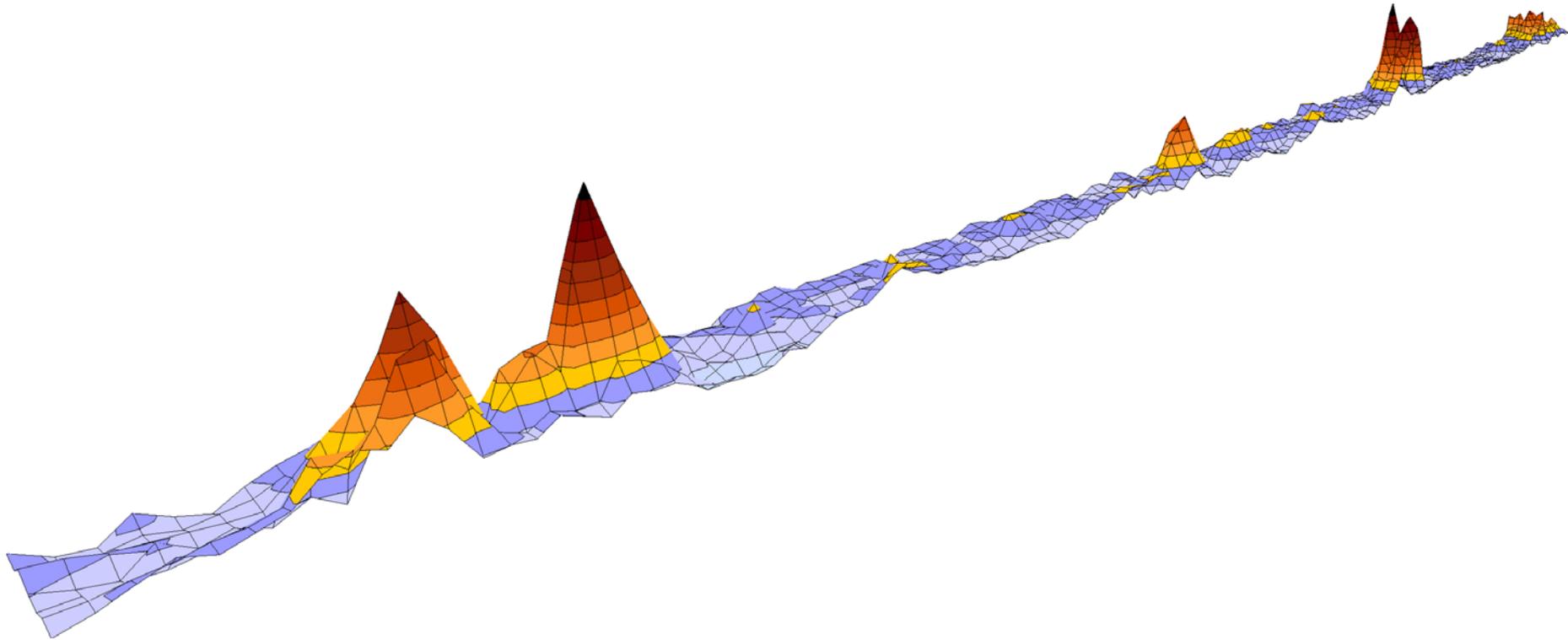


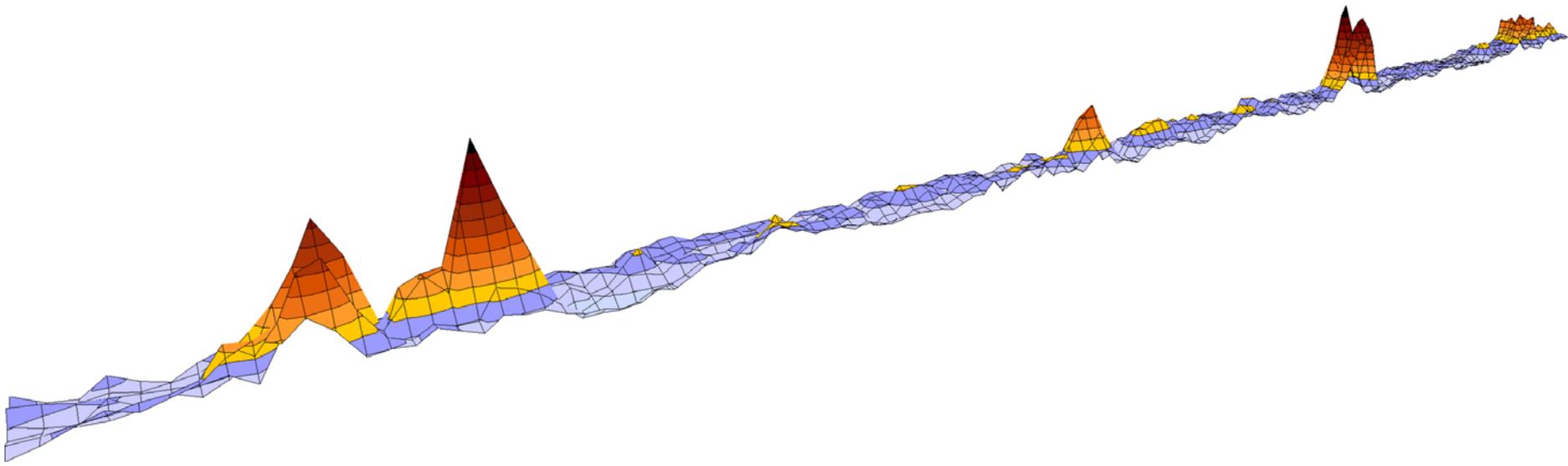


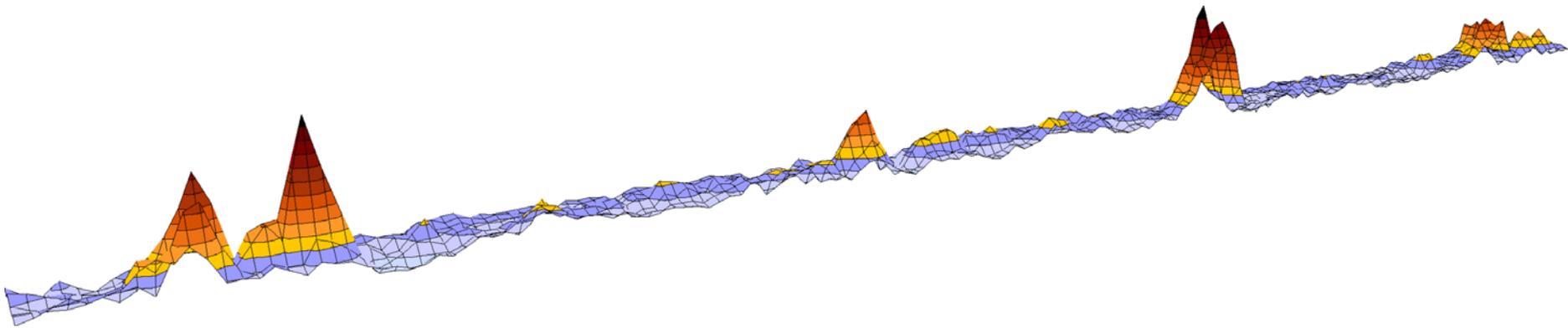


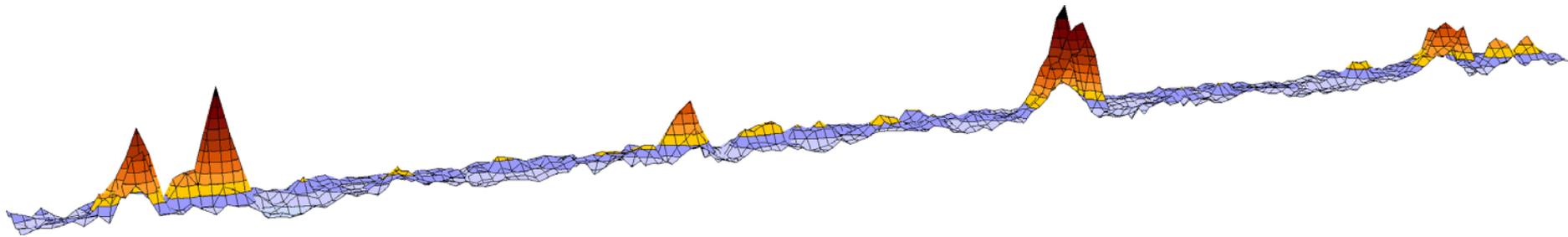


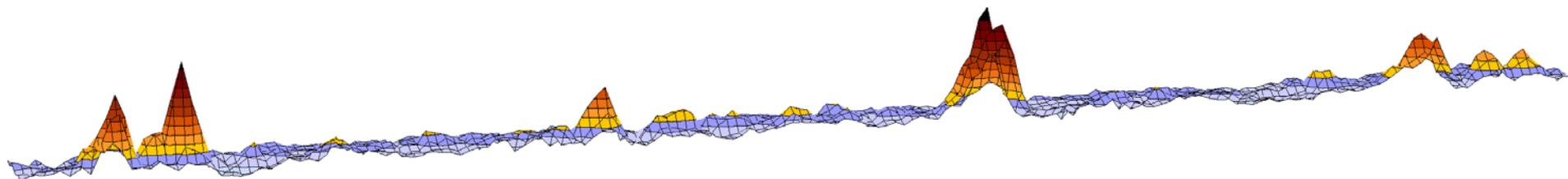


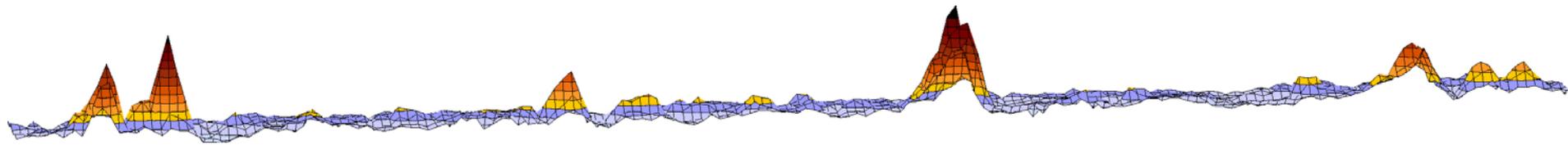


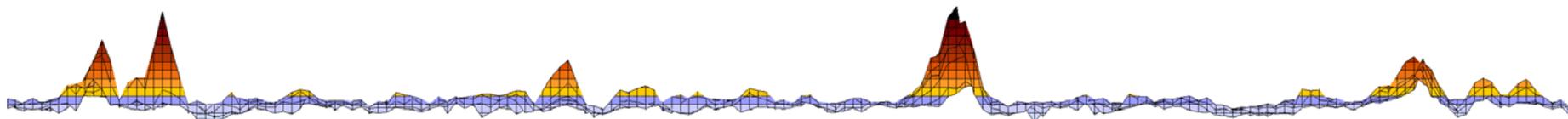


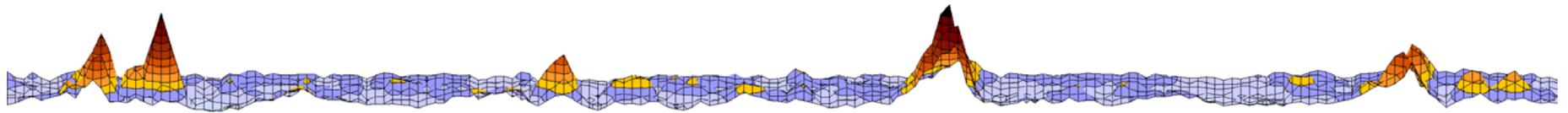


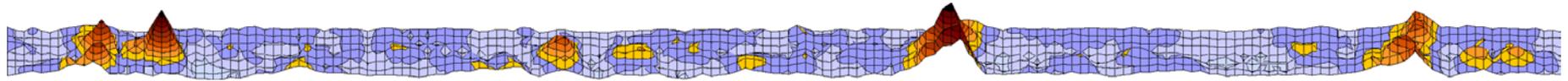


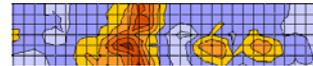
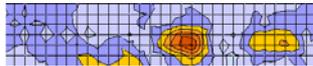
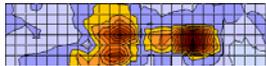




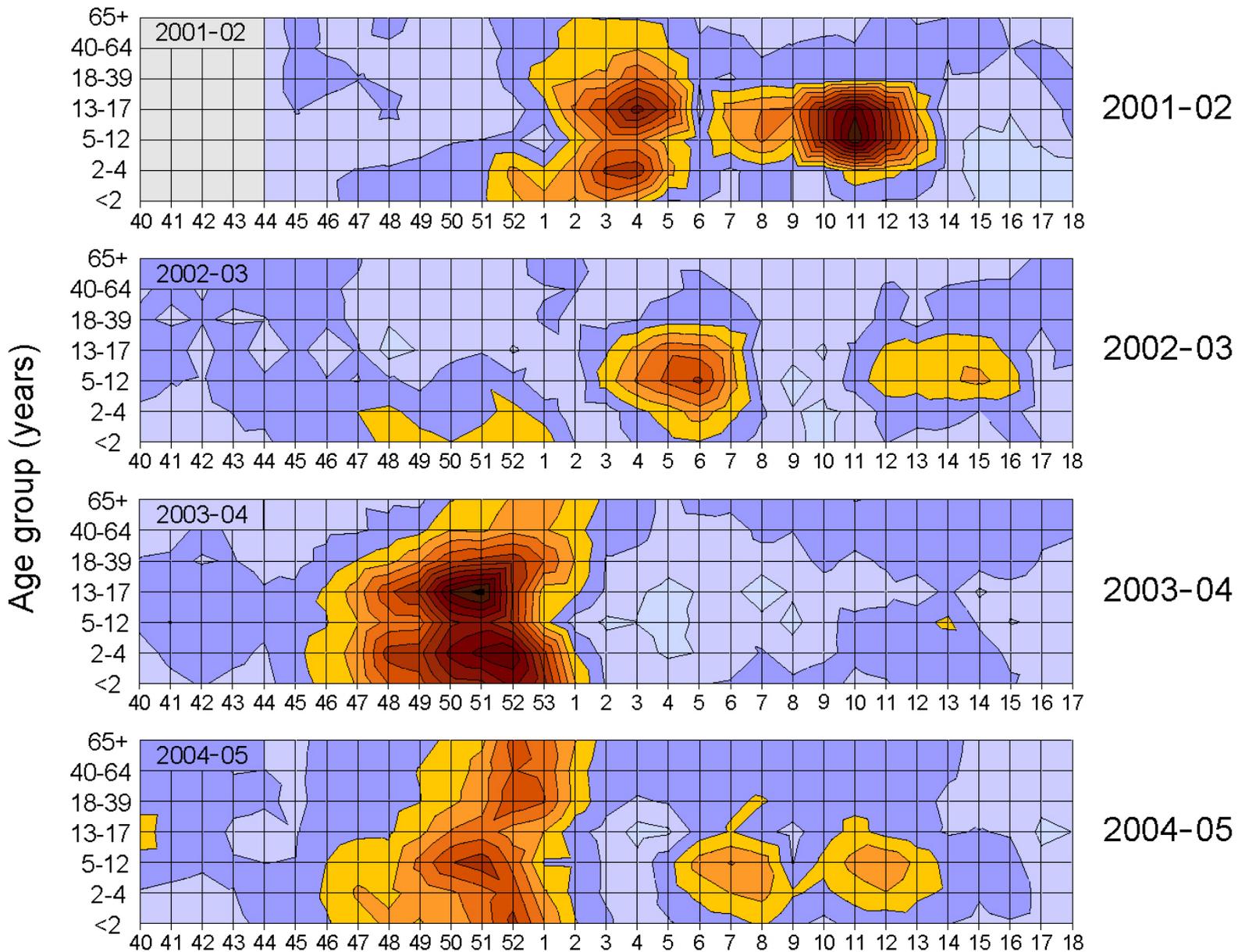


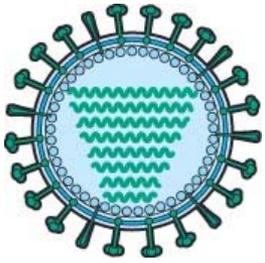






Relative Excess





FINDINGS

Syndrome data can be used to retrospectively describe

- impact by influenza season
specific to influenza type, subtype & strain
- impact within-season
consistent with early spread among kids

Acknowledgments

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