

THE INTERNATIONAL CRIMINAL TRIBUNAL  
FOR THE FORMER YUGOSLAVIA

Case No. IT-02-54-T

IN THE TRIAL CHAMBER

Before: Judge Richard May, Presiding  
Judge Patrick Lipton Robinson  
Judge O-Gon Kwon

Registrar: Mr. Hans Holthuis

Date Filed: 6 March 2002

THE PROSECUTOR

v.

SLOBODAN MILOŠEVIĆ

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PROSECUTION'S NOTICE OF ADDITIONAL FILING OF ADDENDUM TO  
EXPERT REPORT OF PATRICK BALL

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The Office of the Prosecutor:

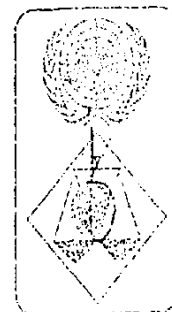
Mr. Geoffrey Nice  
Mr. Dirk Ryneveld  
Ms. Hildegard Uertz-Retzlaff  
Mr. Dermot Groome

Amicus Curiae:

Mr. Steven Kay  
Mr. Branislav Tapušković  
Mr. Michail Wladimiroff

The Accused

Mr. Slobodan Milošević



THE INTERNATIONAL CRIMINAL TRIBUNAL  
FOR THE FORMER YUGOSLAVIA

THE PROSECUTOR

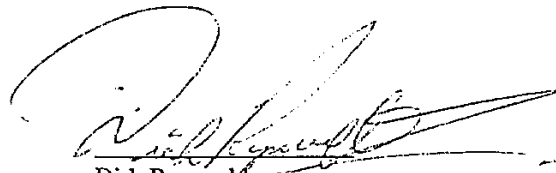
v.

SLOBODAN MILOŠEVIĆ

Case No. IT-02-54-T

PROSECUTION'S NOTICE OF SUBMISSION OF FOURTH APPENDIX TO  
EXPERT REPORT OF PATRICK BALL

On 15 February 2002, pursuant to Rule 94*bis*, the Prosecution filed the expert report of Dr. Patrick Ball. The expert report had three appendices. Subsequently, the Prosecution received an additional appendix to the expert report. Accordingly, pursuant to Rule 94*bis*, the Prosecution now submits the fourth appendix to the expert report provided by Dr. Patrick Ball.



Dirk Ryneveld  
Senior Trial Attorney

Dated This Sixth Day of March 2002  
In The Hague  
The Netherlands

## 1. Reexamining the killing-refugee flow correlation

We were asked by the Office of the Prosecutor (OTP) to review analysis done in Figures 8 and 9 (see pages 11 and 12, and subsections 5.1 and 5.2, respectively) of the report with respect to the relationship between killing and refugee flow.

To review, the analysis in Figures 8 and 9 examines the date with maximum killings or refugee flow (for each municipality) to determine if that date, or the immediately preceding date, corresponds to KLA or NATO activity. In each of the comparisons that were made (of KLA and NATO activity versus refugee flow and killings); we observed that in only a small number of municipalities did KLA or NATO activity immediately precede or coincide with the peak refugee flow and killing dates (in all comparisons, the number of municipalities in which the hypothesized causal factor was present immediately before the peak violence was 11 or fewer). In a far larger proportion of municipalities, KLA and NATO activity either occurred after the peak or occurred substantially earlier than the peak.

Accordingly, we concluded that there is no causal relationship between NATO and KLA activity on patterns of killings or refugee flow (see pp. 12-13).

This analytic technique (which we will call the *peaks-versus-presence method*) can show that a given pattern (the cause) was absent during the date when the proposed effect was at its maximum. If the hypothesized cause is absent from the period preceding the maximum, then the causal hypothesis should be rejected.

In an earlier section, our report hypothesized that killings and refugee flow occurred in distinct patterns indicating the existence of a common cause of both phenomena. The finding was based on the observation that the two phenomena tended to reach their highest and lowest levels at the same times; and furthermore, that the correlated rise-and-fall was consistent over the four regions we examined (see Figures 4-7, and the accompanying text, especially section 4.3). In this discussion, we noted that the correlation neither proves nor implies that killings caused refugee flow (or vice-versa).

### 1.1. Requested results

During a phone conversation last week, representatives of the OTP asked me to apply the peak-versus-presence method to the relationship between killing and refugee flow. The hypothesized relationship is that killings might have been a direct or indirect cause of the refugee flow. Thus we would expect that high levels of refugee flow would follow or coincide with killings.

We observe that in 20 municipalities (69%), the peak in refugee flows coincided with or occurred during the two-day interval following one or more killings. Similarly, in 24 municipalities (83%), the peak in killings coincided with or occurred during the two-day interval prior to recorded refugee flow.

Note that the number of municipalities in which the peak-versus-presence method observes a "presence before the peak" for the killing-refugee flow relationship is approximately double the number found for KLA or NATO activity. This observation is consistent with our original conclusions that killing and

refugee flow are correlated, and that KLA and NATO activity are not plausible explanations for killing and refugee flow. However, we caution that these observations are *not* confirmation that killings caused refugee flow.

## 1.2. Discussion

The peaks-versus-presence method is adequate to reject a hypothesis that two patterns are causally related, but the method is insufficient to imply positively that the series are linked causally.

To illustrate this idea, consider the following example. Imagine that we measured whether the sun rose one or more times in each two-day period in each municipality. Note that the "rising sun" measure would have a "presence" before every peak of killings or migration. With the peaks-versus-presence method, we could not reject the hypothesis that the sun's rise caused killing or migration. The failure to reject the hypothesis that the rising sun causes violence does *not* imply that we should confirm this hypothesis.

It would be fallacious to argue beyond the failure to reject the hypothesis that the rising sun causes violence. The "presence-versus-peaks" measure may fail to reject some false hypotheses. Even so, when the method indicates that a hypothesis should be rejected, it is a convincing test. If a hypothesized cause has not occurred before the maximum point of the hypothesized result, it is reasonable to reject the causal hypothesis.

The "peak-versus-presence" measure is crude: it considers only the effect of the hypothesized cause on the hypothesized result at the time of the result's maximum (the peak). Its primary value is that it allows us to reject some false hypotheses. The primary drawback of the "peaks-versus-presence" method is that it considers only the effect of hypothesized cause on the hypothesized effect at the time of the effect's peak or maximum point.

A subtler and more finely-grained evaluation examines the simultaneous correlation of all the variables proposed as causes with the variable proposed as the effect over each of the points in time. This more thorough measure — given in Section 5.3 — includes more information about the process because we include the estimated total killings (not just the simple counts) and the bombing and KLA information together, all compared over all the two-day periods for each region. The consequent analysis shows that even in this more rigorous test, the overall effect of KLA activity and NATO airstrikes does not much change the killing and refugee flow patterns (see Figure 19, p. 58, in the report for the regression equations and statistics).

## 2. Considering the independent effects of NATO and KLA activity on killing and migration

The second request from the OTP is to re-run the analysis of residuals shown in Appendix Two, Figures 19-21, looking separately at the effect of NATO bombing and KLA activity. As is clear in Figures 1-4 below, the effect of the analyses separately is no different from the analyses together.

### 2.1. Technical note on the unit of analysis

The regression equations predicted refugee flow and killing using regional dummies and lagged terms, following the structure described in the second and

fourth columns of Figure 19, page 58, in the report. The units of analysis are two-day periods by regions. We note explicitly that on page 57, the report mis-specifies the unit of analysis for Figures 20-21 and for the underlying regression equations (as six-day period by region). The killing data were estimated for six-day period and spread to two-day periods as described in Section 3.5 (pp. 50-51).

## 2.2. Findings and discussion

The statistical patterns in neither KLA activity nor NATO airstrikes explain enough variance in the killing or migration patterns to create random residuals. If the statistical patterns in KLA activity or NATO airstrikes were correlated strongly with the patterns of refugee flow or killings, the residual pattern would resemble noise — it would be random — because the underlying pattern would be fully explained. The formal measure of the amount of the pattern which has been explained is the  $R^2$  statistic. The maximum  $R^2$  value in the underlying regression equations for the figures below is a modest 0.12. The residuals closely track the original killing and refugee flow patterns over time. The close connection between the residual and the original patterns indicates that the regression equation that generated the residuals did not explain the pattern in the original data.

The two exceptions are the KLA residuals regressed against refugee flow in the northern and eastern regions during the later part of Phase 1 (evident in Figure 2, below). These exceptions are thoroughly discussed in the text of the original report (see p. 14 and p. 59).

With these exceptions, we note that the findings rejecting KLA and NATO activity as causes for killing and refugee flow are consistent using different methods (presence-versus-peak and regression) and across different levels of time and space (municipality by two-day, overall by two-day, and region by six-day).

Figure 1: Estimated total refugee flow and residuals over time (bombing)

Estimated refugee flow and residuals (bomb) by region over time

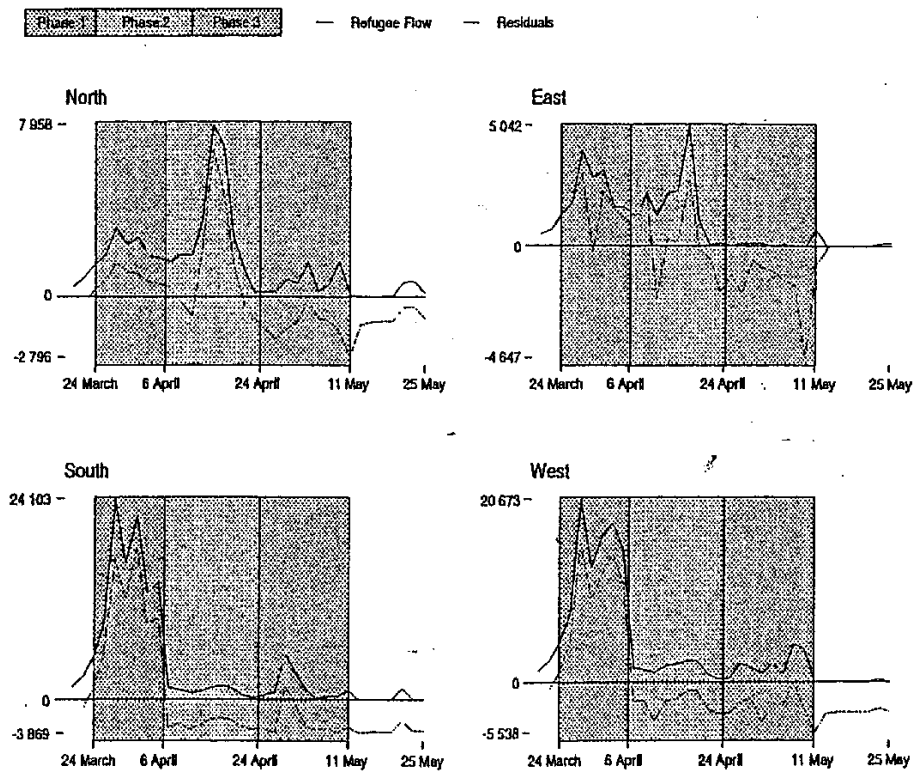


Figure 2: Estimated total refugee flow and residuals over time (KLA)

Estimated refugee flow and residuals (KLA) by region over time

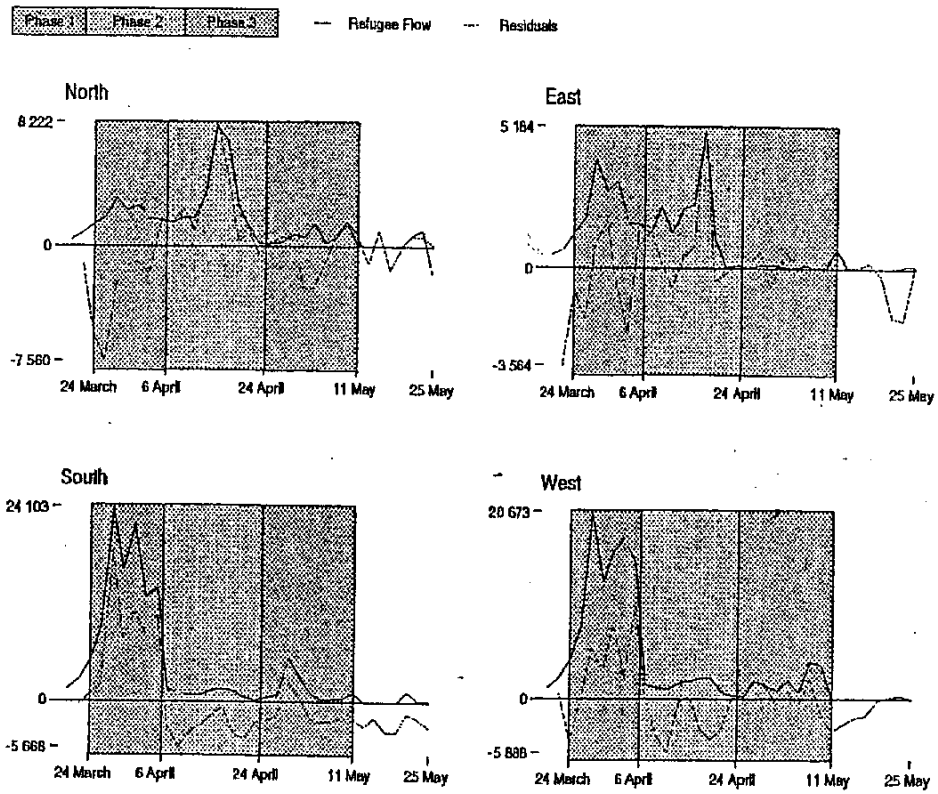


Figure 3: Estimated total killings and residuals over time (bombing)

Estimated total killings and residuals (bomb) by region over time

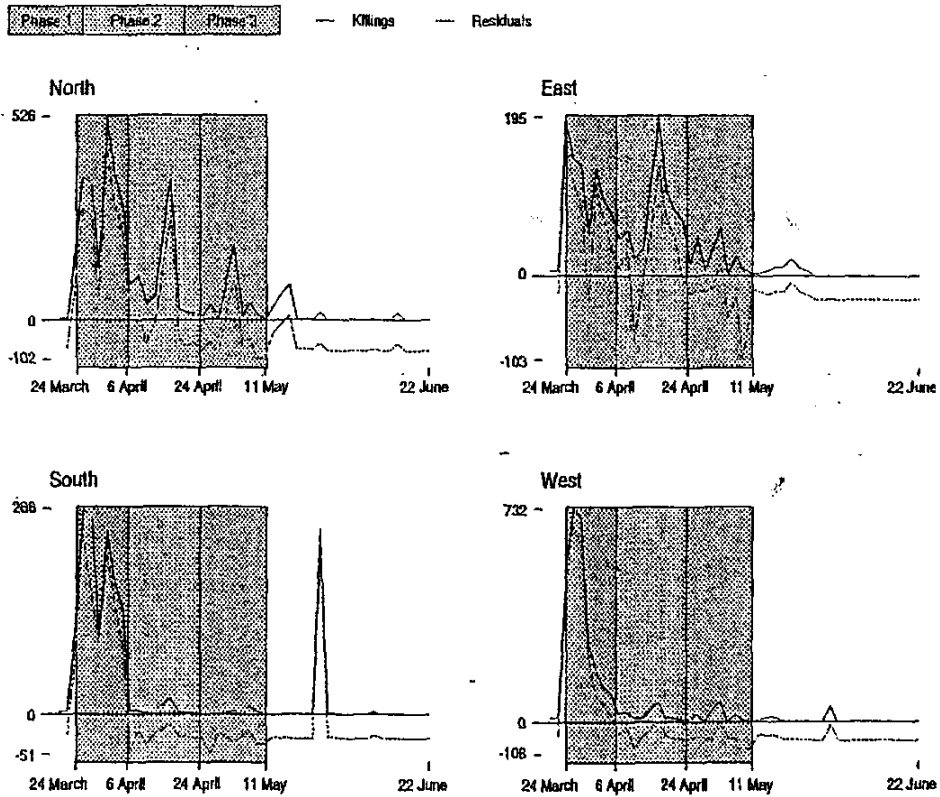


Figure 4: Estimated total killings and residuals over time (KLA)

Estimated total killings and residuals (KLA) by region over time

