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# Piecewise regression of semi logaritmic plotting: a method to represent and analyse dynamics of epidemics

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## Introduction

The objective is to describe the complex temporal dynamics of seasonal epidemics. The method is based on the fact that the semi-logarithmic plotting of the ascending phase of an epidemic - when the increase in the number of cases is exponential - becomes linear

### 1. Methods

After semi-logarithmic plotting, daily time series are broken into segments by piecewise regression. Coordinates (time and incidence) of the breakpoints and the slope ( $\alpha$ ) of each segment are then determined. The daily transmission rate (Rd) equals  $\alpha$  +1.

The method is applied retrospectively to the 2010 to 2014 ILI in France series.

### 2. Results

From July to mid-November, the dynamics of the four years are similar. Later, two subgroups are observed. Years 2010/2011 and 2011/2012 have only one ascending phase starting mid-November and ending at the peak. Years 2011/2012 and 2013/2014 show two rapidly ascending phases interspersed by a slowly ascending phase.

#### 3. Discussion

Cross-analysis with virological surveys is needed to better understand the biological sense of breakpoints. Using this method in real-time requires a real-time monitoring system able to estimate low incidences in with accuracy. The method is implemented on www.OpenHealth.fr and will be used in real-time during the 2014-2015 season.

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