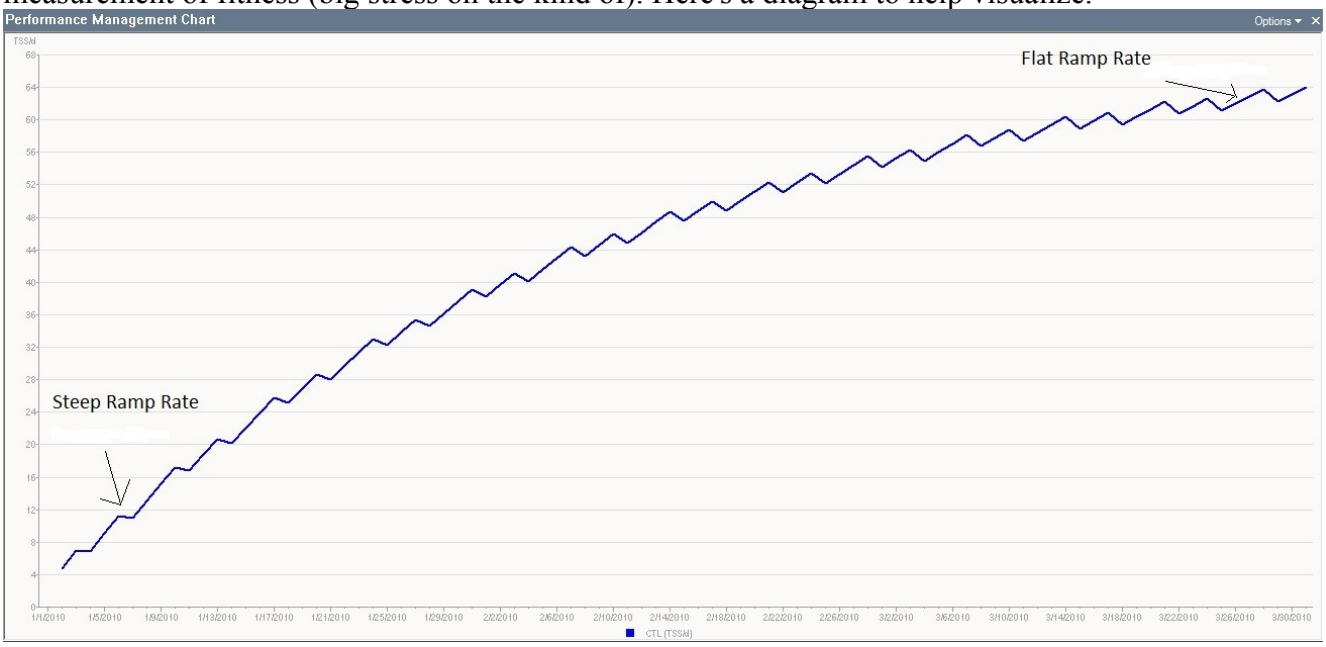
Performance Management Chart, What does it all mean and how does it relate to performance?

Last month I wrote about Training Stress Score, this month I want to build on that and discuss one of the more important charts in Trainingpeaks, the Performance Management Chart (PMC) The PMC graphs 3 critical and interrelated variables: Chronic Training Load (CTL), Acute Training Load (ATL), and Training Stress Balance (TSB). When ride data is uploaded daily this chart provides very powerful information about workload and performance. So what does CTL, ATL, and TSB mean and why should you (or your coach) care?

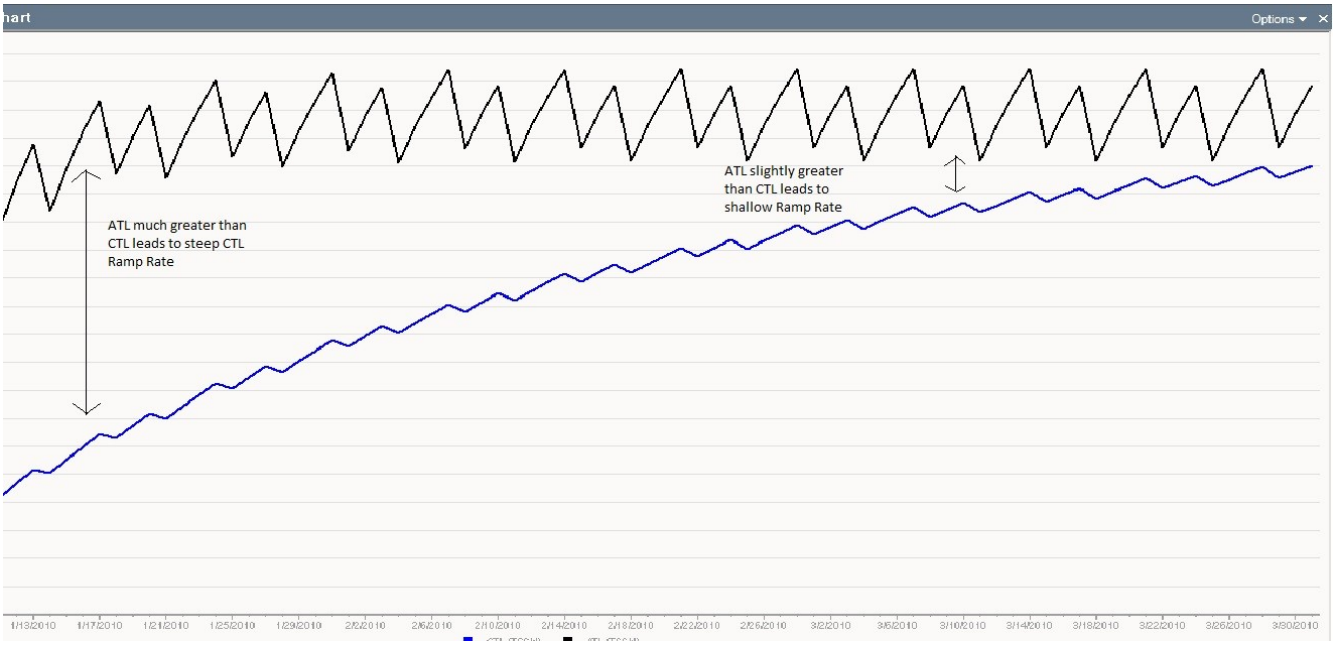
Before we jump into the definitions, make sure that your threshold power is correct. The majority of the metrics in trainingpeaks are ultimately anchored to threshold power, and if this is set incorrectly, most of the data is useless.
Okay, let's look at the three variables the performance management chart graphs:

Chronic Training Load is the overall workload (frequency, intensity, and duration) the athlete has performed over a sustained amount of time. It is a rolling, weighted average of daily TSS (training stress score). If an athlete goes from not riding at all to riding 2 hours a day, 5 days a week, for 3 months, his CTL will rise quickly, then rise less quickly, then flatten out. CTL is *kind of* like a measurement of fitness (big stress on the kind of). Here's a diagram to help visualize.

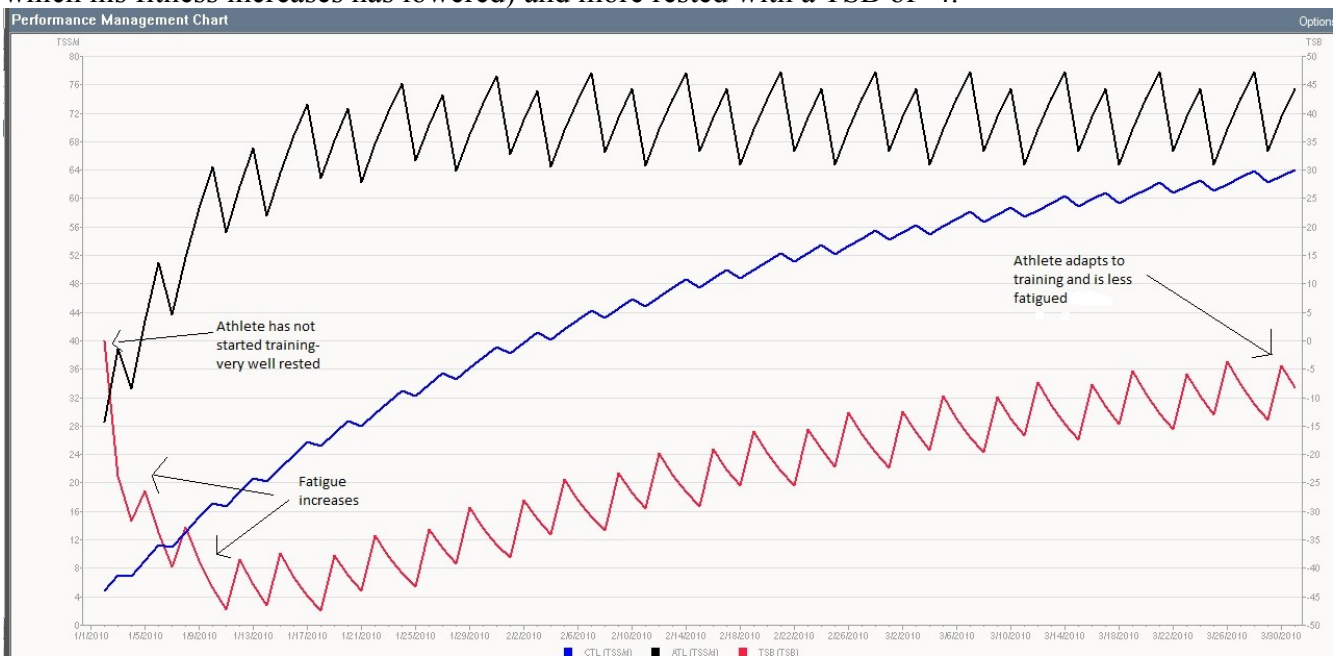


Notice how CTL climbs steeply initially then levels off? The athlete is adapting to the stress, so the exact same stress (repeated for 3 months) will have a noticibly greater impact on fitness initially than it will 90 days later. Why is the line jagged? Because the athlete is riding 5 days per week, the downslope is rest days.

Acute Training Load is calculated the same as CTL, only over a much shorter duration (typically 7 days vs 42). If ATL is greater than CTL, CTL will rise. If ATL is below CTL then CTL will drop. The bigger the difference between the two, the greater the effect on CTL. What does this mean? If an athlete continually increases daily TSS (either by increasing volume, intensity, or duration) then he will become more fit (later I will discuss the obvious absurdity of that comment). Here's another picture to help out:



Training Stress Balance is the difference between CTL and ATL and is a good way to quantify an athletes level of fatigue. If CTL is 75 TSS per day, and ATL is 50 TSS per day, then TSB will be +25, which is well rested. If ATL is 85 and CTL is 75, then TSB is -10, which is somewhat fatigued. In the diagram below CTL and ATL become closer and closer. When the athlete began to train there was a large initial increase in training volume and therefore a large initial increase in "fitness," however, there was also a large increase in fatigue (TSB of -47). The athlete was "fit" but tired. At the end of the training program we can see the athlete has adapted to the training, he is more fit (although the rate at which his fitness increases has lowered) and more rested with a TSB of -4.



Seems pretty simple: The more/ harder you ride, the more fit you become. Initially it will be hard (you will be tired) but your body will adapt and it will get easier. So where does the model fail?

First of all, the model fails to account for specificity. A rider who is training to win the state criterium championships can reach an extremely high CTL simply by putting in big miles at an aerobic pace, but this would not prepare him for the explosiveness of the race. Similarly, it does not account for limiters. A criterium racer with a terrible sprint might be better off with a much lower CTL value, but a much improved sprint. Lastly, the idea that we can train, adapt, then train more is true only to a certain extent. Eventually one reaches a training workload they can't adapt to, exceeding this workload, no matter how slow the progression, will result in injury or overtraining. This maximum workload varies from athlete to athlete, and even within athletes over time.

But don't throw the baby out with the bath water. While the PMC has some setbacks, it's arguably one of the most critical tools in Trainingpeaks. It is handy to visualize the workload and is very handy for tapering before important events. It can also be overlaid with peak power outputs to look for trends, such as training volume and peak 20 minute power.

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