Aligning Timescales and Frequency Combs

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NIST Technical Note XXXX

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Abstract

Required

Key words

Required, alphabetized, separated by semicolon, and end in a period.

Table of contents

Introduction 4
All Subsection Headings Capitalized 4

List of Tables

1 Title. 5

List of Figures

1 This is the caption text. 5

Glossary

Delete if not applicable

Introduction

All Subsection Headings Capitalized

This can be seen in Eq. (1) and Table 1. Information about flowers is available in Sec.?? .[1]

$$x^n + y^n = z^n \tag{1}$$

- Initial input: Independent series of clock and comb data
  - Clock shift files containing variables: MJD, shift, and possibly ISGOOD
  - Frequency comb data containing variables: MJD, SDR:frep ErYb, fo ErYb, fb Si ErYb, fb Al ErYb, fb Yb ErYb
- Read data into Python
- Define functions to find optical frequencies for each clock with comb equation, these frequencies will become additional variables in the frequency comb data object
- compute total correction for each clock's shift data
- Data processing
  - change all data variables to type float for high precision computing
  - find overlapping MJD values for each clock frequency data set
  - visualize gaps in the clock frequency data sets
  - decide upon initial and final MJD values for analysis
- Imputation - decide how to deal with missing shift values
  - adjust start/end MJD indices for large gaps of missing values
  - use interpolation techniques (see below) for short sequence of individual missing values
  - keep with caution about how this may impact subsequent steps
- Interpolation - to get clock data to match up with comb time intervals, key difference from imputation step is data is contained w/in a certain range of start/stop MJD values
  - numpy.interp, linear
  - pandas.interpolate, linear

[1] NIST disclaimer text here.

  - incorporate randomness
  - kalman smoothing

- Calculate clock frequencies by adding together comb frequencies and shift data, scaled by the total correction amount
- End results: clock ratio data to compute offset to compare to previous measurements (may contain missing values?)

Table 1. Title.

ColumnA	ColumnB
text	text[a]
text	text
text	text
text	text

[a]Footnote

Figure 1. This is the caption text.