

# Inference on the Champagne Model using a Gaussian Process

## TODO

- Set seed for LHC and stuff
- Change to log discrepancy with custom observation variance
- Change from MLE to cross validation

## Setting up the Champagne Model

### Imports

```
import pandas as pd
import numpy as np
from typing import Any
import matplotlib.pyplot as plt

from scipy.stats import qmc

import tensorflow as tf
import tensorflow_probability as tfp

tfb = tfp.bijectors
tfd = tfp.distributions
tfk = tfp.math.psd_kernels
```

2024-04-17 18:50:34.112531: I tensorflow/core/platform/cpu\_feature\_guard.cc:210] This TensorFlow binary is optimized with **AVX2** FMA, in other operations, rebuild TensorFlow with **-DNOMINANANOVILLE** to disable.

2024-04-17 18:50:34.706538: W tensorflow/compiler/tf2tensorrt/utils/py\_utils.cc:38] TF-TRT Warning: If you want to **get the best performance**, set **-DTRTEngineBuilder.allow\_tf32=1**.

## Model itself

```
np.random.seed(590154)

population = 1000
initial_infecteds = 10
epidemic_length = 1000
number_of_events = 15000

pv_champ_alpha = 0.4 # prop of effective care
pv_champ_beta = 0.4 # prop of radical cure
pv_champ_gamma_L = 1 / 223 # liver stage clearance rate
pv_champ_delta = 0.05 # prop of imported cases
pv_champ_lambda = 0.04 # transmission rate
pv_champ_f = 1 / 72 # relapse frequency
pv_champ_r = 1 / 60 # blood stage clearance rate

def champagne_stochastic(
    alpha_,
    beta_,
    gamma_L,
    lambda_,
    f,
    r,
    N=population,
    I_L=initial_infecteds,
    I_0=0,
    S_L=0,
    delta_=0,
    end_time=epidemic_length,
    num_events=number_of_events,
):
    if (0 > (alpha_ or beta_)) or (1 < (alpha_ or beta_)):
        return "Alpha or Beta out of bounds"
    if 0 > (gamma_L or lambda_ or f or r):
        return "Gamma, lambda, f or r out of bounds"

    t = 0
    S_0 = N - I_L - I_0 - S_L
    inc_counter = 0
```

```

list_of_outcomes = [
    {"t": 0, "S_0": S_0, "S_L": S_L, "I_0": I_0, "I_L": I_L, "inc_counter": 0}
]

prop_new = alpha_*beta_*f/(alpha_*beta_*f + gamma_L)

for i in range(num_events):
    if S_0 == N:
        while t < 31:
            t += 1
            new_stages = {
                "t": t,
                "S_0": N,
                "S_L": 0,
                "I_0": 0,
                "I_L": 0,
                "inc_counter": inc_counter,
            }
            list_of_outcomes.append(new_stages)
            break

    S_0_to_I_L = (1 - alpha_) * lambda_ * (I_L + I_0) / N * S_0
    S_0_to_S_L = alpha_ * (1 - beta_) * lambda_ * (I_0 + I_L) / N * S_0
    I_0_to_S_0 = r * I_0 / N
    I_0_to_I_L = lambda_ * (I_L + I_0) / N * I_0
    I_L_to_I_0 = gamma_L * I_L
    I_L_to_S_L = r * I_L
    S_L_to_S_0 = (gamma_L + (f + lambda_ * (I_0 + I_L) / N) * alpha_ * beta_) * S_L
    S_L_to_I_L = (f + lambda_ * (I_0 + I_L) / N) * (1 - alpha_) * S_L

    total_rate =
        S_0_to_I_L
        + S_0_to_S_L
        + I_0_to_S_0
        + I_0_to_I_L
        + I_L_to_I_0
        + I_L_to_S_L
        + S_L_to_S_0
        + S_L_to_I_L
    )

    delta_t = np.random.exponential(1 / total_rate)

```

```

new_stages_prob = [
    S_0_to_I_L / total_rate,
    S_0_to_S_L / total_rate,
    I_0_to_S_0 / total_rate,
    I_0_to_I_L / total_rate,
    I_L_to_I_0 / total_rate,
    I_L_to_S_L / total_rate,
    S_L_to_S_0 / total_rate,
    S_L_to_I_L / total_rate,
]
t += delta_t
silent_incidents = np.random.poisson(
    delta_t * alpha_ * beta_ * lambda_ * (I_L + I_0) * S_0 / N
)

new_stages = np.random.choice(
    [
        {
            "t": t,
            "S_0": S_0 - 1,
            "S_L": S_L,
            "I_0": I_0,
            "I_L": I_L + 1,
            "inc_counter": inc_counter + silent_incidents + 1,
        },
        {
            "t": t,
            "S_0": S_0 - 1,
            "S_L": S_L + 1,
            "I_0": I_0,
            "I_L": I_L,
            "inc_counter": inc_counter + silent_incidents + 1,
        },
        {
            "t": t,
            "S_0": S_0 + 1,
            "S_L": S_L,
            "I_0": I_0 - 1,
            "I_L": I_L,
            "inc_counter": inc_counter + silent_incidences,
        },
    ],

```

```

        "t": t,
        "S_0": S_0,
        "S_L": S_L,
        "I_0": I_0 - 1,
        "I_L": I_L + 1,
        "inc_counter": inc_counter + silent_incidents,
    },
    {
        "t": t,
        "S_0": S_0,
        "S_L": S_L,
        "I_0": I_0 + 1,
        "I_L": I_L - 1,
        "inc_counter": inc_counter + silent_incidents,
    },
    {
        "t": t,
        "S_0": S_0,
        "S_L": S_L + 1,
        "I_0": I_0,
        "I_L": I_L - 1,
        "inc_counter": inc_counter + silent_incidents,
    },
    {
        "t": t,
        "S_0": S_0 + 1,
        "S_L": S_L - 1,
        "I_0": I_0,
        "I_L": I_L,
        "inc_counter": inc_counter
        + silent_incidents
        + np.random.binomial(1, prop_new),
    },
    {
        "t": t,
        "S_0": S_0,
        "S_L": S_L - 1,
        "I_0": I_0,
        "I_L": I_L + 1,
        "inc_counter": inc_counter + silent_incidents + 1,
    },
],

```

```

        p=new_stages_prob,
    )

list_of_outcomes.append(new_stages)

S_0 = new_stages["S_0"]
I_0 = new_stages["I_0"]
I_L = new_stages["I_L"]
S_L = new_stages["S_L"]
inc_counter = new_stages["inc_counter"]

outcome_df = pd.DataFrame(list_of_outcomes)
return outcome_df

champ_samp = champagne_stochastic(
    pv_champ_alpha,
    pv_champ_beta,
    pv_champ_gamma_L,
    pv_champ_lambda,
    pv_champ_f,
    pv_champ_r,
) # .melt(id_vars='t')

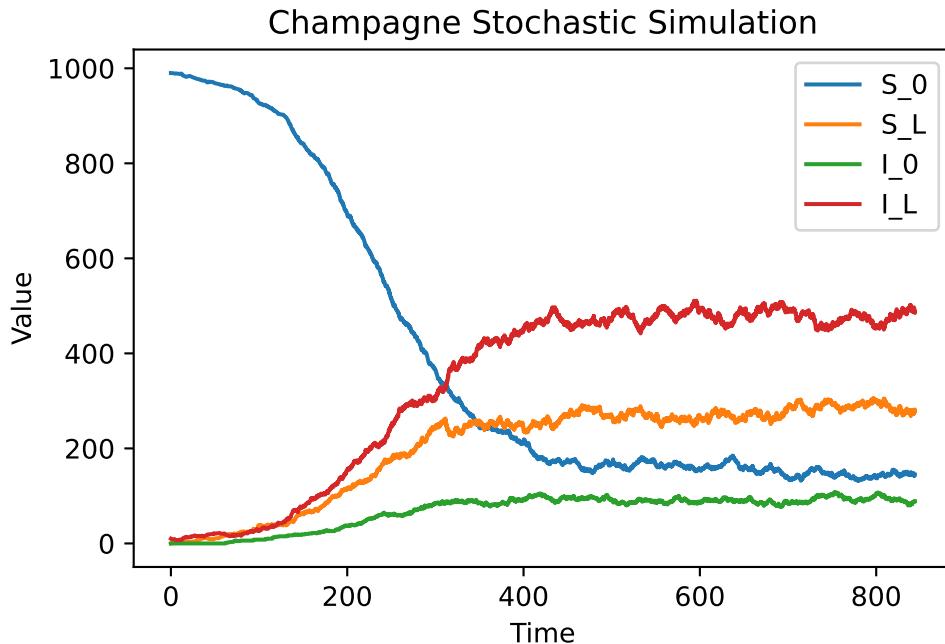
```

## Plotting outcome

```

champ_samp.drop("inc_counter", axis=1).plot(x="t", legend=True)
plt.xlabel("Time")
plt.ylabel("Value")
plt.title("Champagne Stochastic Simulation")
plt.savefig("champagne_GP_images/champagne_simulation.pdf")
plt.show()

```



### Function that Outputs Final Prevalence

```

def incidence(df, start, days):
    start_ind = df[df["t"].le(start)].index[-1]
    end_ind = df[df["t"].le(start + days)].index[-1]
    incidence_week = df.iloc[end_ind]["inc_counter"] - df.iloc[start_ind]["inc_counter"]
    return incidence_week

def champ_sum_stats(alpha_, beta_, gamma_L, lambda_, f, r):
    champ_df_ = champagne_stochastic(alpha_, beta_, gamma_L, lambda_, f, r)
    fin_t = champ_df_.iloc[-1]["t"]
    first_month_inc = incidence(champ_df_, 0, 30)
    fin_t = champ_df_.iloc[-1]["t"]
    fin_week_inc = incidence(champ_df_, fin_t - 7, 7)
    fin_prev = champ_df_.iloc[-1]["I_0"] + champ_df_.iloc[-1]["I_L"]

    return np.array([fin_prev, first_month_inc, fin_week_inc])

observed_sum_stats = champ_sum_stats()

```

```

    pv_champ_alpha,
    pv_champ_beta,
    pv_champ_gamma_L,
    pv_champ_lambda,
    pv_champ_f,
    pv_champ_r,
)

def discrepancy_fn(alpha_, beta_, gamma_L, lambda_, f, r): # best is L1 norm
    x = champ_sum_stats(alpha_, beta_, gamma_L, lambda_, f, r)
    return np.log(np.sum(np.abs((x - observed_sum_stats) / observed_sum_stats)))

```

Testing the variances across different values of params etc.

```

# samples = 30
# cor_sums = np.zeros(samples)
# for i in range(samples):
#     cor_sums[i] = discrepancy_fn(
#         pv_champ_alpha,
#         pv_champ_beta,
#         pv_champ_gamma_L,
#         pv_champ_lambda,
#         pv_champ_f,
#         pv_champ_r,
#     )

# cor_mean = np.mean(cor_sums)
# cor_s_2 = sum((cor_sums - cor_mean) ** 2) / (samples - 1)
# print(cor_mean, cor_s_2)

# doub_sums = np.zeros(samples)
# for i in range(samples):
#     doub_sums[i] = discrepancy_fn(
#         2 * pv_champ_alpha,
#         2 * pv_champ_beta,
#         2 * pv_champ_gamma_L,
#         2 * pv_champ_lambda,
#         2 * pv_champ_f,
#         2 * pv_champ_r,
#     )

```

```

# doub_mean = np.mean(doub_sums)
# doub_s_2 = sum((doub_sums - doub_mean) ** 2) / (samples - 1)
# print(doub_mean, doub_s_2)

# half_sums = np.zeros(samples)
# for i in range(samples):
#     half_sums[i] = discrepancy_fn(
#         pv_champ_alpha / 2,
#         pv_champ_beta / 2,
#         pv_champ_gamma_L / 2,
#         pv_champ_lambda / 2,
#         pv_champ_f / 2,
#         pv_champ_r / 2,
#     )

# half_mean = np.mean(half_sums)
# half_s_2 = sum((half_sums - half_mean) ** 2) / (samples - 1)
# print(half_mean, half_s_2)

# rogue_sums = np.zeros(samples)
# for i in range(samples):
#     rogue_sums[i] = discrepancy_fn(
#         pv_champ_alpha / 2,
#         pv_champ_beta / 2,
#         pv_champ_gamma_L / 2,
#         pv_champ_lambda / 2,
#         pv_champ_f / 2,
#         pv_champ_r / 2,
#     )

# rogue_mean = np.mean(rogue_sums)
# rogue_s_2 = sum((rogue_sums - rogue_mean) ** 2) / (samples - 1)
# print(rogue_mean, rogue_s_2)

# plt.figure(figsize=(7, 4))
# plt.scatter(
#     np.array([half_mean, cor_mean, doub_mean, rogue_mean]),
#     np.array([half_s_2, cor_s_2, doub_s_2, rogue_s_2]),
# )
# plt.title("variance and mean")
# plt.xlabel("mean")
# plt.ylabel("variance")

```

```
# plt.show()
```

## Gaussian Process Regression on Final Prevalence Discrepancy

```
my_seed = np.random.default_rng(seed=1795) # For replicability

num_samples = 30

variables_names = ["alpha", "beta", "gamma_L", "lambda", "f", "r"]

pv_champ_alpha = 0.4 # prop of effective care
pv_champ_beta = 0.4 # prop of radical cure
pv_champ_gamma_L = 1 / 223 # liver stage clearance rate
pv_champ_lambda = 0.04 # transmission rate
pv_champ_f = 1 / 72 # relapse frequency
pv_champ_r = 1 / 60 # blood stage clearance rate

samples = np.concatenate(
    (
        my_seed.uniform(low=0, high=1, size=(num_samples, 1)), # alpha
        my_seed.uniform(low=0, high=1, size=(num_samples, 1)), # beta
        my_seed.exponential(scale=pv_champ_gamma_L, size=(num_samples, 1)), # gamma_L
        my_seed.exponential(scale=pv_champ_lambda, size=(num_samples, 1)), # lambda
        my_seed.exponential(scale=pv_champ_f, size=(num_samples, 1)), # f
        my_seed.exponential(scale=pv_champ_r, size=(num_samples, 1)), # r
    ),
    axis=1,
)
LHC_sampler = qmc.LatinHypercube(d=6, seed=my_seed)
LHC_samples = LHC_sampler.random(n=num_samples)
LHC_samples[:, 2] = -pv_champ_gamma_L * np.log(LHC_samples[:, 2])
LHC_samples[:, 3] = -pv_champ_lambda * np.log(LHC_samples[:, 3])
LHC_samples[:, 4] = -pv_champ_f * np.log(LHC_samples[:, 4])
LHC_samples[:, 5] = -pv_champ_r * np.log(LHC_samples[:, 5])

LHC_samples = np.repeat(LHC_samples, 3, axis = 0)

random_indices_df = pd.DataFrame(samples, columns=variables_names)
```

```
LHC_indices_df = pd.DataFrame(LHC_samples, columns=variables_names)

print(random_indices_df.head())
print(LHC_indices_df.head())
```

	alpha	beta	gamma_L	lambda	f	r
0	0.201552	0.081511	0.004695	0.017172	0.007355	0.021370
1	0.332324	0.374497	0.003022	0.020210	0.001350	0.002604
2	0.836050	0.570164	0.002141	0.043572	0.001212	0.008367
3	0.566773	0.347186	0.001925	0.016830	0.000064	0.003145
4	0.880603	0.316884	0.000425	0.012374	0.000358	0.003491
	alpha	beta	gamma_L	lambda	f	r
0	0.066680	0.570582	0.001707	0.002226	0.004358	0.003743
1	0.066680	0.570582	0.001707	0.002226	0.004358	0.003743
2	0.066680	0.570582	0.001707	0.002226	0.004358	0.003743
3	0.132042	0.551592	0.013131	0.036829	0.002851	0.002075
4	0.132042	0.551592	0.013131	0.036829	0.002851	0.002075

## Generate Discrepancies

```
random_discrepancies = LHC_indices_df.apply(
    lambda x: discrepancy_fn(
        x["alpha"], x["beta"], x["gamma_L"], x["lambda"], x["f"], x["r"]
    ),
    axis=1,
)
```

```
print(random_discrepancies.head())
```

```
0    0.542551
1    0.627749
2    0.650314
3    0.644435
4    0.667979
dtype: float64
```

## Differing Methods to Iterate Function

```
# import timeit

# def function1():
#     np.vectorize(champ_sum_stats)(random_indices_df['alpha'],
#     random_indices_df['beta'], random_indices_df['gamma_L'],
#     random_indices_df['lambda'], random_indices_df['f'], random_indices_df['r'])
#     pass

# def function2():
#     random_indices_df.apply(
#         lambda x: champ_sum_stats(
#             x['alpha'], x['beta'], x['gamma_L'], x['lambda'], x['f'], x['r']),
#         axis = 1)
#     pass

# # Time function1
# time_taken_function1 = timeit.timeit(
#     "function1()", globals=globals(), number=100)

# # Time function2
# time_taken_function2 = timeit.timeit(
#     "function2()", globals=globals(), number=100)

# print("Time taken for function1:", time_taken_function1)
# print("Time taken for function2:", time_taken_function2)
```

Time taken for function1: 187.48960775700016 Time taken for function2: 204.06618941299985

## Constrain Variables to be Positive

```
constrain_positive = tfb.Shift(np.finfo(np.float64).tiny)(tfb.Exp())
```

```
2024-04-17 18:51:09.141481: I external/local_xla/xla/stream_executor/cuda/cuda_executor.cc:99
2024-04-17 18:51:09.176938: W tensorflow/core/common_runtime/gpu/gpu_device.cc:2251] Cannot o
Skipping registering GPU devices...
```

## Custom Quadratic Mean Function

```
class quad_mean_fn(tf.Module):
    def __init__(self):
        super(quad_mean_fn, self).__init__()
        self.amp_alpha_mean = tfp.util.TransformedVariable(
            bijector=constrain_positive,
            initial_value=1.0,
            dtype=np.float64,
            name="amp_alpha_mean",
        )
        self.alpha_tp = tf.Variable(pv_champ_alpha, dtype=np.float64, name="alpha_tp")
        self.amp_beta_mean = tfp.util.TransformedVariable(
            bijector=constrain_positive,
            initial_value=1.0,
            dtype=np.float64,
            name="amp_beta_mean",
        )
        self.beta_tp = tf.Variable(pv_champ_beta, dtype=np.float64, name="beta_tp")
        self.amp_gamma_L_mean = tfp.util.TransformedVariable(
            bijector=constrain_positive,
            initial_value=1.0,
            dtype=np.float64,
            name="amp_gamma_L_mean",
        )
        self.gamma_L_tp = tf.Variable(
            pv_champ_gamma_L, dtype=np.float64, name="gamma_L_tp"
        )
        self.amp_lambda_mean = tfp.util.TransformedVariable(
            bijector=constrain_positive,
            initial_value=1.0,
            dtype=np.float64,
            name="amp_lambda_mean",
        )
        self.lambda_tp = tf.Variable(
            pv_champ_lambda, dtype=np.float64, name="lambda_tp"
        )
        self.amp_f_mean = tfp.util.TransformedVariable(
            bijector=constrain_positive,
            initial_value=1.0,
            dtype=np.float64,
            name="amp_f_mean",
```

```

)
self.f_tp = tf.Variable(pv_champ_f, dtype=np.float64, name="f_tp")
self.amp_r_mean = tfp.util.TransformedVariable(
    bijector=constrain_positive,
    initial_value=1.0,
    dtype=np.float64,
    name="amp_r_mean",
)
self.r_tp = tf.Variable(pv_champ_r, dtype=np.float64, name="r_tp")
# self.bias_mean = tfp.util.TransformedVariable(
#     bijector=constrain_positive,
#     initial_value=50.0,
#     dtype=np.float64,
#     name="bias_mean",
# )
self.bias_mean = tf.Variable(0.0, dtype=np.float64, name="bias_mean")

def __call__(self, x):
    return (
        self.amp_alpha_mean * (x[..., 0] - self.alpha_tp) ** 2
        + self.amp_beta_mean * (x[..., 1] - self.beta_tp) ** 2
        + self.amp_gamma_L_mean * (x[..., 2] - self.gamma_L_tp) ** 2
        + self.amp_lambda_mean * (x[..., 3] - self.lambda_tp) ** 2
        + self.amp_f_mean * (x[..., 4] - self.f_tp) ** 2
        + self.amp_r_mean * (x[..., 5] - self.r_tp) ** 2
        + self.bias_mean
    )

```

## Making the ARD Kernel

```

index_vals = LHC_indices_df.values
obs_vals = random_discrepancies.values

amplitude_champ = tfp.util.TransformedVariable(
    bijector=constrain_positive,
    initial_value=1.0,
    dtype=np.float64,
    name="amplitude_champ",
)

```

```

observation_noise_variance_champ = tfp.util.TransformedVariable(
    bijector=constrain_positive,
    initial_value=0.03,
    dtype=np.float64,
    name="observation_noise_variance_champ",
)

length_scales_champ = tfp.util.TransformedVariable(
    bijector=constrain_positive,
    initial_value=[0.05, 0.05, 0.05, 0.05, 0.05, 0.05],
    dtype=np.float64,
    name="length_scales_champ",
)

kernel_champ = tfk.FeatureScaled(
    tfk.MaternFiveHalves(amplitude=amplitude_champ),
    scale_diag=length_scales_champ,
)

```

## Define the Gaussian Process with Quadratic Mean Function and ARD Kernel

```

# Define Gaussian Process with the custom kernel
champ_GP = tfd.GaussianProcess(
    kernel=kernel_champ,
    observation_noise_variance=observation_noise_variance_champ,
    index_points=index_vals,
    mean_fn=quad_mean_fn(),
)

print(champ_GP.trainable_variables)

Adam_optim = tf.optimizers.Adam(learning_rate=0.01)

(<tf.Variable 'amplitude_champ:0' shape=() dtype=float64, numpy=0.0>, <tf.Variable 'length_scales_champ:0' shape=() dtype=float64, numpy=[0.05, 0.05, 0.05, 0.05, 0.05, 0.05]>, <tf.Variable 'observation_noise_variance_champ:0' shape=() dtype=float64, numpy=0.03>)

```

## Train the Hyperparameters

```
# predictive log stuff
@tf.function(autograph=False, jit_compile=False)
def optimize():
    with tf.GradientTape() as tape:
        K = (
            champ_GP.kernel.matrix(index_vals, index_vals)
            + tf.eye(index_vals.shape[0], dtype=np.float64)
            * observation_noise_variance_champ
        )
        means = champ_GP.mean_fn(index_vals)
        K_inv = tf.linalg.inv(K)
        K_inv_y = K_inv @ tf.reshape(obs_vals - means, shape=[obs_vals.shape[0], 1])
        K_inv_diag = tf.linalg.diag_part(K_inv)
        log_var = tf.math.log(K_inv_diag)
        log_mu = tf.reshape(K_inv_y, shape=[-1]) ** 2
        loss = -tf.math.reduce_sum(log_var - log_mu)
    grads = tape.gradient(loss, champ_GP.trainable_variables)
    Adam_optim.apply_gradients(zip(grads, champ_GP.trainable_variables))
    return loss

num_iters = 10000

lls_ = np.zeros(num_iters, np.float64)
tolerance = 1e-6 # Set your desired tolerance level
previous_loss = float("inf")

for i in range(num_iters):
    loss = optimize()
    lls_[i] = loss

    # Check if change in loss is less than tolerance
    if abs(loss - previous_loss) < tolerance:
        print(f"Hyperparameter convergence reached at iteration {i+1}.")
        lls_ = lls_[range(i + 1)]
        break

    previous_loss = loss
```

Hyperparameter convergence reached at iteration 2028.

```

print("Trained parameters:")
for var in champ_GP.trainable_variables:
    if "tp" in var.name or "bias" in var.name:
        print("{} is {}".format(var.name, var.numpy().round(3)))
    else:
        print(
            "{} is {}".format(
                var.name, constrain_positive.forward(var).numpy().round(3)
            )
        )

```

Trained parameters:

amplitude\_champ:0 is 0.812

length\_scales\_champ:0 is [0.004 0.014 0.032 0.017 0.022 0.018]

observation\_noise\_variance\_champ:0 is 0.238

alpha\_tp:0 is -0.575

amp\_alpha\_mean:0 is 0.252

amp\_beta\_mean:0 is 1.231

amp\_f\_mean:0 is 1128.319

amp\_gamma\_L\_mean:0 is 4.401

amp\_lambda\_mean:0 is 96.25

amp\_r\_mean:0 is 48.536

beta\_tp:0 is 0.522

bias\_mean:0 is -1.332

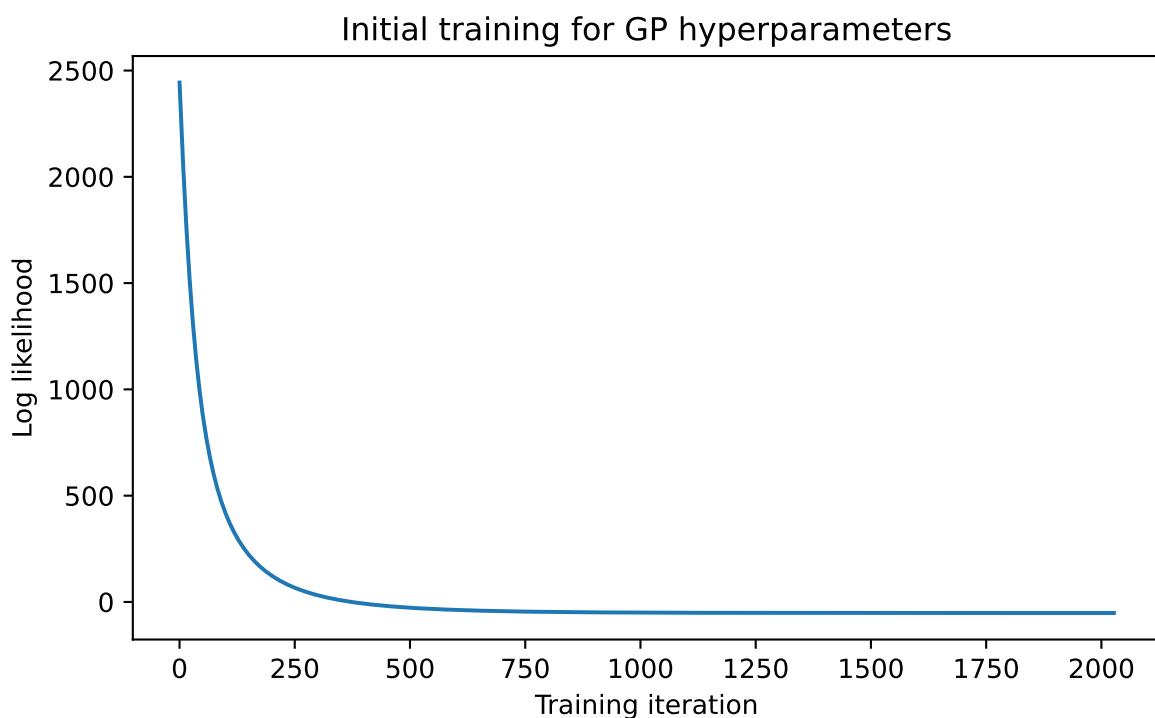
f\_tp:0 is 0.015

gamma\_L\_tp:0 is -0.103

lambda\_tp:0 is 0.041

```
r_tp:0 is 0.173
```

```
plt.figure(figsize=(7, 4))
plt.plot(lls_)
plt.title("Initial training for GP hyperparameters")
plt.xlabel("Training iteration")
plt.ylabel("Log likelihood")
plt.savefig("champagne_GP_images/hyperparam_loss.pdf")
plt.show()
```



### Creating slices across one variable dimension

```
plot_samp_no = 21
plot_gp_no = 200
gp_samp_no = 50
```

```
slice_samples_dict = {
    "alpha_slice_samples": np.repeat(np.concatenate(
```

```

(
    np.linspace(0, 1, plot_samp_no, dtype=np.float64).reshape(-1, 1), # alpha
    np.repeat(pv_champ_beta, plot_samp_no).reshape(-1, 1), # beta
    np.repeat(pv_champ_gamma_L, plot_samp_no).reshape(-1, 1), # gamma_L
    np.repeat(pv_champ_lambda, plot_samp_no).reshape(-1, 1), # lambda
    np.repeat(pv_champ_f, plot_samp_no).reshape(-1, 1), # f
    np.repeat(pv_champ_r, plot_samp_no).reshape(-1, 1), # r
),
axis=1,
),
3, axis = 0),
"alpha_gp_samples": np.concatenate(
(
    np.linspace(0, 1, plot_gp_no, dtype=np.float64).reshape(-1, 1), # alpha
    np.repeat(pv_champ_beta, plot_gp_no).reshape(-1, 1), # beta
    np.repeat(pv_champ_gamma_L, plot_gp_no).reshape(-1, 1), # gamma_L
    np.repeat(pv_champ_lambda, plot_gp_no).reshape(-1, 1), # lambda
    np.repeat(pv_champ_f, plot_gp_no).reshape(-1, 1), # f
    np.repeat(pv_champ_r, plot_gp_no).reshape(-1, 1), # r
),
axis=1,
),
"beta_slice_samples": np.repeat(np.concatenate(
(
    np.repeat(pv_champ_alpha, plot_samp_no).reshape(-1, 1), # alpha
    np.linspace(0, 1, plot_samp_no, dtype=np.float64).reshape(-1, 1), # beta
    np.repeat(pv_champ_gamma_L, plot_samp_no).reshape(-1, 1), # gamma_L
    np.repeat(pv_champ_lambda, plot_samp_no).reshape(-1, 1), # lambda
    np.repeat(pv_champ_f, plot_samp_no).reshape(-1, 1), # f
    np.repeat(pv_champ_r, plot_samp_no).reshape(-1, 1), # r
),
axis=1,
),
3, axis = 0),
"beta_gp_samples": np.concatenate(
(
    np.repeat(pv_champ_alpha, plot_gp_no).reshape(-1, 1), # alpha
    np.linspace(0, 1, plot_gp_no, dtype=np.float64).reshape(-1, 1), # beta
    np.repeat(pv_champ_gamma_L, plot_gp_no).reshape(-1, 1), # gamma_L
    np.repeat(pv_champ_lambda, plot_gp_no).reshape(-1, 1), # lambda
    np.repeat(pv_champ_f, plot_gp_no).reshape(-1, 1), # f
    np.repeat(pv_champ_r, plot_gp_no).reshape(-1, 1), # r
),
axis=1,
)
)

```

```

),
"gamma_L_slice_samples": np.repeat(np.concatenate(
(
    np.repeat(pv_champ_alpha, plot_samp_no).reshape(-1, 1), # alpha
    np.repeat(pv_champ_beta, plot_samp_no).reshape(-1, 1), # beta
    -10*pv_champ_gamma_L
    * np.log(
        np.linspace(0, 1, plot_samp_no + 2, dtype=np.float64)[1:-1]
    ).reshape(
        -1, 1
    ), # gamma_L
    np.repeat(pv_champ_lambda, plot_samp_no).reshape(-1, 1), # lambda
    np.repeat(pv_champ_f, plot_samp_no).reshape(-1, 1), # f
    np.repeat(pv_champ_r, plot_samp_no).reshape(-1, 1), # r
),
axis=1,
), 3, axis = 0),
"gamma_L_gp_samples": np.concatenate(
(
    np.repeat(pv_champ_alpha, plot_gp_no).reshape(-1, 1), # alpha
    np.repeat(pv_champ_beta, plot_gp_no).reshape(-1, 1), # beta
    np.linspace(
        -10*pv_champ_gamma_L
        * np.log(
            np.linspace(0, 1, plot_samp_no + 2, dtype=np.float64)[1:-1]
        ).reshape(-1, 1)[0],
        -10*pv_champ_gamma_L
        * np.log(
            np.linspace(0, 1, plot_samp_no + 2, dtype=np.float64)[1:-1]
        ).reshape(-1, 1)[-1], plot_gp_no, dtype=np.float64
    ),
    # gamma_L
    np.repeat(pv_champ_lambda, plot_gp_no).reshape(-1, 1), # lambda
    np.repeat(pv_champ_f, plot_gp_no).reshape(-1, 1), # f
    np.repeat(pv_champ_r, plot_gp_no).reshape(-1, 1), # r
),
axis=1,
),
"lambda_slice_samples": np.repeat(np.concatenate(
(
    np.repeat(pv_champ_alpha, plot_samp_no).reshape(-1, 1), # alpha
    np.repeat(pv_champ_beta, plot_samp_no).reshape(-1, 1), # beta
    np.repeat(pv_champ_gamma_L, plot_samp_no).reshape(-1, 1), # gamma_L

```



```

        ),
        # f
        np.repeat(pv_champ_r, plot_samp_no).reshape(-1, 1), # r
    ),
    axis=1,
),
3, axis = 0),
"f_gp_samples": np.concatenate(
(
    np.repeat(pv_champ_alpha, plot_gp_no).reshape(-1, 1), # alpha
    np.repeat(pv_champ_beta, plot_gp_no).reshape(-1, 1), # beta
    np.repeat(pv_champ_gamma_L, plot_gp_no).reshape(-1, 1), # gamma_L
    np.repeat(pv_champ_lambda, plot_gp_no).reshape(-1, 1), # lambda
    np.linspace(
        -10*pv_champ_f
        * np.log(
            np.linspace(0, 1, plot_samp_no + 2, dtype=np.float64)[1:-1]
        ).reshape(-1, 1)[0],
        -10*pv_champ_f
        * np.log(
            np.linspace(0, 1, plot_samp_no + 2, dtype=np.float64)[1:-1]
        ).reshape(-1, 1)[-1], plot_gp_no, dtype=np.float64
    ), # f
    np.repeat(pv_champ_r, plot_gp_no).reshape(-1, 1), # r
),
axis=1,
),
"r_slice_samples": np.repeat(np.concatenate(
(
    np.repeat(pv_champ_alpha, plot_samp_no).reshape(-1, 1), # alpha
    np.repeat(pv_champ_beta, plot_samp_no).reshape(-1, 1), # beta
    np.repeat(pv_champ_gamma_L, plot_samp_no).reshape(-1, 1), # gamma_L
    np.repeat(pv_champ_lambda, plot_samp_no).reshape(-1, 1), # lambda
    np.repeat(pv_champ_f, plot_samp_no).reshape(-1, 1), # f
    -2*pv_champ_r
    * np.log(
        np.linspace(0, 1, plot_samp_no + 2, dtype=np.float64)[1:-1]
    ).reshape(
        -1, 1
    ), # r
),
axis=1,
),
3, axis = 0),
"r_gp_samples": np.concatenate(

```

```

(
    np.repeat(pv_champ_alpha, plot_gp_no).reshape(-1, 1), # alpha
    np.repeat(pv_champ_beta, plot_gp_no).reshape(-1, 1), # beta
    np.repeat(pv_champ_gamma_L, plot_gp_no).reshape(-1, 1), # gamma_L
    np.repeat(pv_champ_lambda, plot_gp_no).reshape(-1, 1), # lambda
    np.repeat(pv_champ_f, plot_gp_no).reshape(-1, 1), # f
    np.linspace(
        -2*pv_champ_r
        * np.log(
            np.linspace(0, 1, plot_samp_no + 2, dtype=np.float64)[1:-1]
        ).reshape(-1, 1)[0],
        -2*pv_champ_r
        * np.log(
            np.linspace(0, 1, plot_samp_no + 2, dtype=np.float64)[1:-1]
        ).reshape(-1, 1)[-1], plot_gp_no, dtype=np.float64
    ), # r
),
axis=1,
),
)
}

```

## Plotting the GPs across different slices

```

GP_seed = tfp.random.sanitize_seed(4362)
vars = ["alpha", "beta", "gamma_L", "lambda", "f", "r"]
slice_indices_dfs_dict = {}
slice_index_vals_dict = {}
slice_discrepancies_dict = {}

for var in vars:
    val_df = pd.DataFrame(
        slice_samples_dict[var + "_slice_samples"], columns=variables_names
    )
    slice_indices_dfs_dict[var + "_slice_indices_df"] = val_df
    slice_index_vals_dict[var + "_slice_index_vals"] = val_df.values
    discreps = val_df.apply(
        lambda x: discrepancy_fn(
            x["alpha"], x["beta"], x["gamma_L"], x["lambda"], x["f"], x["r"]
        ),
        axis=1,
    )

```

```

)
slice_discrepancies_dict[var + "_slice_discrepancies"] = discreps

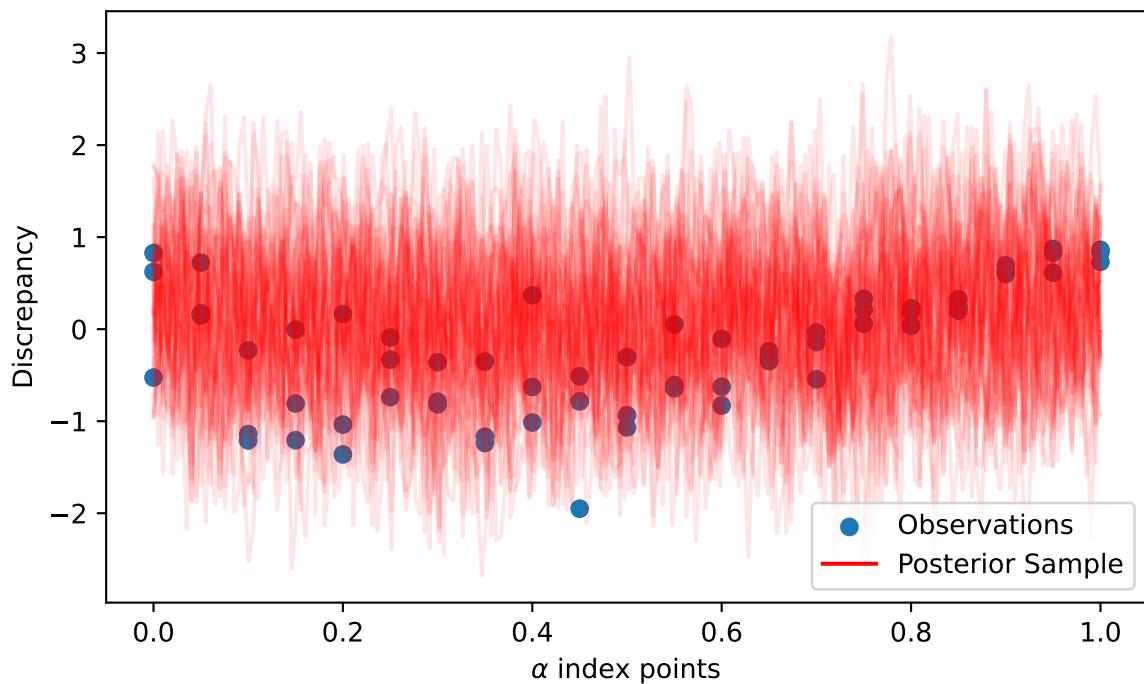
gp_samples_df = pd.DataFrame(
    slice_samples_dict[var + "_gp_samples"], columns=variables_names
)
slice_indices_dfs_dict[var + "_gp_indices_df"] = gp_samples_df
slice_index_vals_dict[var + "_gp_index_vals"] = gp_samples_df.values

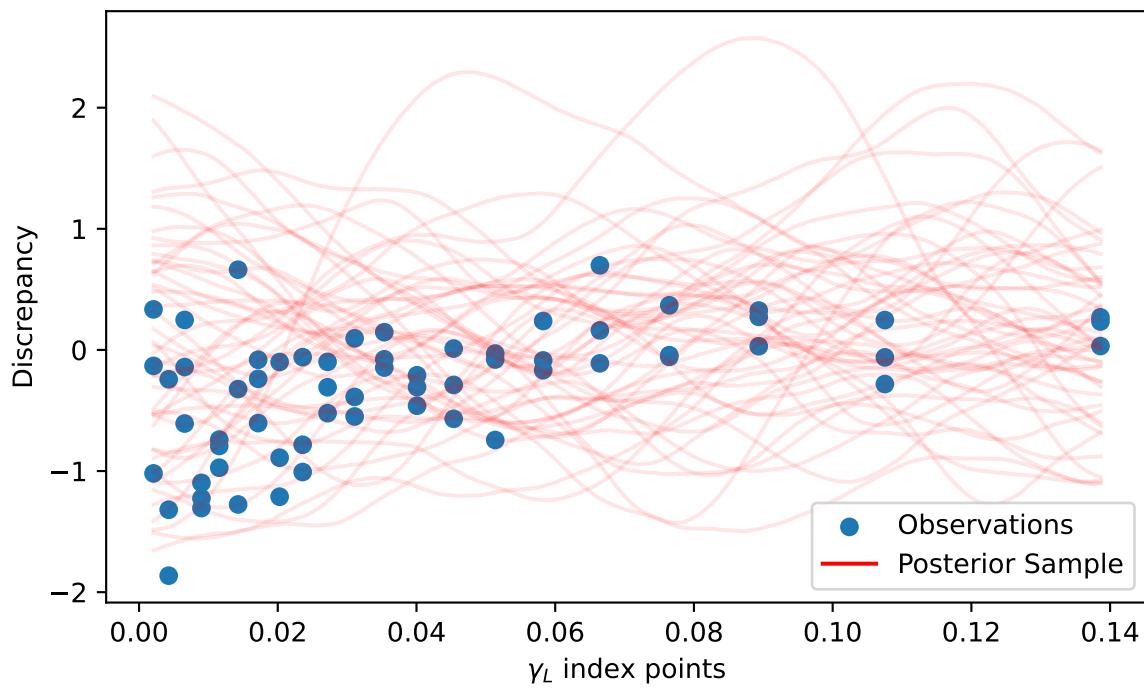
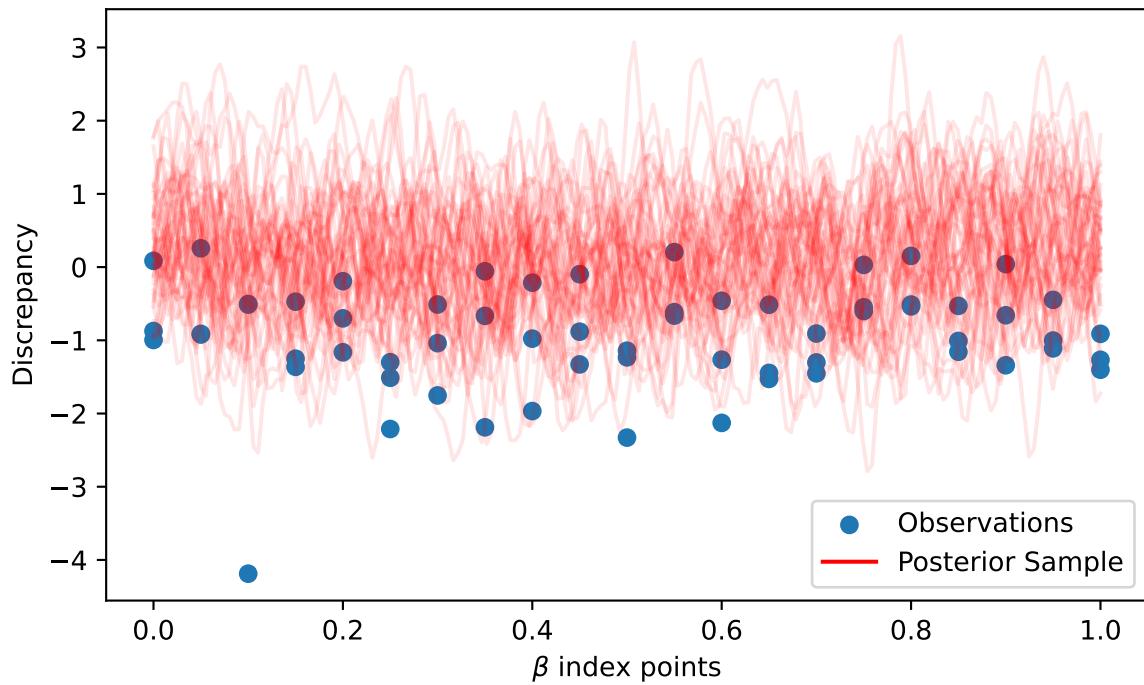
champ_GP_reg = tfd.GaussianProcessRegressionModel(
    kernel=kernel_champ,
    index_points=gp_samples_df.values,
    observation_index_points=index_vals,
    observations=obs_vals,
    observation_noise_variance=observation_noise_variance_champ,
    predictive_noise_variance=0.0,
    mean_fn=quad_mean_fn(),
)
GP_samples = champ_GP_reg.sample(gp_samp_no, seed=GP_seed)

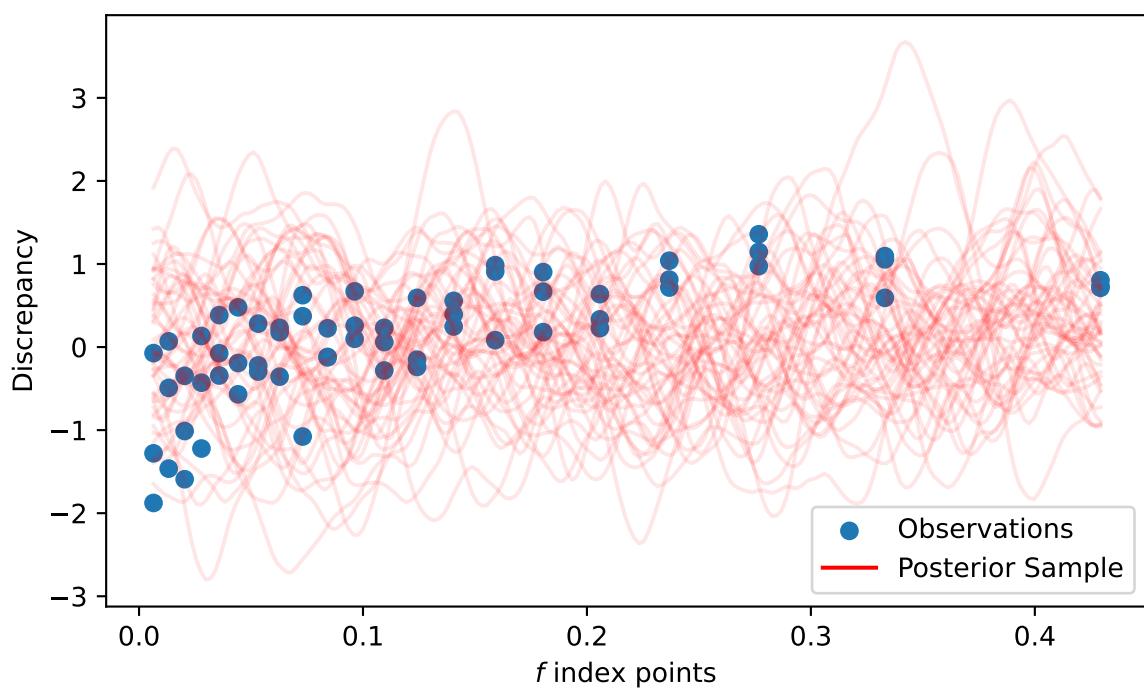
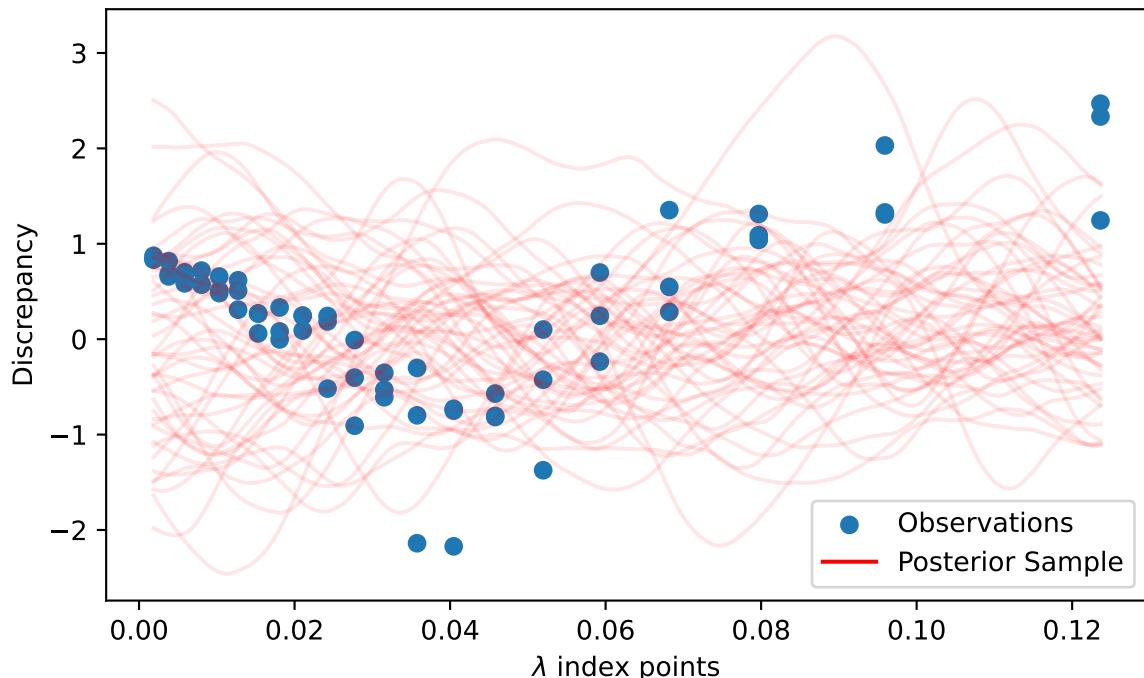
plt.figure(figsize=(7, 4))
plt.scatter(
    val_df[var].values,
    discreps,
    label="Observations",
)
for i in range(gp_samp_no):
    plt.plot(
        gp_samples_df[var].values,
        GP_samples[i, :],
        c="r",
        alpha=0.1,
        label="Posterior Sample" if i == 0 else None,
    )
leg = plt.legend(loc="lower right")
for lh in leg.legend_handles:
    lh.set_alpha(1)
if var in ["f", "r"]:
    plt.xlabel("$" + var + " index points")
else:
    plt.xlabel("$\\" + var + " index points")

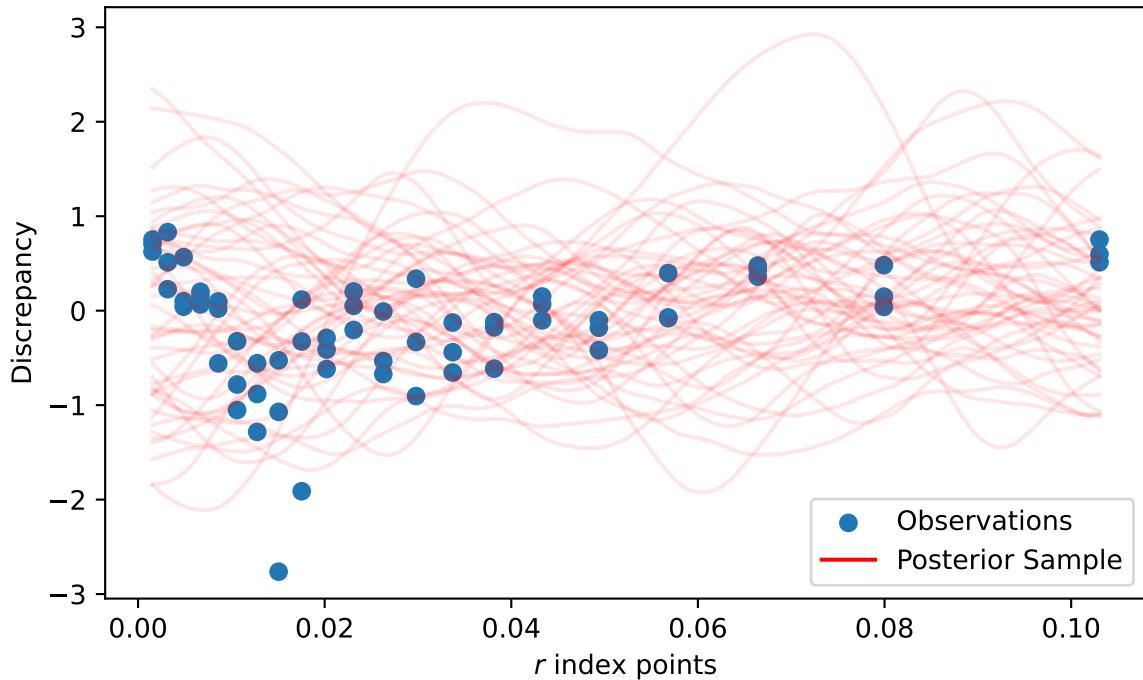
```

```
# if var not in ["alpha", "beta"]:
#     plt.xscale("log", base=np.e)
plt.ylabel("Discrepancy")
plt.savefig("champagne_GP_images/initial_" + var + "_slice.pdf")
plt.show()
```









## Acquiring the next datapoint to test

**Proof that .variance returns what we need in acquisition function**

```

new_guess = np.array([0.4, 0.4, 0.004, 0.04, 0.01, 0.17])
mean_t = champ_GP_reg.mean_fn(new_guess)
variance_t = champ_GP_reg.variance(index_points=[new_guess])

kernel_self = kernel_champ.apply(new_guess, new_guess)
kernel_others = kernel_champ.apply(new_guess, index_vals)
K = kernel_champ.matrix(
    index_vals, index_vals
) + observation_noise_variance_champ * np.identity(index_vals.shape[0])
inv_K = np.linalg.inv(K)
print("Self Kernel is {}".format(kernel_self.numpy().round(3)))
print("Others Kernel is {}".format(kernel_others.numpy().round(3)))
print(inv_K)
my_var_t = kernel_self - kernel_others.numpy() @ inv_K @ kernel_others.numpy()

```

## Loss function

```
next_alpha = tfp.util.TransformedVariable(  
    initial_value=0.5,  
    bijector=tfb.Sigmoid(),  
    dtype=np.float64,  
    name="next_alpha",  
)  
  
next_beta = tfp.util.TransformedVariable(  
    initial_value=0.5,  
    bijector=tfb.Sigmoid(),  
    dtype=np.float64,  
    name="next_beta",  
)
```

```

next_gamma_L = tfp.util.TransformedVariable(
    initial_value=0.1,
    bijector=constrain_positive,
    dtype=np.float64,
    name="next_gamma_L",
)

next_lambda = tfp.util.TransformedVariable(
    initial_value=0.1,
    bijector=constrain_positive,
    dtype=np.float64,
    name="next_lambda",
)

next_f = tfp.util.TransformedVariable(
    initial_value=0.1,
    bijector=constrain_positive,
    dtype=np.float64,
    name="next_f",
)

next_r = tfp.util.TransformedVariable(
    initial_value=0.1,
    bijector=constrain_positive,
    dtype=np.float64,
    name="next_r",
)

next_vars = [
    v.trainable_variables[0]
    for v in [next_alpha, next_beta, next_gamma_L, next_lambda, next_f, next_r]
]

```

```

Adam_optim = tf.optimizers.Adam(learning_rate=0.1)

@tf.function(autograph=False, jit_compile=False)
def optimize():
    with tf.GradientTape() as tape:
        next_guess = tf.reshape(
            [
                tfb.Sigmoid().forward(next_vars[0]),

```

```

        tfb.Sigmoid().forward(next_vars[1]),
        constrain_positive.forward(next_vars[2]),
        constrain_positive.forward(next_vars[3]),
        constrain_positive.forward(next_vars[4]),
        constrain_positive.forward(next_vars[5]),
    ],
    [1, 6],
)
mean_t = champ_GP_reg.mean_fn(next_guess)
std_t = champ_GP_reg.stddev(index_points=next_guess)
loss = tf.squeeze(mean_t - 1.7 * std_t)
grads = tape.gradient(loss, next_vars)
Adam_optim.apply_gradients(zip(grads, next_vars))
return loss

num_iters = 10000

lls_ = np.zeros(num_iters, np.float64)
tolerance = 1e-6 # Set your desired tolerance level
previous_loss = float("inf")

for i in range(num_iters):
    loss = optimize()
    lls_[i] = loss

    # Check if change in loss is less than tolerance
    if abs(loss - previous_loss) < tolerance:
        print(f"Acquisition function convergence reached at iteration {i+1}.")
        lls_ = lls_[range(i + 1)]
        break

    previous_loss = loss

print("Trained parameters:")
for var in next_vars:
    if ("alpha" in var.name) | ("beta" in var.name):
        print(
            "{} is {}".format(var.name, (tfb.Sigmoid().forward(var).numpy().round(3)))
        )
    else:
        print(

```

```

        "{} is {}".format(
            var.name, constrain_positive.forward(var).numpy().round(3)
        )
    )

```

Acquisition function convergence reached at iteration 61.

Trained parameters:

```

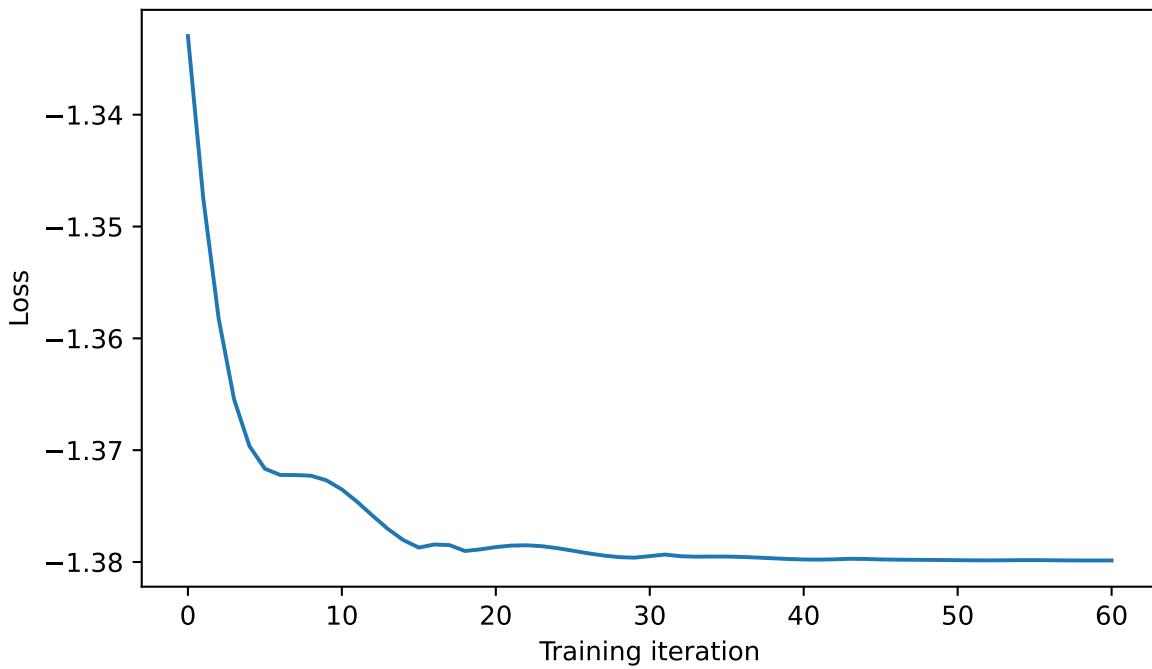
next_alpha:0 is 0.39
next_beta:0 is 0.4
next_gamma_L:0 is 0.012
next_lambda:0 is 0.042
next_f:0 is 0.015
next_r:0 is 0.017

```

```

plt.figure(figsize=(7, 4))
plt.plot(l1s_)
plt.xlabel("Training iteration")
plt.ylabel("Loss")
plt.savefig("champagne_GP_images/bolfi_optim_loss.pdf")
plt.show()

```



```

def update_GP():
    @tf.function
def opt_GP():
    with tf.GradientTape() as tape:
        K = (
            champ_GP.kernel.matrix(index_vals, index_vals)
            + tf.eye(index_vals.shape[0], dtype=np.float64)
            * observation_noise_variance_champ
        )
        means = champ_GP.mean_fn(index_vals)
        K_inv = tf.linalg.inv(K)
        K_inv_y = K_inv @ tf.reshape(obs_vals - means, shape=[obs_vals.shape[0], 1])
        K_inv_diag = tf.linalg.diag_part(K_inv)
        log_var = tf.math.log(K_inv_diag)
        log_mu = tf.reshape(K_inv_y, shape=[-1]) ** 2
        loss = -tf.math.reduce_sum(log_var - log_mu)
        grads = tape.gradient(loss, champ_GP.trainable_variables)
        optimizer_slow.apply_gradients(zip(grads, champ_GP.trainable_variables))
    return loss

num_iters = 10000

lls_ = np.zeros(num_iters, np.float64)
tolerance = 1e-6 # Set your desired tolerance level
previous_loss = float("inf")

for i in range(num_iters):
    loss = opt_GP()
    lls_[i] = loss.numpy()

    # Check if change in loss is less than tolerance
    if abs(loss - previous_loss) < tolerance:
        print(f"Hyperparameter convergence reached at iteration {i+1}..")
        lls_ = lls_[range(i + 1)]
        break

    previous_loss = loss
for var in optimizer_slow.variables:
    var.assign(tf.zeros_like(var))

def update_var():

```

```

@tf.function
def opt_var():
    with tf.GradientTape() as tape:
        next_guess = tf.reshape(
            [
                tfb.Sigmoid().forward(next_vars[0]),
                tfb.Sigmoid().forward(next_vars[1]),
                tfb.Sigmoid().forward(next_vars[2]),
                tfb.Sigmoid().forward(next_vars[3]),
                tfb.Sigmoid().forward(next_vars[4]),
                tfb.Sigmoid().forward(next_vars[5]),
            ],
            [1, 6],
        )
        mean_t = champ_GP_reg.mean_fn(next_guess)
        std_t = champ_GP_reg.stddev(index_points=next_guess)
        loss = tf.squeeze(mean_t - eta_t * std_t)
        grads = tape.gradient(loss, next_vars)
        optimizer_fast.apply_gradients(zip(grads, next_vars))
    return loss

num_iters = 10000

lls_ = np.zeros(num_iters, np.float64)
tolerance = 1e-6 # Set your desired tolerance level
previous_loss = float("inf")

for i in range(num_iters):
    loss = opt_var()
    lls_[i] = loss

    # Check if change in loss is less than tolerance
    if abs(loss - previous_loss) < tolerance:
        print(f"Acquisition function convergence reached at iteration {i+1}.")
        lls_ = lls_[range(i + 1)]
        break

    previous_loss = loss
print(loss)
for var in optimizer_fast.variables:
    var.assign(tf.zeros_like(var))

```

```

def new_eta_t(t, d, exploration_rate):
    return np.sqrt(np.log((t + 1) ** (d / 2 + 2) * np.pi**2 / (3 * exploration_rate)))

exploration_rate = 0.001
d = 6
update_freq = 20 # how many iterations before updating GP hyperparams
eta_t = tf.Variable(0,dtype=np.float64, name = "eta_t")

for t in range(801):
    print(index_vals[-1,:])
    optimizer_fast = tf.optimizers.Adam(learning_rate=0.01)
    optimizer_slow = tf.optimizers.Adam()
    eta_t.assign(new_eta_t(t, d, exploration_rate))
    print(eta_t)
    print(t)

    for var in next_vars:
        var.assign(my_seed.uniform(0,1))
    update_var()

    new_discrepancy = discrepancy_fn(
        next_alpha.numpy(),
        next_beta.numpy(),
        next_gamma_L.numpy(),
        next_lambda.numpy(),
        next_f.numpy(),
        next_r.numpy(),
    )

    index_vals = np.append(
        index_vals,
        np.array([
            next_alpha.numpy(),
            next_beta.numpy(),
            next_gamma_L.numpy(),
            next_lambda.numpy(),
            next_f.numpy(),
            next_r.numpy(),
        ]),
        axis=0
    ).reshape(1, -1),

```

```

        axis=0,
    )
obs_vals = np.append(obs_vals, new_discrepancy)

if t % update_freq == 0:
    champ_GP = tfd.GaussianProcess(
        kernel=kernel_champ,
        observation_noise_variance=observation_noise_variance_champ,
        index_points=index_vals,
        mean_fn=quad_mean_fn(),
    )
    update_GP()

champ_GP_reg = tfd.GaussianProcessRegressionModel(
    kernel=kernel_champ,
    observation_index_points=index_vals,
    observations=obs_vals,
    observation_noise_variance=observation_noise_variance_champ,
    predictive_noise_variance=0.0,
    mean_fn=quad_mean_fn(),
)
if (t > 0) & (t % 50 == 0):
    print("Trained parameters:")
    for var in champ_GP.trainable_variables:
        if "tp" in var.name or "bias" in var.name:
            print("{} is {}\n".format(var.name, var.numpy().round(3)))
        else:
            print(
                "{} is {}\n".format(
                    var.name, constrain_positive.forward(var).numpy().round(3)
                )
            )
    for var in vars:
        champ_GP_reg = tfd.GaussianProcessRegressionModel(
            kernel=kernel_champ,
            index_points=slice_indices_dfs_dict[var + "_gp_indices_df"].values,
            observation_index_points=index_vals,
            observations=obs_vals,
            observation_noise_variance=observation_noise_variance_champ,
            predictive_noise_variance=0.0,
            mean_fn=quad_mean_fn(),

```

```

)
GP_samples = champ_GP_reg.sample(gp_samp_no, seed=GP_seed)

plt.figure(figsize=(7, 4))
plt.scatter(
    slice_indices_dfs_dict[var + "_slice_indices_df"][var].values,
    slice_discrepancies_dict[var + "_slice_discrepancies"],
    label="Observations",
)
for i in range(gp_samp_no):
    plt.plot(
        slice_indices_dfs_dict[var + "_gp_indices_df"][var].values,
        GP_samples[i, :],
        c="r",
        alpha=0.1,
        label="Posterior Sample" if i == 0 else None,
    )
leg = plt.legend(loc="lower right")
for lh in leg.legend_handles:
    lh.set_alpha(1)
if var in ["f", "r"]:
    plt.xlabel("$" + var + "$ index points")
else:
    plt.xlabel("$\\" + var + "$ index points")
plt.ylabel("Discrepancy")
plt.savefig(
    "champagne_GP_images/" + var + "_slice_" + str(t) + "_bolfi_updates.pdf"
)
plt.show()

# print(index_vals[-600,:])
print(index_vals[-400,:])
print(index_vals[-200,:])
print(index_vals[-80,:])
print(index_vals[-40,:])
print(index_vals[-20,:])
print(index_vals[-8,:])
print(index_vals[-4,:])
print(index_vals[-2,:])
print(index_vals[-1,:])

```

[0.73704431 0.30911903 0.00761646 0.06693362 0.00576551 0.00166694]

```

<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=2.8458044138719067>
0
Acquisition function convergence reached at iteration 2666.
tf.Tensor(-2.309187769694058, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 7618.
[0.39222127 0.39970071 0.02899881 0.04791333 0.02846772 0.02929489]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=3.400637979087535>
1
Acquisition function convergence reached at iteration 1178.
tf.Tensor(-3.151306190601046, shape=(), dtype=float64)
[0.39487951 0.39981681 0.04249713 0.04680719 0.046578 0.03337252]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=3.686687429841778>
2
Acquisition function convergence reached at iteration 2543.
tf.Tensor(-3.305246813219561, shape=(), dtype=float64)
[0.40835275 0.39338596 0.02975687 0.05247209 0.02683019 0.03158347]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=3.8768640120092273>
3
Acquisition function convergence reached at iteration 1259.
tf.Tensor(-3.509227801897462, shape=(), dtype=float64)
[0.41004555 0.39981903 0.04738835 0.05583762 0.05032722 0.04325662]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.0181827141362465>
4
Acquisition function convergence reached at iteration 2163.
tf.Tensor(-3.6371103694838216, shape=(), dtype=float64)
[0.40687143 0.38160006 0.0289219 0.0429138 0.02982275 0.02913775]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.130060545337454>
5
Acquisition function convergence reached at iteration 2054.
tf.Tensor(-3.7916169237791197, shape=(), dtype=float64)
[0.40629115 0.39289556 0.0312214 0.03867972 0.03185103 0.02058918]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.222339814284184>
6
Acquisition function convergence reached at iteration 1356.
tf.Tensor(-3.896791759394204, shape=(), dtype=float64)
[0.41008226 0.38678692 0.04458384 0.04103846 0.04272747 0.02515729]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.3006755830232075>
7
Acquisition function convergence reached at iteration 1916.
tf.Tensor(-4.032487077785229, shape=(), dtype=float64)
[0.4096749 0.38915268 0.03175285 0.0342328 0.02415614 0.03340357]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.368606831553273>
8

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```

Acquisition function convergence reached at iteration 1168.
tf.Tensor(-4.219565708442147, shape=(), dtype=float64)
[0.4076555 0.38974835 0.04795489 0.03596518 0.04014226 0.03922979]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.428490513367174>
9
Acquisition function convergence reached at iteration 1351.
tf.Tensor(-4.27566462058356, shape=(), dtype=float64)
[0.41019269 0.38652918 0.0320604 0.04057736 0.01539951 0.02151896]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.481972682425082>
10
Acquisition function convergence reached at iteration 1314.
tf.Tensor(-4.015616403041395, shape=(), dtype=float64)
[0.36360715 0.37449679 0.04421902 0.04757495 0.03574059 0.03872505]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.5302467936032835>
11
Acquisition function convergence reached at iteration 1370.
tf.Tensor(-4.35096758859952, shape=(), dtype=float64)
[0.40965688 0.38884195 0.01234972 0.03760945 0.04381742 0.03097663]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.574204799669611>
12
Acquisition function convergence reached at iteration 1334.
tf.Tensor(-4.333494422343697, shape=(), dtype=float64)
[0.41097965 0.37971368 0.04249528 0.03764409 0.02711142 0.0388586 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.614530248041411>
13
Acquisition function convergence reached at iteration 1276.
tf.Tensor(-5.338554204635432, shape=(), dtype=float64)
[0.41086716 0.37805946 0.0433083 0.03244655 0.02796529 0.03686298]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.65175813725562>
14
Acquisition function convergence reached at iteration 1076.
tf.Tensor(-5.445165935868113, shape=(), dtype=float64)
[0.411166 0.38222448 0.04200616 0.04619803 0.0256091 0.04296929]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.686314796640505>
15
Acquisition function convergence reached at iteration 1209.
tf.Tensor(-4.972158758837441, shape=(), dtype=float64)
[0.41266722 0.3835551 0.03943173 0.03873072 0.0295043 0.03789836]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.718545271828375>
16
Acquisition function convergence reached at iteration 1430.
tf.Tensor(-4.976630903437041, shape=(), dtype=float64)
[0.41008617 0.37940924 0.02970003 0.03969996 0.0185638 0.04161414]
```

```

<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.748732625816456>
17
Acquisition function convergence reached at iteration 1137.
tf.Tensor(-5.006444124240583, shape=(), dtype=float64)
[0.41048308 0.38125216 0.06152601 0.04155748 0.02591028 0.03606652]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.7771118531854615>
18
Acquisition function convergence reached at iteration 1370.
tf.Tensor(-4.903092803252218, shape=(), dtype=float64)
[0.41086819 0.37811783 0.03909838 0.0414559 0.04546912 0.04076699]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.803880111928563>
19
Acquisition function convergence reached at iteration 1348.
tf.Tensor(-4.303666443983787, shape=(), dtype=float64)
[0.35788532 0.41323667 0.04808321 0.0599632 0.03963426 0.03782086]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.829204380705992>
20
Acquisition function convergence reached at iteration 1393.
tf.Tensor(-4.319556661743271, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 9712.
[0.34767597 0.33205069 0.04595902 0.07231087 0.04585296 0.05436473]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.853227279739165>
21
Acquisition function convergence reached at iteration 1336.
tf.Tensor(-4.321426346423761, shape=(), dtype=float64)
[0.38591592 0.40000031 0.05701782 0.05921195 0.06142341 0.06010885]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.876071558299629>
22
Acquisition function convergence reached at iteration 1325.
tf.Tensor(-4.342287617562223, shape=(), dtype=float64)
[0.40421177 0.4000041 0.05098002 0.08314323 0.05899695 0.04878352]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.897843598335144>
23
Acquisition function convergence reached at iteration 2203.
tf.Tensor(-4.363308787230102, shape=(), dtype=float64)
[0.45038767 0.39993746 0.02978643 0.06224236 0.03744022 0.03705094]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.918636181539943>
24
Acquisition function convergence reached at iteration 2400.
tf.Tensor(-4.382994784729975, shape=(), dtype=float64)
[0.36345592 0.39835685 0.04212001 0.03861909 0.02914413 0.03223746]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.938530697699493>
25

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Acquisition function convergence reached at iteration 1453.
tf.Tensor(-4.399321507336605, shape=(), dtype=float64)
[0.39920749 0.39999912 0.04639523 0.07221615 0.04342001 0.05871624]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.957598924079526>
26
Acquisition function convergence reached at iteration 1644.
tf.Tensor(-4.414850415858212, shape=(), dtype=float64)
[0.45698602 0.3999552 0.03858897 0.05407317 0.04855368 0.04254617]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.975904471841159>
27
Acquisition function convergence reached at iteration 2265.
tf.Tensor(-4.424209414197256, shape=(), dtype=float64)
[0.50329535 0.39943553 0.04889748 0.03640081 0.02917785 0.03729217]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=4.993503971355705>
28
Acquisition function convergence reached at iteration 1627.
tf.Tensor(-4.446055831287332, shape=(), dtype=float64)
[0.46628327 0.40004213 0.03521869 0.04485249 0.04593351 0.04537647]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.010448050855692>
29
Acquisition function convergence reached at iteration 3051.
tf.Tensor(-4.455121698050429, shape=(), dtype=float64)
[0.50050082 0.39643484 0.05887583 0.02544322 0.02801433 0.02753238]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.0267821500875245>
30
Acquisition function convergence reached at iteration 3196.
tf.Tensor(-4.4789151220815295, shape=(), dtype=float64)
[0.45460181 0.39985289 0.01767976 0.05548901 0.02952705 0.02447085]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.04254720116842>
31
Acquisition function convergence reached at iteration 1551.
tf.Tensor(-4.490708511970717, shape=(), dtype=float64)
[0.45810583 0.39998347 0.03526949 0.04492346 0.04419782 0.04888821]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.057780201762946>
32
Acquisition function convergence reached at iteration 1678.
tf.Tensor(-4.484990122946843, shape=(), dtype=float64)
[0.54345126 0.40007777 0.06142612 0.03600093 0.04499246 0.05030361]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.072514700332926>
33
Acquisition function convergence reached at iteration 3409.
tf.Tensor(-4.522665817306322, shape=(), dtype=float64)
[0.38065763 0.4 0.01756766 0.04831018 0.026127 0.02340583]
```

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<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.086781209120351>
34
Acquisition function convergence reached at iteration 1626.
tf.Tensor(-4.520215502795982, shape=(), dtype=float64)
[0.50900942 0.40004419 0.04333369 0.06590172 0.05192706 0.04946668]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.100607557369355>
35
Acquisition function convergence reached at iteration 1840.
tf.Tensor(-4.610602913488006, shape=(), dtype=float64)
[0.38072715 0.4           0.02395439 0.05402592 0.0454539 0.04310428]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.114019194844105>
36
Acquisition function convergence reached at iteration 1386.
tf.Tensor(-4.554906759887832, shape=(), dtype=float64)
[0.3935649 0.39999745 0.05062974 0.06073027 0.05597006 0.06031075]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.127039453782734>
37
Acquisition function convergence reached at iteration 2416.
tf.Tensor(-4.567157174139741, shape=(), dtype=float64)
[0.33879448 0.39999998 0.02903975 0.03456529 0.03348437 0.0311398 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.139689775916545>
38
Acquisition function convergence reached at iteration 2430.
tf.Tensor(-4.572066001241575, shape=(), dtype=float64)
[0.5014956 0.39911148 0.02578946 0.05506127 0.02800594 0.03161264]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.15198990998454>
39
Acquisition function convergence reached at iteration 2296.
tf.Tensor(-4.587028624734884, shape=(), dtype=float64)
[0.32285309 0.40265129 0.02650901 0.05746151 0.02926831 0.03872724]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.1639580842154755>
40
Acquisition function convergence reached at iteration 2193.
tf.Tensor(-4.600161648265507, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 3682.
[0.4574281 0.4002121 0.02947932 0.03441467 0.03880412 0.04018838]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.1756111574798265>
41
Acquisition function convergence reached at iteration 2600.
tf.Tensor(-4.673068465922283, shape=(), dtype=float64)
[0.45861697 0.39998613 0.02131616 0.03340367 0.03146831 0.03452002]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.186964752191848>
42

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```

Acquisition function convergence reached at iteration 2291.
tf.Tensor(-4.650688915858279, shape=(), dtype=float64)
[0.35394274 0.40008261 0.0204766 0.03057497 0.03695427 0.0381383 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.198033371536213>
43
Acquisition function convergence reached at iteration 2825.
tf.Tensor(-4.654930333565416, shape=(), dtype=float64)
[0.49210075 0.39998307 0.01784239 0.03552164 0.03094093 0.02677225]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.208830503180577>
44
Acquisition function convergence reached at iteration 2653.
tf.Tensor(-4.66454526978181, shape=(), dtype=float64)
[0.49225389 0.40000822 0.02402164 0.0484472 0.03116812 0.02961471]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.219368711296252>
45
Acquisition function convergence reached at iteration 2533.
tf.Tensor(-4.667093804004708, shape=(), dtype=float64)
[0.27687794 0.40000792 0.02415729 0.02983421 0.03321661 0.02878242]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.229659718429405>
46
Acquisition function convergence reached at iteration 2276.
tf.Tensor(-4.690119876178403, shape=(), dtype=float64)
[0.43251765 0.39999927 0.02509948 0.03780593 0.03613815 0.03558533]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.239714478533376>
47
Acquisition function convergence reached at iteration 2596.
tf.Tensor(-4.7829117054246515, shape=(), dtype=float64)
[0.45870141 0.39999849 0.02327989 0.0387237 0.02687835 0.03056972]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.2495432422798425>
48
Acquisition function convergence reached at iteration 2411.
tf.Tensor(-4.818249680731575, shape=(), dtype=float64)
[0.40776367 0.40006602 0.02336743 0.04109023 0.0349049 0.03656136]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.259155615605376>
49
Acquisition function convergence reached at iteration 2416.
tf.Tensor(-4.795006819008022, shape=(), dtype=float64)
[0.33842996 0.39999983 0.02093847 0.03381958 0.03248714 0.03585637]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.268560612314758>
50
Acquisition function convergence reached at iteration 2291.
tf.Tensor(-4.726029165139585, shape=(), dtype=float64)

Trained parameters:

```

```

amplitude_champ:0 is 0.897
length_scales_champ:0 is [1.000e-03 7.660e-01 6.000e-03 2.000e-03 2.270e-01 1.807e+00]
observation_noise_variance_champ:0 is 0.236
alpha_tp:0 is 0.452
amp_alpha_mean:0 is 2.752
amp_beta_mean:0 is 2.744
amp_f_mean:0 is 365.326
amp_gamma_L_mean:0 is 131.351
amp_lambda_mean:0 is 45.174
amp_r_mean:0 is 381.152
beta_tp:0 is 0.493
bias_mean:0 is -2.558
f_tp:0 is -0.012
gamma_L_tp:0 is 0.101
lambda_tp:0 is -0.081
r_tp:0 is 0.047
[0.38101606 0.39999813 0.01925825 0.03544881 0.03441068 0.03421918]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.277766701448631>
51
Acquisition function convergence reached at iteration 3179.
tf.Tensor(-4.730299912426762, shape=(), dtype=float64)
[0.46060734 0.4       0.03166048 0.06476252 0.02799777 0.02932284]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.286781850026861>
52
Acquisition function convergence reached at iteration 2824.
tf.Tensor(-4.722654424043598, shape=(), dtype=float64)
[0.5410709  0.39999976 0.03318628 0.04367172 0.03121513 0.02714811]

```

```

<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.295613561697473>
53
Acquisition function convergence reached at iteration 2197.
tf.Tensor(-4.818240243774092, shape=(), dtype=float64)
[0.39222874 0.39999702 0.01938538 0.05113109 0.0332088 0.03597919]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.304268911751664>
54
Acquisition function convergence reached at iteration 2621.
tf.Tensor(-4.75779732246009, shape=(), dtype=float64)
[0.38785952 0.4       0.02053982 0.06472819 0.03288635 0.03354763]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.312754578906179>
55
Acquisition function convergence reached at iteration 2581.
tf.Tensor(-4.7647527645873655, shape=(), dtype=float64)
[0.39502186 0.4       0.02553447 0.07475436 0.03351474 0.03161193]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.321076874203715>
56
Acquisition function convergence reached at iteration 2771.
tf.Tensor(-4.772219997756265, shape=(), dtype=float64)
[0.3794453 0.4       0.02766004 0.07091826 0.03120052 0.03140658]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.329241767338476>
57
Acquisition function convergence reached at iteration 2759.
tf.Tensor(-4.779027239747134, shape=(), dtype=float64)
[0.38675251 0.4       0.02928506 0.08346648 0.0282955 0.03293968]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.337254910676594>
58
Acquisition function convergence reached at iteration 2173.
tf.Tensor(-4.785016099885396, shape=(), dtype=float64)
[0.38837033 0.4       0.04569338 0.07779634 0.03704141 0.03410125]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.345121661208782>
59
Acquisition function convergence reached at iteration 2998.
tf.Tensor(-4.823228295889366, shape=(), dtype=float64)
[0.43336763 0.39999999 0.02489411 0.03473333 0.02667601 0.02639567]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.352847100644608>
60
Acquisition function convergence reached at iteration 3374.
tf.Tensor(-4.8878726306257505, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 6598.
[0.53999588 0.4       0.02563959 0.04563393 0.02265362 0.02382176]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.360436053833521>
61

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Acquisition function convergence reached at iteration 2850.
tf.Tensor(-4.597952446732367, shape=(), dtype=float64)
[0.39769441 0.4       0.02446628 0.09512691 0.0297661  0.03087229]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.367893105676611>
62
Acquisition function convergence reached at iteration 2110.
tf.Tensor(-4.6026529052006016, shape=(), dtype=float64)
[0.39421413 0.4       0.0431165  0.09343312 0.03563467 0.03288653]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.375222616674698>
63
Acquisition function convergence reached at iteration 2249.
tf.Tensor(-4.607954390716736, shape=(), dtype=float64)
[0.39638987 0.4       0.0552633  0.08992418 0.03526798 0.03663856]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.382428737242233>
64
Acquisition function convergence reached at iteration 1717.
tf.Tensor(-4.61719893967234, shape=(), dtype=float64)
[0.42052703 0.40000081 0.03196141 0.04278183 0.04579385 0.04681095]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.389515420902417>
65
Acquisition function convergence reached at iteration 1595.
tf.Tensor(-4.791195841276787, shape=(), dtype=float64)
[0.3800692 0.40000001 0.02438888 0.03421248 0.04966363 0.05398785]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.39648643646657>
66
Acquisition function convergence reached at iteration 1545.
tf.Tensor(-5.829877293447355, shape=(), dtype=float64)
[0.41094103 0.39999807 0.04056329 0.03762096 0.04779909 0.05135133]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.403345379289886>
67
Acquisition function convergence reached at iteration 2290.
tf.Tensor(-4.63187675985538, shape=(), dtype=float64)
[0.39288867 0.4       0.06646759 0.07637107 0.03786858 0.03393615]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.410095681686149>
68
Acquisition function convergence reached at iteration 1494.
tf.Tensor(-4.63175698049226, shape=(), dtype=float64)
[0.48823564 0.4       0.05251663 0.04089425 0.04663016 0.05509501]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.4167406225755>
69
Acquisition function convergence reached at iteration 1296.
tf.Tensor(-4.64138444562995, shape=(), dtype=float64)
[0.4381152 0.4       0.05372258 0.07841659 0.05997675 0.05885572]

```

```

<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.423283336431853>
70
Acquisition function convergence reached at iteration 1526.
tf.Tensor(-4.634464329841863, shape=(), dtype=float64)
[0.52636454 0.40000002 0.05683071 0.03166269 0.04637746 0.05323692]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.429726821589932>
71
Acquisition function convergence reached at iteration 1501.
tf.Tensor(-4.655576640166305, shape=(), dtype=float64)
[0.41930723 0.4       0.04989705 0.07169825 0.04194179 0.05616176]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.436073947966012>
72
Acquisition function convergence reached at iteration 1280.
tf.Tensor(-4.659862692893843, shape=(), dtype=float64)
[0.41476596 0.4       0.03202899 0.09386623 0.06093315 0.05439278]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.442327464241166>
73
Acquisition function convergence reached at iteration 1811.
tf.Tensor(-4.669095372377587, shape=(), dtype=float64)
[0.39905609 0.40000001 0.02532997 0.06565698 0.04455912 0.03737449]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.448490004551204>
74
Acquisition function convergence reached at iteration 2180.
tf.Tensor(-4.742575236916147, shape=(), dtype=float64)
[0.38074356 0.4       0.01817622 0.04637556 0.03730235 0.03364466]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.454564094723288>
75
Acquisition function convergence reached at iteration 2097.
tf.Tensor(-4.715552619496175, shape=(), dtype=float64)
[0.41798863 0.39999979 0.03466218 0.04332527 0.0409082  0.036062  ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.460552158095484>
76
Acquisition function convergence reached at iteration 2673.
tf.Tensor(-4.687830528758045, shape=(), dtype=float64)
[0.36016378 0.40000001 0.03543288 0.06205937 0.02918419 0.02991268]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.466456520952196>
77
Acquisition function convergence reached at iteration 1513.
tf.Tensor(-4.688130976970958, shape=(), dtype=float64)
[0.41997828 0.39999997 0.04765876 0.05681026 0.04542684 0.05603189]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.472279417605422>
78
Acquisition function convergence reached at iteration 2341.

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tf.Tensor(-4.763396278231029, shape=(), dtype=float64)
[0.39069609 0.39999999 0.03096858 0.04714076 0.03718037 0.03516395]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.478022995149093>
79
Acquisition function convergence reached at iteration 1333.
tf.Tensor(-4.693248983285064, shape=(), dtype=float64)
[0.42739295 0.4      0.08529161 0.04623668 0.0500154 0.05660672]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.483689317911348>
80
Acquisition function convergence reached at iteration 1477.
tf.Tensor(-4.70239132245431, shape=(), dtype=float64)
[0.40655038 0.4      0.05470165 0.06444152 0.04966881 0.05057497]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.489280371627422>
81
Acquisition function convergence reached at iteration 2300.
tf.Tensor(-4.632797246432374, shape=(), dtype=float64)
[0.40048665 0.4      0.07437208 0.10018965 0.03411694 0.03593096]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.494798067353869>
82
Acquisition function convergence reached at iteration 3408.
tf.Tensor(-4.637394223561755, shape=(), dtype=float64)
[0.40329226 0.4      0.07242825 0.09729101 0.01867543 0.02699183]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.500244245143064>
83
Acquisition function convergence reached at iteration 1368.
tf.Tensor(-4.646664980276456, shape=(), dtype=float64)
[0.39877231 0.40000234 0.06670325 0.0475041 0.05469407 0.05806779]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.505620677495354>
84
Acquisition function convergence reached at iteration 1473.
tf.Tensor(-4.648862888365025, shape=(), dtype=float64)
[0.40173775 0.39999994 0.0745423 0.05796796 0.04539341 0.05659415]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.51092907260476>
85
Acquisition function convergence reached at iteration 2261.
tf.Tensor(-4.651458674629808, shape=(), dtype=float64)
[0.40027138 0.4      0.08575472 0.07676399 0.03047309 0.03596722]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.516171077412824>
86
Acquisition function convergence reached at iteration 1823.
tf.Tensor(-4.6530652804541255, shape=(), dtype=float64)
[0.40164217 0.4      0.08196494 0.09182606 0.04843319 0.04708557]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.5213482804840215>

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87
Acquisition function convergence reached at iteration 2423.
tf.Tensor(-4.661307402764324, shape=(), dtype=float64)
[0.39954485 0.4      0.0340736 0.12235397 0.03188872 0.0344354 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.526462214715082>
88
Acquisition function convergence reached at iteration 2760.
tf.Tensor(-4.665499878281962, shape=(), dtype=float64)
[0.39897241 0.4      0.03717189 0.11973886 0.02967405 0.03143621]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.531514359889536>
89
Acquisition function convergence reached at iteration 2157.
tf.Tensor(-4.668844464916544, shape=(), dtype=float64)
[0.40045218 0.4      0.05145524 0.11982574 0.035107 0.03474353]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.536506145087991>
90
Acquisition function convergence reached at iteration 2143.
tf.Tensor(-4.672893711736829, shape=(), dtype=float64)
[0.40075127 0.4      0.05468475 0.11689471 0.03193935 0.03477011]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.541438950963732>
91
Acquisition function convergence reached at iteration 2411.
tf.Tensor(-4.675724930237035, shape=(), dtype=float64)
[0.40065785 0.4      0.06275743 0.11476217 0.03936671 0.03634271]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.54631411189261>
92
Acquisition function convergence reached at iteration 1523.
tf.Tensor(-4.677537766196998, shape=(), dtype=float64)
[0.40187519 0.4      0.07123151 0.09666571 0.06998756 0.05040348]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.551132918005373>
93
Acquisition function convergence reached at iteration 3707.
tf.Tensor(-4.685817891202351, shape=(), dtype=float64)
[0.40116226 0.4      0.08143204 0.07353701 0.01741473 0.01978326]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.555896617110107>
94
Acquisition function convergence reached at iteration 2389.
tf.Tensor(-4.6850165004395565, shape=(), dtype=float64)
[0.39990757 0.4      0.08255019 0.13022031 0.03145375 0.03843271]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.560606416511782>
95
Acquisition function convergence reached at iteration 2284.
tf.Tensor(-4.688701516178463, shape=(), dtype=float64)

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[0.39988819 0.4      0.09510771 0.11930296 0.03023225 0.03790519]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.565263484735448>
96
Acquisition function convergence reached at iteration 2351.
tf.Tensor(-4.692795793517543, shape=(), dtype=float64)
[0.39987027 0.4      0.0823805 0.12958211 0.03883529 0.03055951]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.569868953159103>
97
Acquisition function convergence reached at iteration 2150.
tf.Tensor(-4.696816382509944, shape=(), dtype=float64)
[0.39984627 0.4      0.08217549 0.12944106 0.03237817 0.03307561]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.574423917561866>
98
Acquisition function convergence reached at iteration 2283.
tf.Tensor(-4.700567040493841, shape=(), dtype=float64)
[0.39983913 0.4      0.0821853 0.12933962 0.03495313 0.03232737]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.578929439592625>
99
Acquisition function convergence reached at iteration 2568.
tf.Tensor(-4.708276486744551, shape=(), dtype=float64)
[0.39862746 0.4      0.09533915 0.06231239 0.0330604 0.03221778]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.583386548164038>
100
Acquisition function convergence reached at iteration 2403.
tf.Tensor(-4.708151024233074, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 8146.
Trained parameters:
amplitude_champ:0 is 0.849

length_scales_champ:0 is [1.2000e-01 3.5158e+01 1.5000e-02 1.0000e-03 1.3000e-02 2.3900e-01]

observation_noise_variance_champ:0 is 0.237

alpha_tp:0 is 0.352

amp_alpha_mean:0 is 0.63

amp_beta_mean:0 is 0.681

amp_f_mean:0 is 452.428

amp_gamma_L_mean:0 is 239.208

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amp_lambda_mean:0 is 30.884
amp_r_mean:0 is 88.926
beta_tp:0 is 0.43
bias_mean:0 is -2.324
f_tp:0 is 0.017
gamma_L_tp:0 is 0.051
lambda_tp:0 is -0.212
r_tp:0 is 0.062
[0.39982988 0.4      0.08208838 0.12929694 0.03189675 0.03511164]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.587796240776338>
101
Acquisition function convergence reached at iteration 2571.
tf.Tensor(-4.7386783194562785, shape=(), dtype=float64)
[0.39992767 0.4      0.02333883 0.11943916 0.02836862 0.03516761]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.59215948477518>
102
Acquisition function convergence reached at iteration 2677.
tf.Tensor(-4.737759803227666, shape=(), dtype=float64)
[0.40000021 0.4      0.02282541 0.15704581 0.02796285 0.03128569]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.596477218547369>
103
Acquisition function convergence reached at iteration 2664.
tf.Tensor(-4.746004656656882, shape=(), dtype=float64)
[0.39994361 0.4      0.02684805 0.11952997 0.03053384 0.02902482]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.600750352658155>
104
Acquisition function convergence reached at iteration 2824.
tf.Tensor(-4.7496112306946525, shape=(), dtype=float64)
[0.39993913 0.4      0.02573419 0.11949853 0.030051  0.03248311]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.604979770933448>
105
Acquisition function convergence reached at iteration 4303.
tf.Tensor(-4.749698504172234, shape=(), dtype=float64)
[0.39988867 0.4      0.00428368 0.14797986 0.02028256 0.02060216]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.609166331490123>

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106
Acquisition function convergence reached at iteration 2539.
tf.Tensor(-4.756823693081349, shape=(), dtype=float64)
[0.3999365 0.4 0.02385935 0.11942087 0.03199172 0.0307645 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.613310867717369>
107
Acquisition function convergence reached at iteration 2590.
tf.Tensor(-4.760325338107154, shape=(), dtype=float64)
[0.39993801 0.4 0.02500933 0.11947109 0.03065455 0.03113174]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.617414189211843>
108
Acquisition function convergence reached at iteration 2760.
tf.Tensor(-4.763764102320114, shape=(), dtype=float64)
[0.39994022 0.4 0.0267276 0.11953713 0.02877094 0.03193926]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.62147708266919>
109
Acquisition function convergence reached at iteration 2606.
tf.Tensor(-4.7626967691150695, shape=(), dtype=float64)
[0.40000021 0.4 0.02128752 0.15685353 0.02687318 0.03326536]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.625500312734371>
110
Acquisition function convergence reached at iteration 2521.
tf.Tensor(-4.770704391572303, shape=(), dtype=float64)
[0.3999279 0.4 0.02277654 0.11941239 0.02948617 0.0344573 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.629484622813025>
111
Acquisition function convergence reached at iteration 4504.
tf.Tensor(-4.7705328622810255, shape=(), dtype=float64)
[0.39988221 0.4 0.00463995 0.14794568 0.01851443 0.02108637]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.633430735846011>
112
Acquisition function convergence reached at iteration 2572.
tf.Tensor(-4.777407403568634, shape=(), dtype=float64)
[0.39994181 0.4 0.02505445 0.11945447 0.0325634 0.02850614]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.637339355049091>
113
Acquisition function convergence reached at iteration 2646.
tf.Tensor(-4.780702526984563, shape=(), dtype=float64)
[0.39994296 0.4 0.02670394 0.11952691 0.03030448 0.02936953]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.641211164619622>
114
Acquisition function convergence reached at iteration 2710.
tf.Tensor(-4.779379040746952, shape=(), dtype=float64)

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[0.4000002 0.4          0.02405794 0.15716332 0.02710058 0.03083549]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.645046830412007>
115
Acquisition function convergence reached at iteration 2663.
tf.Tensor(-4.787245754888233, shape=(), dtype=float64)
[0.39994385 0.4          0.02537825 0.11945793 0.03326424 0.02785061]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.648847000583536>
116
Acquisition function convergence reached at iteration 2707.
tf.Tensor(-4.790469208737188, shape=(), dtype=float64)
[0.39994219 0.4          0.02484862 0.11943892 0.03334507 0.02897156]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.65261230621216>
117
Acquisition function convergence reached at iteration 2689.
tf.Tensor(-4.793676501175027, shape=(), dtype=float64)
[0.3999378 0.4          0.02402074 0.11942072 0.03248354 0.03119565]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.656343361887649>
118
Acquisition function convergence reached at iteration 2642.
tf.Tensor(-4.796856116228314, shape=(), dtype=float64)
[0.39993629 0.4          0.02376285 0.11941697 0.03205121 0.03167154]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.660040766277488>
119
Acquisition function convergence reached at iteration 2635.
tf.Tensor(-4.799981112998103, shape=(), dtype=float64)
[0.39994319 0.4          0.02587034 0.11948776 0.03189353 0.0286832 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.663705102668794>
120
Acquisition function convergence reached at iteration 4767.
tf.Tensor(-4.799581748158871, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 8040.
[0.39988438 0.4          0.00465298 0.14795927 0.01886581 0.01898832]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.667336939487462>
121
Acquisition function convergence reached at iteration 2964.
tf.Tensor(-4.483486428427416, shape=(), dtype=float64)
[0.4          0.4          0.0246832 0.11877453 0.02261895 0.07435922]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.670936830795677>
122
Acquisition function convergence reached at iteration 3384.
tf.Tensor(-4.488721871495695, shape=(), dtype=float64)
[0.39999996 0.4          0.02012694 0.08780017 0.01509151 0.07892767]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.6745053167688555>

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123
Acquisition function convergence reached at iteration 2254.
tf.Tensor(-5.4412286322174435, shape=(), dtype=float64)
[0.39898515 0.39999999 0.04245806 0.03783557 0.02573646 0.04596924]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.678042924153034>
124
Acquisition function convergence reached at iteration 4213.
tf.Tensor(-4.620247065390541, shape=(), dtype=float64)
[0.40006201 0.4 0.00310549 0.04460241 0.03265717 0.05110333]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.681550166703645>
125
Acquisition function convergence reached at iteration 3670.
tf.Tensor(-4.495517977667226, shape=(), dtype=float64)
[0.39999998 0.4 0.01871792 0.11885613 0.06330985 0.01153609]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.685027545606599>
126
Acquisition function convergence reached at iteration 2628.
tf.Tensor(-4.501502587849123, shape=(), dtype=float64)
[0.40000195 0.4 0.02870452 0.05538507 0.02894397 0.07652117]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.688475549882491>
127
Acquisition function convergence reached at iteration 2684.
tf.Tensor(-4.500251543250833, shape=(), dtype=float64)
[0.4 0.4 0.021494 0.11543815 0.0219718 0.07831763]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.691894656774771>
128
Acquisition function convergence reached at iteration 4023.
tf.Tensor(-4.506779546707093, shape=(), dtype=float64)
[0.40000002 0.4 0.01386327 0.0695431 0.00820011 0.07294108]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.695285332122592>
129
Acquisition function convergence reached at iteration 2446.
tf.Tensor(-4.505428520564444, shape=(), dtype=float64)
[0.39999994 0.4 0.03170812 0.06976244 0.03456653 0.10174875]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.698648030719092>
130
Acquisition function convergence reached at iteration 2082.
tf.Tensor(-4.505768041618549, shape=(), dtype=float64)
[0.39999998 0.4 0.03226858 0.12105013 0.05846374 0.06947307]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.701983196655764>
131
Acquisition function convergence reached at iteration 2783.
tf.Tensor(-4.510821365052404, shape=(), dtype=float64)

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[0.39999999 0.4      0.02441891 0.11326535 0.0187425 0.0791815 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.705291263653557>
132
Acquisition function convergence reached at iteration 2644.
tf.Tensor(-4.5175687651973355, shape=(), dtype=float64)
[0.4000004 0.4      0.03012396 0.05997576 0.07073146 0.01957029]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.7085726553813245>
133
Acquisition function convergence reached at iteration 2163.
tf.Tensor(-4.513057509551823, shape=(), dtype=float64)
[0.39999997 0.4      0.03367109 0.11985924 0.05662828 0.07157492]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.711827785762187>
134
Acquisition function convergence reached at iteration 2704.
tf.Tensor(-4.519567258192363, shape=(), dtype=float64)
[0.4000001 0.4      0.02866309 0.07710462 0.09218533 0.02357952]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.715057059268358>
135
Acquisition function convergence reached at iteration 3282.
tf.Tensor(-4.521055739167569, shape=(), dtype=float64)
[0.39999999 0.4      0.02181489 0.11184766 0.0158803 0.07814843]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.718260871204938>
136
Acquisition function convergence reached at iteration 2069.
tf.Tensor(-4.520687668868126, shape=(), dtype=float64)
[0.39999986 0.4      0.03570051 0.08896554 0.05023657 0.10614362]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.721439607983191>
137
Acquisition function convergence reached at iteration 2199.
tf.Tensor(-4.522873164503439, shape=(), dtype=float64)
[0.39999996 0.4      0.03337087 0.11945445 0.05728542 0.07213586]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.724593647383741>
138
Acquisition function convergence reached at iteration 2475.
tf.Tensor(-4.527231358977615, shape=(), dtype=float64)
[0.39999998 0.4      0.02921834 0.11099266 0.02703954 0.08449716]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.7277233588101435>
139
Acquisition function convergence reached at iteration 3432.
tf.Tensor(-4.531826914757931, shape=(), dtype=float64)
[0.39999998 0.4      0.02080723 0.11617532 0.06715947 0.01096524]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.730829103533246>
140

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Acquisition function convergence reached at iteration 2529.
tf.Tensor(-4.530620407347175, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 8842.
[0.39999998 0.4         0.0284731  0.12187893 0.07703322 0.04911546]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.733911234926744>
141
Acquisition function convergence reached at iteration 1911.
tf.Tensor(-4.2142079253251685, shape=(), dtype=float64)
[0.4         0.4         0.03278073 0.07294277 0.06163685 0.08786111]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.736970098694289>
142
Acquisition function convergence reached at iteration 2115.
tf.Tensor(-4.214775100228686, shape=(), dtype=float64)
[0.4         0.4         0.03237073 0.09493943 0.05814609 0.08571172]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.74000603308854>
143
Acquisition function convergence reached at iteration 2017.
tf.Tensor(-4.215297549276589, shape=(), dtype=float64)
[0.4         0.4         0.03437734 0.09226173 0.09213624 0.0810474 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.7430193691224565>
144
Acquisition function convergence reached at iteration 2104.
tf.Tensor(-4.220312732510172, shape=(), dtype=float64)
[0.4         0.4         0.02933491 0.11888626 0.04197894 0.06138046]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.746010430773208>
145
Acquisition function convergence reached at iteration 2954.
tf.Tensor(-4.225200268703818, shape=(), dtype=float64)
[0.4         0.4         0.02450467 0.1099376 0.01492057 0.06467504]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.748979535178961>
146
Acquisition function convergence reached at iteration 2222.
tf.Tensor(-4.223053075653072, shape=(), dtype=float64)
[0.4         0.4         0.03129684 0.11898151 0.05108574 0.06100215]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.751926992828873>
147
Acquisition function convergence reached at iteration 2364.
tf.Tensor(-4.2253011295624505, shape=(), dtype=float64)
[0.4         0.4         0.02523827 0.11810293 0.04987214 0.06312071]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.75485310774655>
148
Acquisition function convergence reached at iteration 2370.
tf.Tensor(-4.227008722303838, shape=(), dtype=float64)

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```
[0.4      0.4      0.03272586 0.11789508 0.0488401  0.06338876]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.7577581776672515>
149
Acquisition function convergence reached at iteration 2157.
tf.Tensor(-4.229151038909848, shape=(), dtype=float64)
[0.4      0.4      0.03128091 0.11760014 0.04829916 0.06387052]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.760642494209083>
150
Acquisition function convergence reached at iteration 2072.
tf.Tensor(-4.23125310777267, shape=(), dtype=float64)
Trained parameters:
amplitude_champ:0 is 0.736

length_scales_champ:0 is [8.264400e+01 3.606616e+03 3.700000e-02 2.000000e-03 7.000000e-03
 5.000000e-03]

observation_noise_variance_champ:0 is 0.294

alpha_tp:0 is 0.092

amp_alpha_mean:0 is 0.475

amp_beta_mean:0 is 1.122

amp_f_mean:0 is 281.025

amp_gamma_L_mean:0 is 258.618

amp_lambda_mean:0 is 32.9

amp_r_mean:0 is 97.459

beta_tp:0 is 0.532

bias_mean:0 is -2.131

f_tp:0 is 0.021

gamma_L_tp:0 is 0.048

lambda_tp:0 is -0.196

r_tp:0 is 0.032
```

```

[0.4      0.4      0.02850548 0.11677041 0.0472546  0.06579625]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.763506343038429>
151
Acquisition function convergence reached at iteration 2160.
tf.Tensor(-4.231898164033211, shape=(), dtype=float64)
[0.4      0.4      0.03435594 0.11844761 0.074721   0.07501499]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.766350004029846>
152
Acquisition function convergence reached at iteration 3328.
tf.Tensor(-4.240391466781785, shape=(), dtype=float64)
[0.4      0.4      0.02129627 0.10709176 0.01023687 0.06170775]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.769173751420646>
153
Acquisition function convergence reached at iteration 2491.
tf.Tensor(-4.236882486457269, shape=(), dtype=float64)
[0.4      0.4      0.02705135 0.11608581 0.04906792 0.06924401]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.771977853960379>
154
Acquisition function convergence reached at iteration 1914.
tf.Tensor(-4.2359827940745705, shape=(), dtype=float64)
[0.4      0.4      0.03506168 0.12016738 0.06921067 0.10218224]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.774762575055403>
155
Acquisition function convergence reached at iteration 1840.
tf.Tensor(-4.23972752091369, shape=(), dtype=float64)
[0.4      0.4      0.03150439 0.117749   0.07685688 0.07513189]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.777528172908754>
156
Acquisition function convergence reached at iteration 2255.
tf.Tensor(-4.2414903527864976, shape=(), dtype=float64)
[0.4      0.4      0.03349982 0.1174545  0.0703498  0.07496787]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.780274900655475>
157
Acquisition function convergence reached at iteration 2120.
tf.Tensor(-4.243102804226605, shape=(), dtype=float64)
[0.4      0.4      0.0324991  0.11707398 0.08357797 0.07502295]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.7830030064935976>
158
Acquisition function convergence reached at iteration 3190.
tf.Tensor(-4.248329605066302, shape=(), dtype=float64)
[0.4      0.4      0.0204802  0.10931514 0.01809696 0.10315807]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.785712733810931>

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159
Acquisition function convergence reached at iteration 2853.
tf.Tensor(-4.2489706821376485, shape=(), dtype=float64)
[0.4      0.4      0.02137498 0.1539949 0.02828632 0.07047685]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.788404321307828>
160
Acquisition function convergence reached at iteration 1909.
tf.Tensor(-4.247563269258769, shape=(), dtype=float64)
[0.4      0.4      0.03487026 0.11895635 0.06517518 0.10823015]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.7910780031160645>
161
Acquisition function convergence reached at iteration 2343.
tf.Tensor(-4.1204336363749405, shape=(), dtype=float64)
[0.4      0.4      0.03365373 0.11640477 0.05951989 0.11867326]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.7937340089139955>
162
Acquisition function convergence reached at iteration 2842.
tf.Tensor(-4.131656276179988, shape=(), dtype=float64)
[0.4      0.4      0.02603762 0.09706672 0.07426003 0.01824988]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.796372564038117>
163
Acquisition function convergence reached at iteration 2034.
tf.Tensor(-4.123687943663473, shape=(), dtype=float64)
[0.4      0.4      0.03427555 0.11876444 0.07153674 0.10485638]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.798993889591171>
164
Acquisition function convergence reached at iteration 2340.
tf.Tensor(-4.1312378357962025, shape=(), dtype=float64)
[0.4      0.4      0.03157873 0.12128808 0.07531226 0.03779928]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.80159820254691>
165
Acquisition function convergence reached at iteration 2907.
tf.Tensor(-4.131715684458494, shape=(), dtype=float64)
[0.4      0.4      0.02257492 0.15459862 0.026802 0.07086207]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.804185715851673>
166
Acquisition function convergence reached at iteration 2982.
tf.Tensor(-4.133719015882856, shape=(), dtype=float64)
[0.4      0.4      0.02462673 0.15391139 0.02148907 0.07027605]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.806756638522844>
167
Acquisition function convergence reached at iteration 2113.
tf.Tensor(-4.136558664102346, shape=(), dtype=float64)

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[0.4      0.4      0.02761002 0.12047391 0.07265302 0.03712072]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.809311175744349>
168
Acquisition function convergence reached at iteration 2202.
tf.Tensor(-4.132698587047547, shape=(), dtype=float64)
[0.4      0.4      0.0363788 0.11859013 0.06635588 0.10672288]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.811849528959274>
169
Acquisition function convergence reached at iteration 1988.
tf.Tensor(-4.134548925564404, shape=(), dtype=float64)
[0.4      0.4      0.03517256 0.11811332 0.08068737 0.10310427]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.814371895959711>
170
Acquisition function convergence reached at iteration 2609.
tf.Tensor(-4.140948962535363, shape=(), dtype=float64)
[0.4      0.4      0.02932669 0.119863   0.091377   0.03789409]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.816878470973937>
171
Acquisition function convergence reached at iteration 2432.
tf.Tensor(-4.141946477445977, shape=(), dtype=float64)
[0.4      0.4      0.03110689 0.1184105  0.09847873 0.03785715]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.819369444751014>
172
Acquisition function convergence reached at iteration 3226.
tf.Tensor(-4.144337722318713, shape=(), dtype=float64)
[0.4      0.4      0.02079816 0.15497277 0.02989259 0.07084265]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.821845004642898>
173
Acquisition function convergence reached at iteration 2171.
tf.Tensor(-4.145074036858813, shape=(), dtype=float64)
[0.4      0.4      0.03465488 0.11779521 0.10094597 0.03749079]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.824305334684163>
174
Acquisition function convergence reached at iteration 2257.
tf.Tensor(-4.145781435415704, shape=(), dtype=float64)
[0.4      0.4      0.03235734 0.11830393 0.10439386 0.05523722]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.826750615669388>
175
Acquisition function convergence reached at iteration 3024.
tf.Tensor(-4.149594778996263, shape=(), dtype=float64)
[0.4      0.4      0.0210209 0.15499473 0.03005409 0.07085365]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.829181025228327>
176

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Acquisition function convergence reached at iteration 2906.
tf.Tensor(-4.151519570279392, shape=(), dtype=float64)
[0.4      0.4      0.02448744 0.15407315 0.02276224 0.07051147]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.831596737898914>
177
Acquisition function convergence reached at iteration 2726.
tf.Tensor(-4.152115503972422, shape=(), dtype=float64)
[0.4      0.4      0.02525542 0.11530819 0.10870398 0.03899221]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.833997925198174>
178
Acquisition function convergence reached at iteration 2425.
tf.Tensor(-4.152024750873963, shape=(), dtype=float64)
[0.4      0.4      0.03240612 0.11644347 0.10378445 0.06672662]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.836384755691136>
179
Acquisition function convergence reached at iteration 2891.
tf.Tensor(-4.156528504219557, shape=(), dtype=float64)
[0.4      0.4      0.01995423 0.15494575 0.02972109 0.07079778]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.838757395057784>
180
Acquisition function convergence reached at iteration 2768.
tf.Tensor(-4.158349303777713, shape=(), dtype=float64)
[0.4      0.4      0.02196786 0.15438453 0.02523525 0.07069563]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.841116006158138>
181
Acquisition function convergence reached at iteration 3133.
tf.Tensor(-4.086776849981956, shape=(), dtype=float64)
[0.4      0.4      0.02327285 0.15651425 0.02758274 0.07299991]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.843460749095516>
182
Acquisition function convergence reached at iteration 3209.
tf.Tensor(-4.088386242055966, shape=(), dtype=float64)
[0.4      0.4      0.02239666 0.15674508 0.02932339 0.07291865]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.84579178127803>
183
Acquisition function convergence reached at iteration 3339.
tf.Tensor(-4.09004013898032, shape=(), dtype=float64)
[0.4      0.4      0.02216687 0.15674692 0.02915659 0.07289158]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.848109257478391>
184
Acquisition function convergence reached at iteration 3173.
tf.Tensor(-4.09164933900352, shape=(), dtype=float64)
[0.4      0.4      0.02080102 0.15691992 0.0307267 0.07276309]

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<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.8504133298920715>
185
Acquisition function convergence reached at iteration 2934.
tf.Tensor(-4.093302122600917, shape=(), dtype=float64)
[0.4      0.4      0.02252099 0.15668187 0.0284431  0.07290997]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.852704148193872>
186
Acquisition function convergence reached at iteration 3974.
tf.Tensor(-4.095339297393041, shape=(), dtype=float64)
[0.4      0.4      0.01680486 0.10431613 0.0094426  0.11817923]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.854981859592955>
187
Acquisition function convergence reached at iteration 2310.
tf.Tensor(-4.091540148779675, shape=(), dtype=float64)
[0.4      0.4      0.02783442 0.11356551 0.06435067 0.12822173]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.857246608886383>
188
Acquisition function convergence reached at iteration 3133.
tf.Tensor(-4.098066647897653, shape=(), dtype=float64)
[0.4      0.4      0.01989295 0.15699243 0.03136677 0.0726732 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.8594985385112315>
189
Acquisition function convergence reached at iteration 2084.
tf.Tensor(-4.093715197001255, shape=(), dtype=float64)
[0.4      0.4      0.03464598 0.11350421 0.08552074 0.12077791]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.861737788595288>
190
Acquisition function convergence reached at iteration 2951.
tf.Tensor(-4.101242708578067, shape=(), dtype=float64)
[0.4      0.4      0.02072775 0.15686052 0.03014588 0.07278029]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.863964497006418>
191
Acquisition function convergence reached at iteration 2425.
tf.Tensor(-4.187385929875176, shape=(), dtype=float64)
[0.4      0.4      0.08380542 0.03607576 0.06259391 0.05159543]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.8661787994006165>
192
Acquisition function convergence reached at iteration 2954.
tf.Tensor(-4.104394652408546, shape=(), dtype=float64)
[0.4      0.4      0.02150762 0.1567082  0.0286932  0.07285184]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.868380829268792>
193
Acquisition function convergence reached at iteration 3019.

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tf.Tensor(-4.105984838541143, shape=(), dtype=float64)
[0.4      0.4      0.02305774 0.15646789 0.02630339 0.07287417]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.870570717982329>
194
Acquisition function convergence reached at iteration 3101.
tf.Tensor(-4.107462170049533, shape=(), dtype=float64)
[0.4      0.4      0.02398067 0.15651    0.02680875 0.07295633]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.872748594837464>
195
Acquisition function convergence reached at iteration 3024.
tf.Tensor(-4.1090262933540425, shape=(), dtype=float64)
[0.4      0.4      0.02250573 0.15656468 0.02733698 0.07288918]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.874914587098503>
196
Acquisition function convergence reached at iteration 2181.
tf.Tensor(-4.103874600406675, shape=(), dtype=float64)
[0.4      0.4      0.03565506 0.11684397 0.09693726 0.1016084 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.877068820039927>
197
Acquisition function convergence reached at iteration 3100.
tf.Tensor(-4.112055528499073, shape=(), dtype=float64)
[0.4      0.4      0.02324692 0.15651395 0.02675438 0.07290201]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.879211416987425>
198
Acquisition function convergence reached at iteration 2294.
tf.Tensor(-4.3009072203568905, shape=(), dtype=float64)
[0.4      0.4      0.05458217 0.0354028  0.06261733 0.04841581]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.8813424993578645>
199
Acquisition function convergence reached at iteration 2888.
tf.Tensor(-4.115048916015423, shape=(), dtype=float64)
[0.4      0.4      0.02428837 0.15643807 0.02593917 0.07292288]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.883462186698255>
200
Acquisition function convergence reached at iteration 3023.
tf.Tensor(-4.116530543948807, shape=(), dtype=float64)
Trained parameters:
amplitude_champ:0 is 0.715

length_scales_champ:0 is [1.4733538e+04 1.1492328e+04 5.4000000e-02 3.0000000e-03 1.0000000e-02
6.0000000e-03]

observation_noise_variance_champ:0 is 0.325

```

```
alpha_tp:0 is 0.154
amp_alpha_mean:0 is 0.386
amp_beta_mean:0 is 1.096
amp_f_mean:0 is 36.634
amp_gamma_L_mean:0 is 191.392
amp_lambda_mean:0 is 30.203
amp_r_mean:0 is 11.629
beta_tp:0 is 0.471
bias_mean:0 is -2.303
f_tp:0 is -0.073
gamma_L_tp:0 is 0.055
lambda_tp:0 is -0.208
r_tp:0 is 0.019
[0.4      0.4      0.02451541 0.1564215  0.02584405 0.07293006]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.885570596723724>
201
Acquisition function convergence reached at iteration 2945.
tf.Tensor(-4.192217972669025, shape=(), dtype=float64)
[0.4      0.4      0.0259724  0.15678063 0.02670196 0.07490858]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.88766784535454>
202
Acquisition function convergence reached at iteration 2939.
tf.Tensor(-4.193642494390191, shape=(), dtype=float64)
[0.4      0.4      0.02333615 0.15719865 0.03105487 0.07475009]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.889754046752199>
203
Acquisition function convergence reached at iteration 3071.
tf.Tensor(-4.195167925454873, shape=(), dtype=float64)
[0.4      0.4      0.02172198 0.157244   0.03160939 0.07467457]
```

```

<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.891829313354628>
204
Acquisition function convergence reached at iteration 2975.
tf.Tensor(-4.196614543639401, shape=(), dtype=float64)
[0.4      0.4      0.02407856 0.1571213  0.0303799  0.07481829]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.893893755910496>
205
Acquisition function convergence reached at iteration 2797.
tf.Tensor(-4.198124213196307, shape=(), dtype=float64)
[0.4      0.4      0.02528954 0.15692468 0.02836709 0.07491301]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.895947483512694>
206
Acquisition function convergence reached at iteration 2493.
tf.Tensor(-4.199655054725313, shape=(), dtype=float64)
[0.4      0.4      0.02515479 0.15678672 0.02694471 0.0749104 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.897990603630988>
207
Acquisition function convergence reached at iteration 2802.
tf.Tensor(-4.201075754331205, shape=(), dtype=float64)
[0.4      0.4      0.02704556 0.15669437 0.02594272 0.07493736]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.900023222143866>
208
Acquisition function convergence reached at iteration 2896.
tf.Tensor(-4.2025100725921956, shape=(), dtype=float64)
[0.4      0.4      0.02481588 0.1569526   0.02867809 0.07489569]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.9020454433696266>
209
Acquisition function convergence reached at iteration 2225.
tf.Tensor(-4.408738489737642, shape=(), dtype=float64)
[0.4      0.4      0.03336554 0.03549113 0.07035063 0.06029112]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.9040573700967>
210
Acquisition function convergence reached at iteration 2796.
tf.Tensor(-4.20539454542096, shape=(), dtype=float64)
[0.4      0.4      0.02299617 0.15711209 0.03032915 0.07479025]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.906059103613245>
211
Acquisition function convergence reached at iteration 2744.
tf.Tensor(-4.206877982843169, shape=(), dtype=float64)
[0.4      0.4      0.02722027 0.15659367 0.02483641 0.07488966]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.908050743736038>
212
Acquisition function convergence reached at iteration 2658.

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tf.Tensor(-4.208301834141491, shape=(), dtype=float64)
[0.4      0.4      0.02570984 0.15674336 0.02642388 0.07490742]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.910032388838667>
213
Acquisition function convergence reached at iteration 3093.
tf.Tensor(-4.2095758067430875, shape=(), dtype=float64)
[0.4      0.4      0.02422471 0.15721405 0.03132701 0.07476879]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.912004135879062>
214
Acquisition function convergence reached at iteration 2554.
tf.Tensor(-4.211109430847627, shape=(), dtype=float64)
[0.4      0.4      0.02280236 0.15704592 0.02961893 0.07480677]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.913966080426372>
215
Acquisition function convergence reached at iteration 2799.
tf.Tensor(-4.407470744993987, shape=(), dtype=float64)
[0.4      0.4      0.07628976 0.03325726 0.0706144   0.05566171]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.9159183166872005>
216
Acquisition function convergence reached at iteration 2804.
tf.Tensor(-4.213788165715359, shape=(), dtype=float64)
[0.4      0.4      0.02180699 0.15741401 0.03330551 0.07452041]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.917860937531252>
217
Acquisition function convergence reached at iteration 2617.
tf.Tensor(-4.215344596798745, shape=(), dtype=float64)
[0.4      0.4      0.02535241 0.15669798 0.02596213 0.07488199]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.919794034516348>
218
Acquisition function convergence reached at iteration 2783.
tf.Tensor(-4.216676221561532, shape=(), dtype=float64)
[0.4      0.4      0.02643488 0.15670584 0.02606489 0.07492011]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.921717697912881>
219
Acquisition function convergence reached at iteration 2567.
tf.Tensor(-4.2180694826940615, shape=(), dtype=float64)
[0.4      0.4      0.02323922 0.15696081 0.02875017 0.07484423]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.9236320167277094>
220
Acquisition function convergence reached at iteration 3037.
tf.Tensor(-4.219315599132284, shape=(), dtype=float64)
[0.4      0.4      0.02105809 0.15743463 0.03354501 0.07448402]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.925537078727483>

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221
Acquisition function convergence reached at iteration 2172.
tf.Tensor(-4.271879603950443, shape=(), dtype=float64)
[0.4      0.4      0.03638038 0.10692111 0.097147  0.13402143]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.927432970461448>
222
Acquisition function convergence reached at iteration 3061.
tf.Tensor(-4.281357251287169, shape=(), dtype=float64)
[0.4      0.4      0.02099406 0.15746089 0.02561457 0.07731647]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.929319777283734>
223
Acquisition function convergence reached at iteration 2385.
tf.Tensor(-4.594585921546432, shape=(), dtype=float64)
[0.4      0.4      0.03183913 0.03263706 0.07301634 0.05317133]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.931197583375125>
224
Acquisition function convergence reached at iteration 2845.
tf.Tensor(-4.28412838242073, shape=(), dtype=float64)
[0.4      0.4      0.02229629 0.15734376 0.02370328 0.07718366]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.933066471764349>
225
Acquisition function convergence reached at iteration 3224.
tf.Tensor(-4.285352863397861, shape=(), dtype=float64)
[0.4      0.4      0.01832636 0.15769189 0.02923286 0.07739255]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.934926524348877>
226
Acquisition function convergence reached at iteration 2811.
tf.Tensor(-4.286751657443712, shape=(), dtype=float64)
[0.4      0.4      0.02061457 0.157517   0.0266211  0.07738986]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.936777821915271>
227
Acquisition function convergence reached at iteration 3232.
tf.Tensor(-4.288098826102683, shape=(), dtype=float64)
[0.4      0.4      0.02312343 0.15738696 0.02458515 0.07730637]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.938620444159066>
228
Acquisition function convergence reached at iteration 3110.
tf.Tensor(-4.289433969008766, shape=(), dtype=float64)
[0.4      0.4      0.02132447 0.15746503 0.02594129 0.07737133]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.940454469704217>
229
Acquisition function convergence reached at iteration 3230.
tf.Tensor(-4.29068946246713, shape=(), dtype=float64)

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[0.4      0.4      0.02093684 0.15758329 0.02779385 0.07746026]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.94227997612211>
230
Acquisition function convergence reached at iteration 2961.
tf.Tensor(-4.292118205143188, shape=(), dtype=float64)
[0.4      0.4      0.01976417 0.15749063 0.02634023 0.07734718]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.9440970399501705>
231
Acquisition function convergence reached at iteration 2827.
tf.Tensor(-4.293468015442145, shape=(), dtype=float64)
[0.4      0.4      0.02239751 0.15732953 0.02371717 0.07720702]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.945905736710037>
232
Acquisition function convergence reached at iteration 3045.
tf.Tensor(-4.29466509086077, shape=(), dtype=float64)
[0.4      0.4      0.02062738 0.15755802 0.02745153 0.07744314]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.947706140925368>
233
Acquisition function convergence reached at iteration 2865.
tf.Tensor(-4.296045539499076, shape=(), dtype=float64)
[0.4      0.4      0.02327883 0.15733344 0.02382557 0.07725466]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.94949832613924>
234
Acquisition function convergence reached at iteration 3233.
tf.Tensor(-4.297245344017785, shape=(), dtype=float64)
[0.4      0.4      0.01985888 0.1576219  0.02845715 0.07745208]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.951282364931181>
235
Acquisition function convergence reached at iteration 3094.
tf.Tensor(-4.298538831428658, shape=(), dtype=float64)
[0.4      0.4      0.02094098 0.15757369 0.02769975 0.07746343]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.9530583289338335>
236
Acquisition function convergence reached at iteration 2980.
tf.Tensor(-4.2999055702325375, shape=(), dtype=float64)
[0.4      0.4      0.02461745 0.15729475 0.02311653 0.07720867]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.954826288849256>
237
Acquisition function convergence reached at iteration 3305.
tf.Tensor(-4.301114308230931, shape=(), dtype=float64)
[0.4      0.4      0.02253312 0.15748932 0.0263588 0.07743913]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.956586314464887>
238

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Acquisition function convergence reached at iteration 3313.
tf.Tensor(-4.302419654660658, shape=(), dtype=float64)
[0.4      0.4      0.02174662 0.15748734 0.02631359 0.07740793]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.958338474669158>
239
Acquisition function convergence reached at iteration 2857.
tf.Tensor(-4.303705769938231, shape=(), dtype=float64)
[0.4      0.4      0.02338433 0.15738268 0.02468091 0.07735048]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.960082837466783>
240
Acquisition function convergence reached at iteration 3280.
tf.Tensor(-4.30490496923764, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 7292.
[0.4      0.4      0.02221754 0.15752556 0.02697844 0.07747074]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.961819469993725>
241
Acquisition function convergence reached at iteration 2419.
tf.Tensor(-4.154580523080466, shape=(), dtype=float64)
[0.4      0.4      0.02792223 0.16419511 0.07343833 0.0624913 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.963548438531842>
242
Acquisition function convergence reached at iteration 1856.
tf.Tensor(-4.155613073904677, shape=(), dtype=float64)
[0.4      0.4      0.0316138  0.16540396 0.07700225 0.05638568]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.965269808523235>
243
Acquisition function convergence reached at iteration 2291.
tf.Tensor(-4.15681695504424, shape=(), dtype=float64)
[0.4      0.4      0.02859074 0.16288054 0.06972306 0.06743728]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.966983644584294>
244
Acquisition function convergence reached at iteration 2214.
tf.Tensor(-4.157831764342903, shape=(), dtype=float64)
[0.4      0.4      0.03304881 0.16464443 0.07558926 0.05916977]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.968690010519447>
245
Acquisition function convergence reached at iteration 2238.
tf.Tensor(-4.159030456212271, shape=(), dtype=float64)
[0.4      0.4      0.03188152 0.16334292 0.07175875 0.06512857]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.970388969334637>
246
Acquisition function convergence reached at iteration 2133.
tf.Tensor(-4.160214258810829, shape=(), dtype=float64)

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[0.4      0.4      0.03255641 0.16413658 0.0742078 0.06146282]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.972080583250509>
247
Acquisition function convergence reached at iteration 2070.
tf.Tensor(-4.1614260692415685, shape=(), dtype=float64)
[0.4      0.4      0.03123638 0.16324755 0.07146704 0.06543787]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.973764913715334>
248
Acquisition function convergence reached at iteration 2091.
tf.Tensor(-4.162588169390639, shape=(), dtype=float64)
[0.4      0.4      0.03220038 0.16413655 0.07427132 0.06133185]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.975442021417667>
249
Acquisition function convergence reached at iteration 1959.
tf.Tensor(-4.163772352085455, shape=(), dtype=float64)
[0.4      0.4      0.03183126 0.16391548 0.07361303 0.06233642]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.977111966298753>
250
Acquisition function convergence reached at iteration 2398.
tf.Tensor(-4.1648933893978075, shape=(), dtype=float64)
Trained parameters:
amplitude_champ:0 is 0.7

length_scales_champ:0 is [2.1246985e+04 1.5952380e+04 4.0000000e-02 4.0000000e-03 1.2000000e-03
8.0000000e-03]

observation_noise_variance_champ:0 is 0.365

alpha_tp:0 is 0.247

amp_alpha_mean:0 is 0.435

amp_beta_mean:0 is 1.239

amp_f_mean:0 is 44.161

amp_gamma_L_mean:0 is 17.001

amp_lambda_mean:0 is 37.251

amp_r_mean:0 is 1.549

beta_tp:0 is 0.45

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bias_mean:0 is -1.246

f_tp:0 is -0.026

gamma_L_tp:0 is 0.135

lambda_tp:0 is -0.138

r_tp:0 is 0.092

[0.4      0.4      0.03176595 0.16290235 0.07028357 0.06700381]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.978774807564669>
251
Acquisition function convergence reached at iteration 2013.
tf.Tensor(-4.166095640426964, shape=(), dtype=float64)
[0.4      0.4      0.03240753 0.16454553 0.07547098 0.05933716]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.980430603698235>
252
Acquisition function convergence reached at iteration 2120.
tf.Tensor(-4.167262763079176, shape=(), dtype=float64)
[0.4      0.4      0.0309096 0.16290964 0.07027457 0.06692024]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.982079412470676>
253
Acquisition function convergence reached at iteration 1897.
tf.Tensor(-4.168442729543178, shape=(), dtype=float64)
[0.4      0.4      0.03155005 0.16438858 0.0750493 0.05995816]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.98372129095306>
254
Acquisition function convergence reached at iteration 2191.
tf.Tensor(-4.169485182120441, shape=(), dtype=float64)
[0.4      0.4      0.03246017 0.16307112 0.07093492 0.06620466]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.985356295527497>
255
Acquisition function convergence reached at iteration 1884.
tf.Tensor(-4.170722937844496, shape=(), dtype=float64)
[0.4      0.4      0.03092533 0.16323918 0.07146811 0.06534309]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.986984481898122>
256
Acquisition function convergence reached at iteration 2138.
tf.Tensor(-4.17187743642662, shape=(), dtype=float64)
[0.4      0.4      0.02906926 0.16211511 0.0667118 0.07038921]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.988605905101863>

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257
Acquisition function convergence reached at iteration 2282.
tf.Tensor(-4.172850015820706, shape=(), dtype=float64)
[0.4      0.4      0.03272443 0.16300057 0.07096625 0.06616291]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.990220619518993>
258
Acquisition function convergence reached at iteration 2173.
tf.Tensor(-4.173977161700808, shape=(), dtype=float64)
[0.4      0.4      0.03320088 0.16353433 0.07280713 0.06369224]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.991828678883473>
259
Acquisition function convergence reached at iteration 2015.
tf.Tensor(-4.1751454713122245, shape=(), dtype=float64)
[0.4      0.4      0.03221378 0.16323553 0.07176534 0.06503771]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.993430136293097>
260
Acquisition function convergence reached at iteration 2290.
tf.Tensor(-4.176210428897691, shape=(), dtype=float64)
[0.4      0.4      0.0336001  0.16378237 0.07359655 0.06255719]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.9950250442194415>
261
Acquisition function convergence reached at iteration 3022.
tf.Tensor(-4.221212141474765, shape=(), dtype=float64)
[0.4      0.4      0.02673927 0.17414734 0.1728025  0.03009178]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.996613454517612>
262
Acquisition function convergence reached at iteration 1705.
tf.Tensor(-4.216517328575562, shape=(), dtype=float64)
[0.4      0.4      0.10207436 0.16883532 0.1555942  0.04320115]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.998195418435816>
263
Acquisition function convergence reached at iteration 4176.
tf.Tensor(-4.227682273948551, shape=(), dtype=float64)
[0.4      0.4      0.03272038 0.24164853 0.00596641 0.01997418]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=5.999770986624735>
264
Acquisition function convergence reached at iteration 1014.
tf.Tensor(-4.467658086266344, shape=(), dtype=float64)
[0.4      0.4      0.08561056 0.0404691  0.09229127 0.06082586]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.001340209146731>
265
Acquisition function convergence reached at iteration 4310.
tf.Tensor(-4.2298447916118915, shape=(), dtype=float64)

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[0.4      0.4      0.02969231 0.24091862 0.00515104 0.01963283]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.002903135484869>
266
Acquisition function convergence reached at iteration 4588.
tf.Tensor(-4.231092331413301, shape=(), dtype=float64)
[0.4      0.4      0.02348135 0.24042809 0.00436628 0.01944042]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.0044598145517725>
267
Acquisition function convergence reached at iteration 4356.
tf.Tensor(-4.231918361158998, shape=(), dtype=float64)
[0.4      0.4      0.02916478 0.24039094 0.00464947 0.02124283]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.006010294698306>
268
Acquisition function convergence reached at iteration 1937.
tf.Tensor(-4.472197024487806, shape=(), dtype=float64)
[0.4      0.4      0.09321663 0.02446608 0.07230543 0.034871  ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.007554623722093>
269
Acquisition function convergence reached at iteration 4046.
tf.Tensor(-4.234016201635078, shape=(), dtype=float64)
[0.4      0.4      0.03161823 0.24031477 0.00461473 0.02204079]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.009092848875888>
270
Acquisition function convergence reached at iteration 4492.
tf.Tensor(-4.235219106604147, shape=(), dtype=float64)
[0.4      0.4      0.0271942  0.2401485  0.00431494 0.02117906]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.010625016875767>
271
Acquisition function convergence reached at iteration 1973.
tf.Tensor(-4.297020225529766, shape=(), dtype=float64)
[0.4      0.4      0.06468809 0.027058   0.09589795 0.03886341]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.012151173909188>
272
Acquisition function convergence reached at iteration 4924.
tf.Tensor(-4.2375056896107095, shape=(), dtype=float64)
[0.4      0.4      0.02354804 0.24002115 0.00408615 0.01943944]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.013671365642886>
273
Acquisition function convergence reached at iteration 3970.
tf.Tensor(-4.238166400979721, shape=(), dtype=float64)
[0.4      0.4      0.03506769 0.24014294 0.00466061 0.02327336]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.015185637230632>
274

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Acquisition function convergence reached at iteration 4076.
tf.Tensor(-4.2392461443055245, shape=(), dtype=float64)
[0.4         0.4         0.0342986  0.24009394 0.00462225 0.02259988]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.016694033320839>
275
Acquisition function convergence reached at iteration 4231.
tf.Tensor(-4.240521028107782, shape=(), dtype=float64)
[0.4         0.4         0.02860867  0.23996323 0.00412077 0.02173348]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.018196598064034>
276
Acquisition function convergence reached at iteration 3143.
tf.Tensor(-4.299202329761596, shape=(), dtype=float64)
[0.4         0.4         0.05989296  0.02300801 0.0714866  0.02693299]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.019693375120199>
277
Acquisition function convergence reached at iteration 3927.
tf.Tensor(-4.242534303987558, shape=(), dtype=float64)
[0.4         0.4         0.03207719  0.23994725 0.0041229  0.0239422 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.021184407665959>
278
Acquisition function convergence reached at iteration 1883.
tf.Tensor(-4.235535742188858, shape=(), dtype=float64)
[0.4         0.4         0.0521687   0.25534051 0.07186999 0.04379618]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.022669738401656>
279
Acquisition function convergence reached at iteration 3944.
tf.Tensor(-4.244527503202692, shape=(), dtype=float64)
[0.4         0.4         0.03458869  0.23998656 0.00453811 0.02137903]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.024149409558295>
280
Acquisition function convergence reached at iteration 4438.
tf.Tensor(-4.2456478105049875, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 7910.
[0.4         0.4         0.03155961  0.23994804 0.00442603 0.0212353 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.025623462904349>
281
Acquisition function convergence reached at iteration 3880.
tf.Tensor(-4.098881757964742, shape=(), dtype=float64)
[0.4         0.4         0.03251995  0.24001564 0.00461966 0.02203468]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.027091939752455>
282
Acquisition function convergence reached at iteration 2033.
tf.Tensor(-4.12435242740754, shape=(), dtype=float64)

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[0.4      0.4      0.02520483 0.01400707 0.11700414 0.04234427]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.02855488096599>
283
Acquisition function convergence reached at iteration 4700.
tf.Tensor(-4.1010772394615636, shape=(), dtype=float64)
[0.4      0.4      0.02603218 0.23998998 0.00451613 0.02094384]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.030012326965516>
284
Acquisition function convergence reached at iteration 4193.
tf.Tensor(-4.10190078880707, shape=(), dtype=float64)
[0.4      0.4      0.03122627 0.24003354 0.0047388 0.02125663]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.0314643177351295>
285
Acquisition function convergence reached at iteration 4052.
tf.Tensor(-4.10298278352549, shape=(), dtype=float64)
[0.4      0.4      0.02942453 0.23999321 0.0045074 0.02091339]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.032910892828679>
286
Acquisition function convergence reached at iteration 2569.
tf.Tensor(-4.16029222390839, shape=(), dtype=float64)
[0.4      0.4      0.01394827 0.02931515 0.12822872 0.03531039]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.034352091375888>
287
Acquisition function convergence reached at iteration 4537.
tf.Tensor(-4.105282681505952, shape=(), dtype=float64)
[0.4      0.4      0.02017937 0.23986237 0.00414271 0.02045545]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.035787952088359>
288
Acquisition function convergence reached at iteration 4590.
tf.Tensor(-4.106091102958596, shape=(), dtype=float64)
[0.4      0.4      0.02478669 0.23996677 0.00438679 0.02119118]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.037218513265478>
289
Acquisition function convergence reached at iteration 4383.
tf.Tensor(-4.107225635181629, shape=(), dtype=float64)
[0.4      0.4      0.02101445 0.23987698 0.00410971 0.02128064]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.0386438128002125>
290
Acquisition function convergence reached at iteration 4600.
tf.Tensor(-4.108030232129229, shape=(), dtype=float64)
[0.4      0.4      0.02506847 0.2399756 0.0044879 0.01907056]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.040063888184813>
291

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Acquisition function convergence reached at iteration 4057.
tf.Tensor(-4.109009370806886, shape=(), dtype=float64)
[0.4      0.4      0.02589072 0.23993839 0.00427109 0.02042015]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.0414787765164055>
292
Acquisition function convergence reached at iteration 4746.
tf.Tensor(-4.110111803634744, shape=(), dtype=float64)
[0.4      0.4      0.02155802 0.23989735 0.0042265  0.02021386]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.042888514502501>
293
Acquisition function convergence reached at iteration 4300.
tf.Tensor(-4.110964368911178, shape=(), dtype=float64)
[0.4      0.4      0.02486028 0.23992463 0.00421342 0.02252906]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.044293138466394>
294
Acquisition function convergence reached at iteration 4134.
tf.Tensor(-4.111978189029405, shape=(), dtype=float64)
[0.4      0.4      0.02369615 0.23987234 0.00403342 0.02310623]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.045692684352483>
295
Acquisition function convergence reached at iteration 4555.
tf.Tensor(-4.112831013605249, shape=(), dtype=float64)
[0.4      0.4      0.0257739  0.23996829 0.00444011 0.02130218]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.0470871877314885>
296
Acquisition function convergence reached at iteration 4669.
tf.Tensor(-4.113724882602964, shape=(), dtype=float64)
[0.4      0.4      0.02716149 0.24001325 0.00464456 0.01997142]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.048476683805588>
297
Acquisition function convergence reached at iteration 4764.
tf.Tensor(-4.1149203357566435, shape=(), dtype=float64)
[0.4      0.4      0.0208006  0.23987691 0.00422251 0.02056721]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.0498612074134615>
298
Acquisition function convergence reached at iteration 1782.
tf.Tensor(-4.103739999693746, shape=(), dtype=float64)
[0.4      0.4      0.1583813  0.16060547 0.11141939 0.04405098]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.051240793035246>
299
Acquisition function convergence reached at iteration 2539.
tf.Tensor(-4.1226106352932135, shape=(), dtype=float64)
[0.4      0.4      0.04028502 0.06045959 0.17279726 0.03233353]

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<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.05261547479742>
300
Acquisition function convergence reached at iteration 1568.
tf.Tensor(-4.115252479938797, shape=(), dtype=float64)
Trained parameters:
amplitude_champ:0 is 0.663

length_scales_champ:0 is [1.8463162e+04 4.4434585e+04 2.4000000e-02 7.0000000e-03 1.4000000e-01]

observation_noise_variance_champ:0 is 0.416

alpha_tp:0 is -1.167

amp_alpha_mean:0 is 0.089

amp_beta_mean:0 is 1.716

amp_f_mean:0 is 4.333

amp_gamma_L_mean:0 is 24.344

amp_lambda_mean:0 is 19.038

amp_r_mean:0 is 9.289

beta_tp:0 is 0.471

bias_mean:0 is -3.169

f_tp:0 is -0.065

gamma_L_tp:0 is 0.041

lambda_tp:0 is -0.361

r_tp:0 is 0.158

[0.4      0.4      0.12956507 0.06658084 0.14340305 0.04265506]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.053985286477593>
301
Acquisition function convergence reached at iteration 3477.
tf.Tensor(-3.9880529865421637, shape=(), dtype=float64)

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[0.4      0.4      0.02053685 0.09984225 0.18558726 0.02470606]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.055350261509211>
302
Acquisition function convergence reached at iteration 3461.
tf.Tensor(-3.98966988579549, shape=(), dtype=float64)
[0.4      0.4      0.02198056 0.23974178 0.0136999 0.02612017]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.056710432986204>
303
Acquisition function convergence reached at iteration 3494.
tf.Tensor(-3.9905259953018253, shape=(), dtype=float64)
[0.4      0.4      0.02571867 0.23959654 0.01277435 0.02570798]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.058065833667532>
304
Acquisition function convergence reached at iteration 3320.
tf.Tensor(-3.9914732718652375, shape=(), dtype=float64)
[0.4      0.4      0.02159755 0.23981071 0.0142219 0.02376902]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.059416495981666>
305
Acquisition function convergence reached at iteration 3281.
tf.Tensor(-3.9924321826826352, shape=(), dtype=float64)
[0.4      0.4      0.01985689 0.23963247 0.01339205 0.0272846 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.060762452031>
306
Acquisition function convergence reached at iteration 3167.
tf.Tensor(-3.9933431072719454, shape=(), dtype=float64)
[0.4      0.4      0.02393496 0.23929416 0.01136437 0.02768221]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.062103733596176>
307
Acquisition function convergence reached at iteration 1994.
tf.Tensor(-3.9852731533571206, shape=(), dtype=float64)
[0.4      0.4      0.1112756 0.10292117 0.16447625 0.0440679 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.063440372140354>
308
Acquisition function convergence reached at iteration 3310.
tf.Tensor(-3.9950731185928836, shape=(), dtype=float64)
[0.4      0.4      0.02226013 0.23957753 0.0128911 0.02680029]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.064772398813395>
309
Acquisition function convergence reached at iteration 3198.
tf.Tensor(-3.995945752326125, shape=(), dtype=float64)
[0.4      0.4      0.02485792 0.2394875 0.01231898 0.0249985 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.066099844455991>
310

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Acquisition function convergence reached at iteration 3212.
tf.Tensor(-3.996804051586753, shape=(), dtype=float64)
[0.4      0.4      0.02611019 0.2394746  0.01223711 0.02399828]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.067422739603715>
311
Acquisition function convergence reached at iteration 3542.
tf.Tensor(-3.9976166063640277, shape=(), dtype=float64)
[0.4      0.4      0.02447429 0.23973661 0.01361706 0.02483678]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.068741114491011>
312
Acquisition function convergence reached at iteration 3246.
tf.Tensor(-3.9924422773823336, shape=(), dtype=float64)
[0.4      0.4      0.00968446 0.16633576 0.16360579 0.02508478]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.070054999055124>
313
Acquisition function convergence reached at iteration 3313.
tf.Tensor(-3.999449991495167, shape=(), dtype=float64)
[0.4      0.4      0.02489329 0.2393832  0.01176952 0.027292  ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.071364422939953>
314
Acquisition function convergence reached at iteration 3418.
tf.Tensor(-4.000270209138019, shape=(), dtype=float64)
[0.4      0.4      0.02264546 0.23976906 0.01392026 0.02457829]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.072669415499858>
315
Acquisition function convergence reached at iteration 3229.
tf.Tensor(-4.001131386201447, shape=(), dtype=float64)
[0.4      0.4      0.0285093  0.23934037 0.01159011 0.0235436 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.07397000580339>
316
Acquisition function convergence reached at iteration 3199.
tf.Tensor(-4.002088071867012, shape=(), dtype=float64)
[0.4      0.4      0.02600404 0.23912926 0.01052154 0.02803518]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.075266222636973>
317
Acquisition function convergence reached at iteration 3072.
tf.Tensor(-3.9933524635068314, shape=(), dtype=float64)
[0.4      0.4      0.01794809 0.15130043 0.18947642 0.02562572]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.076558094508523>
318
Acquisition function convergence reached at iteration 3416.
tf.Tensor(-4.003700119972695, shape=(), dtype=float64)
[0.4      0.4      0.02263077 0.23985012 0.01436634 0.02311077]

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<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.0778456496510085>
319
Acquisition function convergence reached at iteration 3298.
tf.Tensor(-4.004590171605833, shape=(), dtype=float64)
[0.4      0.4      0.02641175 0.23940092 0.01185296 0.02548157]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.079128916025955>
320
Acquisition function convergence reached at iteration 3244.
tf.Tensor(-4.005436240595142, shape=(), dtype=float64)
[0.4      0.4      0.02808138 0.23927051 0.0112266 0.02508812]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.080407921326897>
321
Acquisition function convergence reached at iteration 1845.
tf.Tensor(-3.895302398880723, shape=(), dtype=float64)
[0.4      0.4      0.17222655 0.13050659 0.10233117 0.04292867]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.081682692982766>
322
Acquisition function convergence reached at iteration 2099.
tf.Tensor(-3.895695830783288, shape=(), dtype=float64)
[0.4      0.4      0.06075578 0.16641811 0.14396601 0.04274675]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.082953258161242>
323
Acquisition function convergence reached at iteration 2853.
tf.Tensor(-3.9094199928080213, shape=(), dtype=float64)
[0.4      0.4      0.02384808 0.23695075 0.01485621 0.03041024]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.084219643772036>
324
Acquisition function convergence reached at iteration 1949.
tf.Tensor(-3.895254270363257, shape=(), dtype=float64)
[0.4      0.4      0.08336119 0.15319158 0.17201319 0.04364344]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.085481876470126>
325
Acquisition function convergence reached at iteration 1703.
tf.Tensor(-3.89035348981569, shape=(), dtype=float64)
[0.4      0.4      0.09269995 0.14759042 0.16945377 0.03930771]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.086739982658951>
326
Acquisition function convergence reached at iteration 2923.
tf.Tensor(-3.911848950902862, shape=(), dtype=float64)
[0.4      0.4      0.02465352 0.23685959 0.01455154 0.03048559]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.087993988493546>
327
Acquisition function convergence reached at iteration 1703.

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tf.Tensor(-3.87446463237008, shape=(), dtype=float64)
[0.4      0.4      0.18409031 0.14394424 0.19158287 0.04208838]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.089243919883624>
328
Acquisition function convergence reached at iteration 3168.
tf.Tensor(-3.9133742749354568, shape=(), dtype=float64)
[0.4      0.4      0.02652751 0.23709835 0.01572028 0.02861829]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.090489802496632>
329
Acquisition function convergence reached at iteration 3068.
tf.Tensor(-3.9141874473549025, shape=(), dtype=float64)
[0.4      0.4      0.02319788 0.23760515 0.01826088 0.02691346]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.09173166176073>
330
Acquisition function convergence reached at iteration 2996.
tf.Tensor(-3.9150571756939505, shape=(), dtype=float64)
[0.4      0.4      0.02610008 0.23669327 0.01392646 0.03028402]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.092969522867751>
331
Acquisition function convergence reached at iteration 3044.
tf.Tensor(-3.915846219524792, shape=(), dtype=float64)
[0.4      0.4      0.020046   0.23752306 0.01793471 0.03034747]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.0942034107761>
332
Acquisition function convergence reached at iteration 3056.
tf.Tensor(-3.916558273761373, shape=(), dtype=float64)
[0.4      0.4      0.02723126 0.23733312 0.01691931 0.02470752]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.095433350213611>
333
Acquisition function convergence reached at iteration 3182.
tf.Tensor(-3.917349693978271, shape=(), dtype=float64)
[0.4      0.4      0.02550018 0.23749264 0.01757812 0.02665731]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.096659365680369>
334
Acquisition function convergence reached at iteration 3056.
tf.Tensor(-3.9182245951925765, shape=(), dtype=float64)
[0.4      0.4      0.02099089 0.23746846 0.01758144 0.03026968]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.097881481451476>
335
Acquisition function convergence reached at iteration 2837.
tf.Tensor(-3.919036992750387, shape=(), dtype=float64)
[0.4      0.4      0.02190971 0.2374993  0.01773303 0.0275086 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.099099721579787>

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336
Acquisition function convergence reached at iteration 2987.
tf.Tensor(-3.9197669187046777, shape=(), dtype=float64)
[0.4      0.4      0.02744586 0.23704374 0.01553763 0.02646926]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.100314109898598>
337
Acquisition function convergence reached at iteration 3061.
tf.Tensor(-3.9205252512802122, shape=(), dtype=float64)
[0.4      0.4      0.02433931 0.23761516 0.01823428 0.02576062]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.101524670024294>
338
Acquisition function convergence reached at iteration 2979.
tf.Tensor(-3.921329805908335, shape=(), dtype=float64)
[0.4      0.4      0.0262116 0.23729498 0.01670942 0.02566585]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.102731425358965>
339
Acquisition function convergence reached at iteration 3176.
tf.Tensor(-3.922095404572256, shape=(), dtype=float64)
[0.4      0.4      0.02275372 0.23762394 0.01829734 0.028148 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.103934399092966>
340
Acquisition function convergence reached at iteration 3161.
tf.Tensor(-3.922863255412892, shape=(), dtype=float64)
[0.4      0.4      0.0264251 0.23722947 0.01636933 0.02758489]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.10513361420746>
341
Acquisition function convergence reached at iteration 3036.
tf.Tensor(-3.8213507194627185, shape=(), dtype=float64)
[0.4      0.4      0.02334703 0.23794115 0.01492226 0.0299839 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.1063290934769086>
342
Acquisition function convergence reached at iteration 2941.
tf.Tensor(-3.8220936666644527, shape=(), dtype=float64)
[0.4      0.4      0.02299739 0.23816864 0.01609581 0.02786125]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.107520859471527>
343
Acquisition function convergence reached at iteration 3193.
tf.Tensor(-3.8227957539115986, shape=(), dtype=float64)
[0.4      0.4      0.02661799 0.23783607 0.01442327 0.02867307]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.10870893455971>
344
Acquisition function convergence reached at iteration 2983.
tf.Tensor(-3.8235451073142004, shape=(), dtype=float64)

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[0.4      0.4      0.02350879 0.23842298 0.01742773 0.02502329]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.109893340910416>
345
Acquisition function convergence reached at iteration 3229.
tf.Tensor(-3.824253540973872, shape=(), dtype=float64)
[0.4      0.4      0.02507795 0.23826217 0.01650919 0.02716884]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.11107410049552>
346
Acquisition function convergence reached at iteration 3255.
tf.Tensor(-3.8249623670609862, shape=(), dtype=float64)
[0.4      0.4      0.02568725 0.23842141 0.01736127 0.02489568]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.112251235092124>
347
Acquisition function convergence reached at iteration 2863.
tf.Tensor(-3.825882807663791, shape=(), dtype=float64)
[0.4      0.4      0.02252678 0.2378808 0.01466282 0.02985475]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.113424766284849>
348
Acquisition function convergence reached at iteration 3132.
tf.Tensor(-3.8265095743133224, shape=(), dtype=float64)
[0.4      0.4      0.02132828 0.23852667 0.0180166 0.02745441]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.114594715468076>
349
Acquisition function convergence reached at iteration 3121.
tf.Tensor(-3.8272484069578563, shape=(), dtype=float64)
[0.4      0.4      0.02433985 0.2382248 0.01632837 0.02744528]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.115761103848167>
350
Acquisition function convergence reached at iteration 3237.
tf.Tensor(-3.8279457590726156, shape=(), dtype=float64)
Trained parameters:
amplitude_champ:0 is 0.63

length_scales_champ:0 is [2.2679330e+03 5.6985515e+04 2.3000000e-02 7.0000000e-03 1.4000000e-02
9.4000000e-02]

observation_noise_variance_champ:0 is 0.408

alpha_tp:0 is -0.819

amp_alpha_mean:0 is 0.1

amp_beta_mean:0 is 1.664

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amp_f_mean:0 is 7.814

amp_gamma_L_mean:0 is 15.841

amp_lambda_mean:0 is 20.744

amp_r_mean:0 is 7.493

beta_tp:0 is 0.468

bias_mean:0 is -2.839

f_tp:0 is -0.051

gamma_L_tp:0 is 0.055

lambda_tp:0 is -0.329

r_tp:0 is 0.141

[0.4      0.4      0.02552714 0.23823137 0.01634934 0.02708109]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.11692395244565>
351
Acquisition function convergence reached at iteration 2970.
tf.Tensor(-3.8287814427314766, shape=(), dtype=float64)
[0.4      0.4      0.02554401 0.23776845 0.014084    0.02866893]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.118083282097369>
352
Acquisition function convergence reached at iteration 3127.
tf.Tensor(-3.8294657506788914, shape=(), dtype=float64)
[0.4      0.4      0.0266963   0.23779209 0.01417753 0.02860647]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.119239113458608>
353
Acquisition function convergence reached at iteration 3165.
tf.Tensor(-3.8301764510581995, shape=(), dtype=float64)
[0.4      0.4      0.02270674 0.23836444 0.01701929 0.02817781]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.120391467005187>
354
Acquisition function convergence reached at iteration 3039.
tf.Tensor(-3.8309044354087076, shape=(), dtype=float64)
[0.4      0.4      0.02124525 0.23862911 0.01852982 0.02575976]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.121540363035515>

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355
Acquisition function convergence reached at iteration 3093.
tf.Tensor(-3.831648297241196, shape=(), dtype=float64)
[0.4      0.4      0.02242046 0.23832636 0.01680282 0.02833213]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.122685821672628>
356
Acquisition function convergence reached at iteration 3098.
tf.Tensor(-3.83238325978939, shape=(), dtype=float64)
[0.4      0.4      0.0225114 0.23819954 0.01614313 0.02938897]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.123827862866193>
357
Acquisition function convergence reached at iteration 2868.
tf.Tensor(-3.833140752619274, shape=(), dtype=float64)
[0.4      0.4      0.02504062 0.2379037 0.01468272 0.02759286]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.124966506394482>
358
Acquisition function convergence reached at iteration 3022.
tf.Tensor(-3.8338177602332277, shape=(), dtype=float64)
[0.4      0.4      0.02591541 0.23791027 0.01470067 0.02792505]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.126101771866315>
359
Acquisition function convergence reached at iteration 3135.
tf.Tensor(-3.8345073883639755, shape=(), dtype=float64)
[0.4      0.4      0.02542015 0.23803146 0.01525608 0.02843963]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.1272336787229875>
360
Acquisition function convergence reached at iteration 3067.
tf.Tensor(-3.8352157109542704, shape=(), dtype=float64)
[0.4      0.4      0.02073418 0.23870514 0.01895586 0.02522321]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.1283622462401555>
361
Acquisition function convergence reached at iteration 2881.
tf.Tensor(-3.8748753053581897, shape=(), dtype=float64)
[0.40000002 0.4      0.02628403 0.23682439 0.015998 0.02676762]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.129487493529706>
362
Acquisition function convergence reached at iteration 2959.
tf.Tensor(-3.875578942749508, shape=(), dtype=float64)
[0.40000002 0.4      0.0256656 0.23689968 0.0163245 0.02763672]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.130609439541597>
363
Acquisition function convergence reached at iteration 2851.
tf.Tensor(-3.8763201727020435, shape=(), dtype=float64)

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[0.40000002 0.4      0.02469233 0.23692853 0.01647317 0.02761432]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.131728103065667>
364
Acquisition function convergence reached at iteration 2893.
tf.Tensor(-3.8770243292547466, shape=(), dtype=float64)
[0.40000002 0.4      0.02414381 0.23697998 0.0167228  0.02822247]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.132843502733431>
365
Acquisition function convergence reached at iteration 3117.
tf.Tensor(-3.877654809517435, shape=(), dtype=float64)
[0.40000002 0.4      0.0251167 0.23720613 0.01781471 0.02726685]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.133955657019839>
366
Acquisition function convergence reached at iteration 3092.
tf.Tensor(-3.8783693063600677, shape=(), dtype=float64)
[0.40000002 0.4      0.02283102 0.23744954 0.01909489 0.02719259]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.135064584245017>
367
Acquisition function convergence reached at iteration 3062.
tf.Tensor(-3.8790535356178095, shape=(), dtype=float64)
[0.40000002 0.4      0.02471052 0.23740337 0.01884947 0.02545055]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.1361703025759855>
368
Acquisition function convergence reached at iteration 3021.
tf.Tensor(-3.8797864670131106, shape=(), dtype=float64)
[0.40000002 0.4      0.02254846 0.23746813 0.01921074 0.02692019]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.137272830028349>
369
Acquisition function convergence reached at iteration 3193.
tf.Tensor(-3.8804621613536407, shape=(), dtype=float64)
[0.40000002 0.4      0.02356536 0.23735454 0.01857029 0.02832244]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.138372184467964>
370
Acquisition function convergence reached at iteration 2763.
tf.Tensor(-3.8813186597993803, shape=(), dtype=float64)
[0.40000002 0.4      0.02280217 0.23680853 0.01592728 0.02940881]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.139468383612588>
371
Acquisition function convergence reached at iteration 2928.
tf.Tensor(-3.8819219297617322, shape=(), dtype=float64)
[0.40000002 0.4      0.02128845 0.23743073 0.0190899  0.02760433]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.1405614450335>
372

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Acquisition function convergence reached at iteration 3226.
tf.Tensor(-3.882561539460415, shape=(), dtype=float64)
[0.40000002 0.4      0.02439815 0.2371949  0.01776104 0.02882961]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.141651386157105>
373
Acquisition function convergence reached at iteration 3048.
tf.Tensor(-3.883298224738088, shape=(), dtype=float64)
[0.40000002 0.4      0.02711565 0.23676122 0.01576434 0.02741575]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.14273822426651>
374
Acquisition function convergence reached at iteration 3114.
tf.Tensor(-3.883984174291971, shape=(), dtype=float64)
[0.40000002 0.4      0.0241301  0.23704939 0.01704373 0.02945425]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.143821976503087>
375
Acquisition function convergence reached at iteration 3213.
tf.Tensor(-3.8846122289315987, shape=(), dtype=float64)
[0.40000002 0.4      0.02514537 0.23731481 0.01836869 0.02695895]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.144902659868005>
376
Acquisition function convergence reached at iteration 3097.
tf.Tensor(-3.8853229941285887, shape=(), dtype=float64)
[0.40000002 0.4      0.02405285 0.23737881 0.01870052 0.02681042]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.14598029122375>
377
Acquisition function convergence reached at iteration 3087.
tf.Tensor(-3.886048313898918, shape=(), dtype=float64)
[0.40000002 0.4      0.02300037 0.23721798 0.01789302 0.02902023]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.147054887295619>
378
Acquisition function convergence reached at iteration 3120.
tf.Tensor(-3.8867038995658696, shape=(), dtype=float64)
[0.40000002 0.4      0.02569864 0.23709127 0.01727769 0.02742155]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.148126464673201>
379
Acquisition function convergence reached at iteration 2920.
tf.Tensor(-3.8874393451905416, shape=(), dtype=float64)
[0.40000002 0.4      0.02660235 0.23682354 0.016051   0.02652352]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.149195039811823>
380
Acquisition function convergence reached at iteration 2866.
tf.Tensor(-3.8881834707637277, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 9345.

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[0.40000002 0.4      0.02489854 0.23660744 0.01498631 0.02937802]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.150260629034>
381
Acquisition function convergence reached at iteration 2866.
tf.Tensor(-3.922561355007633, shape=(), dtype=float64)
[0.40000001 0.4      0.02165005 0.23604728 0.01765686 0.03055102]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.1513232485308444>
382
Acquisition function convergence reached at iteration 2791.
tf.Tensor(-3.923249201133374, shape=(), dtype=float64)
[0.40000001 0.4      0.0239246  0.23584744 0.01671052 0.02906849]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.152382914363463>
383
Acquisition function convergence reached at iteration 2974.
tf.Tensor(-3.9238720716625974, shape=(), dtype=float64)
[0.40000001 0.4      0.02722428 0.2356449  0.01587239 0.02799058]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.153439642464347>
384
Acquisition function convergence reached at iteration 3140.
tf.Tensor(-3.924508353574015, shape=(), dtype=float64)
[0.40000001 0.4      0.0250329  0.23604851 0.01774493 0.02893502]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.154493448638725>
385
Acquisition function convergence reached at iteration 2912.
tf.Tensor(-3.925229651595465, shape=(), dtype=float64)
[0.40000001 0.4      0.02335342 0.23619613 0.01850663 0.02771777]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.155544348565912>
386
Acquisition function convergence reached at iteration 2850.
tf.Tensor(-3.925957769157451, shape=(), dtype=float64)
[0.40000001 0.4      0.02441518 0.23567106 0.01596702 0.0298665 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.156592357800636>
387
Acquisition function convergence reached at iteration 3078.
tf.Tensor(-3.9265201125627045, shape=(), dtype=float64)
[0.40000001 0.4      0.02722948 0.23594859 0.01736436 0.02642873]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.157637491774346>
388
Acquisition function convergence reached at iteration 2992.
tf.Tensor(-3.9272604414448145, shape=(), dtype=float64)
[0.40000001 0.4      0.02197638 0.23607231 0.01792277 0.03063731]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.158679765796505>
389

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Acquisition function convergence reached at iteration 2923.
tf.Tensor(-3.927890448551039, shape=(), dtype=float64)
[0.40000001 0.4      0.02192238 0.23658268 0.02057618 0.02521078]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.159719195055864>
390
Acquisition function convergence reached at iteration 3086.
tf.Tensor(-3.928541410590622, shape=(), dtype=float64)
[0.40000001 0.4      0.02526249 0.23603882 0.01775243 0.02831229]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.160755794621723>
391
Acquisition function convergence reached at iteration 2979.
tf.Tensor(-3.929221481654243, shape=(), dtype=float64)
[0.40000001 0.4      0.0221244 0.23644377 0.01984347 0.02724619]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.161789579445174>
392
Acquisition function convergence reached at iteration 2986.
tf.Tensor(-3.929860702620609, shape=(), dtype=float64)
[0.40000001 0.4      0.02269561 0.23656922 0.02049307 0.02532843]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.162820564360324>
393
Acquisition function convergence reached at iteration 2842.
tf.Tensor(-3.930636989560459, shape=(), dtype=float64)
[0.40000001 0.4      0.02482295 0.23553937 0.01540574 0.03001293]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.1638487640855075>
394
Acquisition function convergence reached at iteration 3034.
tf.Tensor(-3.9312151636078556, shape=(), dtype=float64)
[0.40000001 0.4      0.02370703 0.23605948 0.01793083 0.02921983]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.164874193224484>
395
Acquisition function convergence reached at iteration 2959.
tf.Tensor(-3.931923479913271, shape=(), dtype=float64)
[0.40000001 0.4      0.02546695 0.23553433 0.01545058 0.03010035]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.165896866267614>
396
Acquisition function convergence reached at iteration 3011.
tf.Tensor(-3.9325518749682584, shape=(), dtype=float64)
[0.40000001 0.4      0.0251434 0.23572572 0.01634189 0.02975085]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.166916797593025>
397
Acquisition function convergence reached at iteration 2898.
tf.Tensor(-3.9332422457762792, shape=(), dtype=float64)
[0.40000001 0.4      0.02500133 0.23559896 0.01576966 0.02975079]
```

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<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.167934001467764>
398
Acquisition function convergence reached at iteration 2838.
tf.Tensor(-3.9338948579394186, shape=(), dtype=float64)
[0.40000001 0.4       0.02616227 0.2355564  0.01562609 0.02816676]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.168948492048927>
399
Acquisition function convergence reached at iteration 2759.
tf.Tensor(-3.934571481051369, shape=(), dtype=float64)
[0.40000001 0.4       0.02260156 0.23585739 0.01704484 0.02936924]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.169960283384786>
400
Acquisition function convergence reached at iteration 2991.
tf.Tensor(-3.9351511462209228, shape=(), dtype=float64)
Trained parameters:
amplitude_champ:0 is 0.642

length_scales_champ:0 is [6.200000e-01 7.0257558e+04 2.100000e-02 5.000000e-03 1.300000e-02
8.800000e-02]

observation_noise_variance_champ:0 is 0.387

alpha_tp:0 is -0.132

amp_alpha_mean:0 is 0.046

amp_beta_mean:0 is 1.302

amp_f_mean:0 is 6.238

amp_gamma_L_mean:0 is 26.448

amp_lambda_mean:0 is 21.302

amp_r_mean:0 is 13.474

beta_tp:0 is 0.43

bias_mean:0 is -2.894

f_tp:0 is -0.089

gamma_L_tp:0 is 0.073
```

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lambda_tp:0 is -0.331

r_tp:0 is 0.103

[0.40000001 0.4      0.02563297 0.23573898 0.01648755 0.02886926]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.170969389415891>
401
Acquisition function convergence reached at iteration 2956.
tf.Tensor(-3.9402250569533512, shape=(), dtype=float64)
[0.4      0.4      0.02209054 0.23075614 0.02130305 0.02734125]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.1719758239761635>
402
Acquisition function convergence reached at iteration 3068.
tf.Tensor(-3.940844748373071, shape=(), dtype=float64)
[0.4      0.4      0.02682314 0.23006573 0.01796249 0.02861203]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.172979600793978>
403
Acquisition function convergence reached at iteration 3059.
tf.Tensor(-3.9414585058919474, shape=(), dtype=float64)
[0.4      0.4      0.02626915 0.23053304 0.02032641 0.02459936]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.173980733493224>
404
Acquisition function convergence reached at iteration 2949.
tf.Tensor(-3.9421222092736095, shape=(), dtype=float64)
[0.4      0.4      0.02757696 0.23020606 0.0187933  0.02519998]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.174979235594359>
405
Acquisition function convergence reached at iteration 3036.
tf.Tensor(-3.942798634725014, shape=(), dtype=float64)
[0.4      0.4      0.02175902 0.23058476 0.02055705 0.02966577]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.175975120515448>
406
Acquisition function convergence reached at iteration 2953.
tf.Tensor(-3.943423096182285, shape=(), dtype=float64)
[0.4      0.4      0.02297569 0.23077149 0.02151912 0.02560392]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.1769684015731885>
407
Acquisition function convergence reached at iteration 3016.
tf.Tensor(-3.9440665101787262, shape=(), dtype=float64)
[0.4      0.4      0.02656885 0.22998842 0.01765997 0.02895341]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.177959091983924>
408

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Acquisition function convergence reached at iteration 2826.
tf.Tensor(-3.944734282646434, shape=(), dtype=float64)
[0.4      0.4      0.02725178 0.22985943 0.01712911 0.02742667]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.178947204864644>
409
Acquisition function convergence reached at iteration 2909.
tf.Tensor(-3.9453657890411655, shape=(), dtype=float64)
[0.4      0.4      0.02872041 0.22948795 0.01545888 0.02854683]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.17993275323397>
410
Acquisition function convergence reached at iteration 2979.
tf.Tensor(-3.945961778571857, shape=(), dtype=float64)
[0.4      0.4      0.02468993 0.23043588 0.01985916 0.02727573]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.180915750013137>
411
Acquisition function convergence reached at iteration 2874.
tf.Tensor(-3.94661391958096, shape=(), dtype=float64)
[0.4      0.4      0.02562582 0.2302369  0.018917   0.02696296]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.181896208026951>
412
Acquisition function convergence reached at iteration 2700.
tf.Tensor(-3.9473054959546094, shape=(), dtype=float64)
[0.4      0.4      0.02276313 0.23032095 0.01933933 0.02808715]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.182874140004744>
413
Acquisition function convergence reached at iteration 2894.
tf.Tensor(-3.9478739704488066, shape=(), dtype=float64)
[0.4      0.4      0.02595965 0.23010763 0.01828886 0.02783006]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.183849558581315>
414
Acquisition function convergence reached at iteration 2899.
tf.Tensor(-3.948525969019701, shape=(), dtype=float64)
[0.4      0.4      0.02385209 0.23017894 0.01859149 0.0295845 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.184822476297856>
415
Acquisition function convergence reached at iteration 3054.
tf.Tensor(-3.949106091326359, shape=(), dtype=float64)
[0.4      0.4      0.02475671 0.23021378 0.0187431  0.02969772]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.185792905602873>
416
Acquisition function convergence reached at iteration 3073.
tf.Tensor(-3.9497179433296994, shape=(), dtype=float64)
[0.4      0.4      0.02516208 0.23026348 0.01899617 0.02895191]

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<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.186760858853089>
417
Acquisition function convergence reached at iteration 2906.
tf.Tensor(-3.9503845732378426, shape=(), dtype=float64)
[0.4      0.4      0.02252572 0.23052799 0.0203618  0.02798321]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.1877263483143405>
418
Acquisition function convergence reached at iteration 2881.
tf.Tensor(-3.951000804629901, shape=(), dtype=float64)
[0.4      0.4      0.02412291 0.23035735 0.01949657 0.02763379]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.188689386162461>
419
Acquisition function convergence reached at iteration 2876.
tf.Tensor(-3.9516368308016103, shape=(), dtype=float64)
[0.4      0.4      0.02467884 0.2300108  0.01776654 0.02996582]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.1896499844841575>
420
Acquisition function convergence reached at iteration 2896.
tf.Tensor(-3.952218769269604, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 8980.
[0.4      0.4      0.02883513 0.22968844 0.01645966 0.0269376 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.190608155277872>
421
Acquisition function convergence reached at iteration 3012.
tf.Tensor(-3.9688234932995545, shape=(), dtype=float64)
[0.4      0.4      0.02726122 0.23004109 0.01714452 0.02843789]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.191563910454629>
422
Acquisition function convergence reached at iteration 2765.
tf.Tensor(-3.969498962922001, shape=(), dtype=float64)
[0.4      0.4      0.02265193 0.23061483 0.01990977 0.02705849]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.19251726183889>
423
Acquisition function convergence reached at iteration 2916.
tf.Tensor(-3.970079832263685, shape=(), dtype=float64)
[0.4      0.4      0.02710689 0.22998701 0.01690138 0.02812834]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.193468221169373>
424
Acquisition function convergence reached at iteration 2884.
tf.Tensor(-3.9707313194736655, shape=(), dtype=float64)
[0.4      0.4      0.02568844 0.229776   0.01581011 0.03113085]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.194416800099884>
425

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Acquisition function convergence reached at iteration 2904.
tf.Tensor(-3.971304916129722, shape=(), dtype=float64)
[0.4      0.4      0.02519202 0.23034712 0.01856006 0.02766621]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.195363010200125>
426
Acquisition function convergence reached at iteration 3049.
tf.Tensor(-3.971893627500426, shape=(), dtype=float64)
[0.4      0.4      0.02516666 0.23031514 0.01836618 0.02915755]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.196306862956499>
427
Acquisition function convergence reached at iteration 3550.
tf.Tensor(-3.9626127560804574, shape=(), dtype=float64)
[0.4      0.4      0.01396336 0.14336186 0.18907941 0.02458503]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.197248369772904>
428
Acquisition function convergence reached at iteration 2937.
tf.Tensor(-3.9731468029546297, shape=(), dtype=float64)
[0.4      0.4      0.02042778 0.23090269 0.02140285 0.02760942]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.198187541971514>
429
Acquisition function convergence reached at iteration 2810.
tf.Tensor(-3.9737873470425886, shape=(), dtype=float64)
[0.4      0.4      0.02269743 0.2302692 0.01816635 0.0304033 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.199124390793555>
430
Acquisition function convergence reached at iteration 2716.
tf.Tensor(-3.9743908347960426, shape=(), dtype=float64)
[0.4      0.4      0.02289474 0.23046904 0.01917477 0.02780822]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.200058927400076>
431
Acquisition function convergence reached at iteration 2826.
tf.Tensor(-3.9749565063864205, shape=(), dtype=float64)
[0.4      0.4      0.02829108 0.22978092 0.01601646 0.02725466]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.200991162872696>
432
Acquisition function convergence reached at iteration 3038.
tf.Tensor(-3.975525653886074, shape=(), dtype=float64)
[0.4      0.4      0.02428385 0.23045534 0.01903841 0.02895024]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.2019211082143615>
433
Acquisition function convergence reached at iteration 3050.
tf.Tensor(-3.9761229727069454, shape=(), dtype=float64)
[0.4      0.4      0.02518228 0.23030443 0.01831195 0.02924165]

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<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.202848774350077>
434
Acquisition function convergence reached at iteration 2964.
tf.Tensor(-3.9767611934723788, shape=(), dtype=float64)
[0.4      0.4      0.02061686 0.23078264 0.02077692 0.02883849]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.203774172127641>
435
Acquisition function convergence reached at iteration 2903.
tf.Tensor(-3.9773596670871774, shape=(), dtype=float64)
[0.4      0.4      0.02682153 0.22977472 0.01584774 0.03000102]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.204697312318368>
436
Acquisition function convergence reached at iteration 3004.
tf.Tensor(-3.9779121839487943, shape=(), dtype=float64)
[0.4      0.4      0.02750284 0.22997571 0.01684166 0.02854244]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.205618205617798>
437
Acquisition function convergence reached at iteration 2821.
tf.Tensor(-3.9785715630333325, shape=(), dtype=float64)
[0.4      0.4      0.02118778 0.23056202 0.01966111 0.02961216]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.206536862646405>
438
Acquisition function convergence reached at iteration 2954.
tf.Tensor(-3.979141483294957, shape=(), dtype=float64)
[0.4      0.4      0.01993221 0.23093026 0.02158264 0.02765815]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.207453293950294>
439
Acquisition function convergence reached at iteration 2807.
tf.Tensor(-3.9797279737879365, shape=(), dtype=float64)
[0.4      0.4      0.02561784 0.23027911 0.01827227 0.02676442]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.208367510001889>
440
Acquisition function convergence reached at iteration 2639.
tf.Tensor(-3.980378513102511, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 8764.
[0.4      0.4      0.02345843 0.23023026 0.01801644 0.02843396]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.209279521200614>
441
Acquisition function convergence reached at iteration 2713.
tf.Tensor(-3.9880210255645547, shape=(), dtype=float64)
[0.4      0.4      0.02323692 0.23090102 0.01841534 0.02842411]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.210189337873564>
442

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Acquisition function convergence reached at iteration 2832.
tf.Tensor(-3.9885898627412084, shape=(), dtype=float64)
[0.4      0.4      0.02280189 0.23092547 0.01850984 0.02971636]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.211096970276181>
443
Acquisition function convergence reached at iteration 2880.
tf.Tensor(-3.9891796171292837, shape=(), dtype=float64)
[0.4      0.4      0.02253799 0.23078858 0.01784143 0.03132273]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.212002428592895>
444
Acquisition function convergence reached at iteration 3046.
tf.Tensor(-3.9897124309063896, shape=(), dtype=float64)
[0.4      0.4      0.02555304 0.23067082 0.01726788 0.03013192]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.212905722937791>
445
Acquisition function convergence reached at iteration 2878.
tf.Tensor(-3.9903074587529597, shape=(), dtype=float64)
[0.4      0.4      0.02292387 0.2313037 0.02041412 0.02629037]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.213806863355239>
446
Acquisition function convergence reached at iteration 2941.
tf.Tensor(-3.9909125896460016, shape=(), dtype=float64)
[0.4      0.4      0.02147649 0.23104398 0.01912544 0.03081758]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.21470585982054>
447
Acquisition function convergence reached at iteration 2918.
tf.Tensor(-3.991505500385278, shape=(), dtype=float64)
[0.4      0.4      0.02079076 0.23104501 0.01917153 0.03115452]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.215602722240547>
448
Acquisition function convergence reached at iteration 2956.
tf.Tensor(-3.992046971433062, shape=(), dtype=float64)
[0.4      0.4      0.022445   0.23129307 0.02034974 0.02752233]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.216497460454292>
449
Acquisition function convergence reached at iteration 2962.
tf.Tensor(-3.9926025760680797, shape=(), dtype=float64)
[0.4      0.4      0.02420493 0.23120121 0.01986721 0.02675002]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.217390084233594>
450
Acquisition function convergence reached at iteration 3141.
tf.Tensor(-3.9931605173297857, shape=(), dtype=float64)

Trained parameters:

```

```
amplitude_champ:0 is 0.646
length_scales_champ:0 is [6.090000e-01 7.6418654e+04 2.100000e-02 6.000000e-03 1.300000e-02]
observation_noise_variance_champ:0 is 0.387
alpha_tp:0 is 0.048
amp_alpha_mean:0 is 0.065
amp_beta_mean:0 is 1.235
amp_f_mean:0 is 7.865
amp_gamma_L_mean:0 is 28.379
amp_lambda_mean:0 is 23.344
amp_r_mean:0 is 9.088
beta_tp:0 is 0.427
bias_mean:0 is -2.248
f_tp:0 is -0.066
gamma_L_tp:0 is 0.07
lambda_tp:0 is -0.277
r_tp:0 is 0.116
[0.4      0.4      0.02467823 0.23103788 0.01902698 0.02899334]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.218280603283675>
451
Acquisition function convergence reached at iteration 2798.
tf.Tensor(-3.993833749482514, shape=(), dtype=float64)
[0.4      0.4      0.02473351 0.23050867 0.01651613 0.03028118]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.219169027243752>
452
Acquisition function convergence reached at iteration 2937.
tf.Tensor(-3.99436674587194, shape=(), dtype=float64)
```

```

[0.4      0.4      0.02104305 0.2312745 0.02030126 0.02917895]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.220055365687637>
453
Acquisition function convergence reached at iteration 2864.
tf.Tensor(-3.9949083490411175, shape=(), dtype=float64)
[0.4      0.4      0.0268853 0.23082975 0.01815937 0.02568946]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.220939628124323>
454
Acquisition function convergence reached at iteration 3138.
tf.Tensor(-3.995448472697609, shape=(), dtype=float64)
[0.4      0.4      0.02463893 0.23111567 0.0194107 0.02834908]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.221821823998559>
455
Acquisition function convergence reached at iteration 3083.
tf.Tensor(-3.9960175857238402, shape=(), dtype=float64)
[0.4      0.4      0.02592059 0.2310073 0.01893159 0.02725145]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.222701962691436>
456
Acquisition function convergence reached at iteration 2880.
tf.Tensor(-3.9966439262031215, shape=(), dtype=float64)
[0.4      0.4      0.02291141 0.23117715 0.01977545 0.02773453]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.223580053520943>
457
Acquisition function convergence reached at iteration 2816.
tf.Tensor(-3.997269992617508, shape=(), dtype=float64)
[0.4      0.4      0.02145059 0.23075206 0.01772241 0.03196852]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.224456105742537>
458
Acquisition function convergence reached at iteration 2878.
tf.Tensor(-3.9978128280069813, shape=(), dtype=float64)
[0.4      0.4      0.02493656 0.23043789 0.01617406 0.03103889]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.225330128549692>
459
Acquisition function convergence reached at iteration 2914.
tf.Tensor(-3.9983356261359346, shape=(), dtype=float64)
[0.4      0.4      0.02873491 0.23020162 0.0152792 0.02824411]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.226202131074453>
460
Acquisition function convergence reached at iteration 2859.
tf.Tensor(-3.9989172786134284, shape=(), dtype=float64)
[0.4      0.4      0.02168308 0.23125239 0.02019007 0.02813096]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.227072122387979>
461

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Acquisition function convergence reached at iteration 2891.
tf.Tensor(-3.9579761382766705, shape=(), dtype=float64)
[0.4      0.4      0.02764539 0.23105827 0.0167719  0.02701438]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.227940111501073>
462
Acquisition function convergence reached at iteration 2822.
tf.Tensor(-3.958574169613144, shape=(), dtype=float64)
[0.4      0.4      0.02623038 0.2309498  0.01616227 0.02913923]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.228806107364726>
463
Acquisition function convergence reached at iteration 2933.
tf.Tensor(-3.9591008210596894, shape=(), dtype=float64)
[0.4      0.4      0.02229666 0.23166394 0.01958096 0.02890004]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.229670118870629>
464
Acquisition function convergence reached at iteration 2874.
tf.Tensor(-3.9596687269782844, shape=(), dtype=float64)
[0.4      0.4      0.02662506 0.23091136 0.01598664 0.02934694]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.230532154851708>
465
Acquisition function convergence reached at iteration 2952.
tf.Tensor(-3.9602166148172175, shape=(), dtype=float64)
[0.4      0.4      0.02289575 0.23136123 0.01807035 0.03087744]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.231392224082618>
466
Acquisition function convergence reached at iteration 2963.
tf.Tensor(-3.960740580652268, shape=(), dtype=float64)
[0.4      0.4      0.02692112 0.23104413 0.01663319 0.02866744]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.2322503352802725>
467
Acquisition function convergence reached at iteration 3024.
tf.Tensor(-3.961239978579928, shape=(), dtype=float64)
[0.4      0.4      0.02623122 0.23160322 0.01933237 0.02518311]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.233106497104331>
468
Acquisition function convergence reached at iteration 2918.
tf.Tensor(-3.9618503477706764, shape=(), dtype=float64)
[0.4      0.4      0.02629682 0.23103497 0.01656745 0.02928747]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.233960718157706>
469
Acquisition function convergence reached at iteration 2841.
tf.Tensor(-3.962388113372011, shape=(), dtype=float64)
[0.4      0.4      0.02540213 0.23145448 0.01860358 0.02621787]

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<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.234813006987052>
470
Acquisition function convergence reached at iteration 3057.
tf.Tensor(-3.9629400389500904, shape=(), dtype=float64)
[0.4      0.4      0.01988933 0.2318524  0.02067583 0.02981209]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.235663372083247>
471
Acquisition function convergence reached at iteration 2684.
tf.Tensor(-3.963535339763635, shape=(), dtype=float64)
[0.4      0.4      0.02326476 0.23141561 0.01842074 0.02783058]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.236511821881884>
472
Acquisition function convergence reached at iteration 2892.
tf.Tensor(-3.9640207100332816, shape=(), dtype=float64)
[0.4      0.4      0.02509921 0.23137978 0.01823281 0.02773454]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.237358364763741>
473
Acquisition function convergence reached at iteration 2810.
tf.Tensor(-3.964587482491272, shape=(), dtype=float64)
[0.4      0.4      0.02131131 0.23182357 0.02050815 0.0270902 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.238203009055255>
474
Acquisition function convergence reached at iteration 2967.
tf.Tensor(-3.9651165934826818, shape=(), dtype=float64)
[0.4      0.4      0.02759602 0.23064269 0.01481348 0.03036148]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.239045763028985>
475
Acquisition function convergence reached at iteration 2901.
tf.Tensor(-3.965639483812658, shape=(), dtype=float64)
[0.4      0.4      0.0224232  0.23177693 0.02020362 0.0273434 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.239886634904077>
476
Acquisition function convergence reached at iteration 2939.
tf.Tensor(-3.9662062184983418, shape=(), dtype=float64)
[0.4      0.4      0.02083588 0.23154689 0.01910488 0.03112507]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.240725632846721>
477
Acquisition function convergence reached at iteration 3087.
tf.Tensor(-3.966694386430156, shape=(), dtype=float64)
[0.4      0.4      0.02204584 0.23169048 0.01974174 0.02998231]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.241562764970597>
478
Acquisition function convergence reached at iteration 2902.

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tf.Tensor(-3.9672554846832386, shape=(), dtype=float64)
[0.4      0.4      0.02151935 0.23187767 0.02074856 0.02705461]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.242398039337328>
479
Acquisition function convergence reached at iteration 2791.
tf.Tensor(-3.967846523624681, shape=(), dtype=float64)
[0.4      0.4      0.02286724 0.23118449 0.01727536 0.03080061]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.243231463956917>
480
Acquisition function convergence reached at iteration 3097.
tf.Tensor(-3.9682674002857268, shape=(), dtype=float64)
[0.4      0.4      0.02632009 0.23135618 0.01811442 0.0281356 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.244063046788191>
481
Acquisition function convergence reached at iteration 3168.
tf.Tensor(-3.946419445725787, shape=(), dtype=float64)
[0.4      0.4      0.02479241 0.23103661 0.01924801 0.02825921]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.244892795739227>
482
Acquisition function convergence reached at iteration 3019.
tf.Tensor(-3.9470080858086605, shape=(), dtype=float64)
[0.4      0.4      0.02163225 0.23108879 0.01957978 0.02987486]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.245720718667781>
483
Acquisition function convergence reached at iteration 2793.
tf.Tensor(-3.947594720084995, shape=(), dtype=float64)
[0.4      0.4      0.02391094 0.2304102  0.01629643 0.03108318]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.24654682338172>
484
Acquisition function convergence reached at iteration 2776.
tf.Tensor(-3.948096936285049, shape=(), dtype=float64)
[0.4      0.4      0.0246139  0.23061778 0.0172916  0.02886571]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.247371117639426>
485
Acquisition function convergence reached at iteration 3000.
tf.Tensor(-3.948542604540131, shape=(), dtype=float64)
[0.4      0.4      0.02683817 0.23071968 0.01781767 0.02712745]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.24819360915023>
486
Acquisition function convergence reached at iteration 3017.
tf.Tensor(-3.9490518222924376, shape=(), dtype=float64)
[0.4      0.4      0.02639488 0.2309135  0.01872807 0.0261918 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.249014305574805>

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487
Acquisition function convergence reached at iteration 3020.
tf.Tensor(-3.9496261086345172, shape=(), dtype=float64)
[0.4      0.4      0.02057717 0.23121153 0.02023452 0.02995622]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.249833214525584>
488
Acquisition function convergence reached at iteration 3104.
tf.Tensor(-3.95011841784951, shape=(), dtype=float64)
[0.4      0.4      0.02279392 0.23106365 0.01939532 0.029843  ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.2506503435671545>
489
Acquisition function convergence reached at iteration 2883.
tf.Tensor(-3.9506411727308075, shape=(), dtype=float64)
[0.4      0.4      0.02824403 0.23050866 0.01693671 0.02572903]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.251465700216665>
490
Acquisition function convergence reached at iteration 2887.
tf.Tensor(-3.9512052614356157, shape=(), dtype=float64)
[0.4      0.4      0.02084741 0.23127347 0.02055904 0.02780915]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.252279291944208>
491
Acquisition function convergence reached at iteration 2936.
tf.Tensor(-3.951714166368688, shape=(), dtype=float64)
[0.4      0.4      0.02578828 0.2304198 0.0163541 0.03012622]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.253091126173221>
492
Acquisition function convergence reached at iteration 2868.
tf.Tensor(-3.9522419954568817, shape=(), dtype=float64)
[0.4      0.4      0.02695216 0.23022236 0.01549351 0.02949308]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.253901210280863>
493
Acquisition function convergence reached at iteration 2962.
tf.Tensor(-3.9527283583197987, shape=(), dtype=float64)
[0.4      0.4      0.02140468 0.23132813 0.02078029 0.02747356]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.254709551598402>
494
Acquisition function convergence reached at iteration 2916.
tf.Tensor(-3.9532320980009277, shape=(), dtype=float64)
[0.4      0.4      0.0251086 0.23089655 0.01862092 0.02719629]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.25551615741159>
495
Acquisition function convergence reached at iteration 2984.
tf.Tensor(-3.953708032090967, shape=(), dtype=float64)

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[0.4      0.4      0.0270561  0.23088276 0.01863831 0.02483699]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.256321034961039>
496
Acquisition function convergence reached at iteration 2922.
tf.Tensor(-3.9542905872258904, shape=(), dtype=float64)
[0.4      0.4      0.02256914  0.23086513 0.01846687 0.03030562]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.257124191442591>
497
Acquisition function convergence reached at iteration 3134.
tf.Tensor(-3.9547125689186826, shape=(), dtype=float64)
[0.4      0.4      0.02597398  0.2310234  0.01922478 0.02654765]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.257925634007679>
498
Acquisition function convergence reached at iteration 3003.
tf.Tensor(-3.9553018535735487, shape=(), dtype=float64)
[0.4      0.4      0.01968485  0.23127557 0.02062554 0.02985399]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.2587253697637015>
499
Acquisition function convergence reached at iteration 2859.
tf.Tensor(-3.955782623570623, shape=(), dtype=float64)
[0.4      0.4      0.02813668  0.23050019 0.01689478 0.02567319]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.2595234057743685>
500
Acquisition function convergence reached at iteration 2894.
tf.Tensor(-3.9562786105800964, shape=(), dtype=float64)
Trained parameters:
amplitude_champ:0 is 0.634

length_scales_champ:0 is [6.3200000e-01 8.6220385e+04 2.2000000e-02 6.0000000e-03 1.3000000e-02]

observation_noise_variance_champ:0 is 0.393

alpha_tp:0 is -0.049

amp_alpha_mean:0 is 0.04

amp_beta_mean:0 is 1.366

amp_f_mean:0 is 5.922

amp_gamma_L_mean:0 is 25.498

```

```

amp_lambda_mean:0 is 21.346
amp_r_mean:0 is 21.996
beta_tp:0 is 0.435
bias_mean:0 is -2.786
f_tp:0 is -0.1
gamma_L_tp:0 is 0.069
lambda_tp:0 is -0.324
r_tp:0 is 0.093
[0.4      0.4      0.02670032 0.23081849 0.01831192 0.02541963]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.260319749060065>
501
Acquisition function convergence reached at iteration 2970.
tf.Tensor(-3.9430171930012348, shape=(), dtype=float64)
[0.4      0.4      0.02170194 0.23240016 0.02057662 0.02760336]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.2611144065982>
502
Acquisition function convergence reached at iteration 2995.
tf.Tensor(-3.9435056924681597, shape=(), dtype=float64)
[0.4      0.4      0.02425179 0.23218328 0.01945489 0.02691967]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.261907385323554>
503
Acquisition function convergence reached at iteration 3019.
tf.Tensor(-3.9440266431047366, shape=(), dtype=float64)
[0.4      0.4      0.02665043 0.23151485 0.01624482 0.02970299]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.262698692128628>
504
Acquisition function convergence reached at iteration 2893.
tf.Tensor(-3.9445343085415807, shape=(), dtype=float64)
[0.4      0.4      0.02247701 0.23232261 0.02017985 0.02688006]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.263488333863979>
505
Acquisition function convergence reached at iteration 2993.
tf.Tensor(-3.9450096123546734, shape=(), dtype=float64)
[0.4      0.4      0.02331497 0.23229901 0.02003059 0.02703635]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.26427631733856>

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506
Acquisition function convergence reached at iteration 3088.
tf.Tensor(-3.945491275580178, shape=(), dtype=float64)
[0.4      0.4      0.02514531 0.23205927 0.01882923 0.02784324]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.265062649320056>
507
Acquisition function convergence reached at iteration 2979.
tf.Tensor(-3.9460107447475794, shape=(), dtype=float64)
[0.4      0.4      0.02576065 0.23191406 0.0181582  0.0274266 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.265847336535215>
508
Acquisition function convergence reached at iteration 3002.
tf.Tensor(-3.94652725133687, shape=(), dtype=float64)
[0.4      0.4      0.02600146 0.23157578 0.01650473 0.03003696]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.2666303856701715>
509
Acquisition function convergence reached at iteration 2947.
tf.Tensor(-3.9470405893045752, shape=(), dtype=float64)
[0.4      0.4      0.0264225  0.23145306 0.01596086 0.0297736 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.267411803370778>
510
Acquisition function convergence reached at iteration 3041.
tf.Tensor(-3.9474969983778356, shape=(), dtype=float64)
[0.4      0.4      0.02431828 0.23202164 0.01864931 0.02883986]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.268191596242921>
511
Acquisition function convergence reached at iteration 3105.
tf.Tensor(-3.947962583650774, shape=(), dtype=float64)
[0.4      0.4      0.02493092 0.232139   0.01923349 0.02757583]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.268969770852837>
512
Acquisition function convergence reached at iteration 2852.
tf.Tensor(-3.948507673297283, shape=(), dtype=float64)
[0.4      0.4      0.02340402 0.23224217 0.01979281 0.02622198]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.269746333727438>
513
Acquisition function convergence reached at iteration 2942.
tf.Tensor(-3.949011430474311, shape=(), dtype=float64)
[0.4      0.4      0.02660537 0.23148543 0.01612855 0.02925368]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.270521291354612>
514
Acquisition function convergence reached at iteration 3009.
tf.Tensor(-3.949462895922136, shape=(), dtype=float64)

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[0.4      0.4      0.02479439 0.2320485 0.01878669 0.02787591]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.2712946501835365>
515
Acquisition function convergence reached at iteration 3078.
tf.Tensor(-3.9499443384969948, shape=(), dtype=float64)
[0.4      0.4      0.02534248 0.23192756 0.01819308 0.02878429]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.272066416624984>
516
Acquisition function convergence reached at iteration 3054.
tf.Tensor(-3.9504179423183903, shape=(), dtype=float64)
[0.4      0.4      0.0262876 0.2320226 0.018719 0.02630714]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.2728365970516275>
517
Acquisition function convergence reached at iteration 2761.
tf.Tensor(-3.951030647856224, shape=(), dtype=float64)
[0.4      0.4      0.02235579 0.23172723 0.01724176 0.03093256]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.273605197798334>
518
Acquisition function convergence reached at iteration 2987.
tf.Tensor(-3.9514401095394365, shape=(), dtype=float64)
[0.4      0.4      0.02096845 0.23249985 0.02114652 0.02691681]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.274372225162466>
519
Acquisition function convergence reached at iteration 3009.
tf.Tensor(-3.9519066132633762, shape=(), dtype=float64)
[0.4      0.4      0.02390806 0.23215661 0.0193306 0.02782836]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.275137685404174>
520
Acquisition function convergence reached at iteration 3044.
tf.Tensor(-3.9524093581296613, shape=(), dtype=float64)
[0.4      0.4      0.02174407 0.23224076 0.01978492 0.02939952]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.27590158474669>
521
Acquisition function convergence reached at iteration 2812.
tf.Tensor(-3.9340724452740856, shape=(), dtype=float64)
[0.4      0.4      0.02374574 0.2307573 0.01624554 0.03171    ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.276663929376611>
522
Acquisition function convergence reached at iteration 3080.
tf.Tensor(-3.9344199913698232, shape=(), dtype=float64)
[0.4      0.4      0.02582738 0.23154469 0.02014542 0.02447038]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.277424725444188>
523

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Acquisition function convergence reached at iteration 3001.
tf.Tensor(-3.934953506645057, shape=(), dtype=float64)
[0.4      0.4      0.02236459 0.23164068 0.02059809 0.0273372 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.278183979063607>
524
Acquisition function convergence reached at iteration 3113.
tf.Tensor(-3.9353964145490994, shape=(), dtype=float64)
[0.4      0.4      0.02600927 0.23122383 0.01853102 0.02800968]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.278941696313272>
525
Acquisition function convergence reached at iteration 2893.
tf.Tensor(-3.9359687013011397, shape=(), dtype=float64)
[0.4      0.4      0.0228206 0.23101057 0.01747113 0.03141126]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.279697883236075>
526
Acquisition function convergence reached at iteration 2825.
tf.Tensor(-3.9364175959301857, shape=(), dtype=float64)
[0.4      0.4      0.02553385 0.23105225 0.01772319 0.02778059]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.280452545839681>
527
Acquisition function convergence reached at iteration 2945.
tf.Tensor(-3.936893179410604, shape=(), dtype=float64)
[0.4      0.4      0.0243165 0.23098117 0.01731192 0.03071351]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.281205690096793>
528
Acquisition function convergence reached at iteration 2838.
tf.Tensor(-3.9373546318901567, shape=(), dtype=float64)
[0.4      0.4      0.02363748 0.23149834 0.01990198 0.02609415]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.28195732194542>
529
Acquisition function convergence reached at iteration 3055.
tf.Tensor(-3.937776446594553, shape=(), dtype=float64)
[0.4      0.4      0.02658872 0.23122866 0.0185986 0.02664313]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.282707447289148>
530
Acquisition function convergence reached at iteration 2913.
tf.Tensor(-3.9383041607750435, shape=(), dtype=float64)
[0.4      0.4      0.02116175 0.23168968 0.02089214 0.02761581]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.283456071997404>
531
Acquisition function convergence reached at iteration 3075.
tf.Tensor(-3.938714250382167, shape=(), dtype=float64)
[0.4      0.4      0.02585858 0.23140495 0.01943998 0.02609967]

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<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.284203201905716>
532
Acquisition function convergence reached at iteration 2925.
tf.Tensor(-3.939233996391241, shape=(), dtype=float64)
[0.4      0.4      0.02660046 0.23095132 0.01725874 0.02809075]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.28494884281597>
533
Acquisition function convergence reached at iteration 2848.
tf.Tensor(-3.9397187555431255, shape=(), dtype=float64)
[0.4      0.4      0.02379267 0.23140291 0.0194232 0.02700054]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.285693000496672>
534
Acquisition function convergence reached at iteration 3112.
tf.Tensor(-3.9401463137929227, shape=(), dtype=float64)
[0.4      0.4      0.02422795 0.23130048 0.01885333 0.02961269]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.2864356806832>
535
Acquisition function convergence reached at iteration 3033.
tf.Tensor(-3.9406187140704234, shape=(), dtype=float64)
[0.4      0.4      0.0240141 0.23149522 0.01984977 0.02728026]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.28717688907805>
536
Acquisition function convergence reached at iteration 2745.
tf.Tensor(-3.941188721924798, shape=(), dtype=float64)
[0.4      0.4      0.02316908 0.2309339 0.01712111 0.03058169]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.287916631351099>
537
Acquisition function convergence reached at iteration 2979.
tf.Tensor(-3.9415852701877836, shape=(), dtype=float64)
[0.4      0.4      0.02522975 0.23095663 0.01721348 0.03010895]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.288654913139837>
538
Acquisition function convergence reached at iteration 3096.
tf.Tensor(-3.9420019584750374, shape=(), dtype=float64)
[0.4      0.4      0.02574923 0.23126455 0.01872239 0.02786704]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.2893917400496235>
539
Acquisition function convergence reached at iteration 3108.
tf.Tensor(-3.942485759935467, shape=(), dtype=float64)
[0.4      0.4      0.02278503 0.23151133 0.01990777 0.02909723]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.290127117653922>
540
Acquisition function convergence reached at iteration 2966.

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tf.Tensor(-3.9429793041108274, shape=(), dtype=float64)
[0.4      0.4      0.02170787 0.23160841 0.02045609 0.02807613]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.290861051494546>
541
Acquisition function convergence reached at iteration 3012.
tf.Tensor(-3.92405238769621, shape=(), dtype=float64)
[0.4      0.4      0.02594703 0.23145865 0.01828255 0.0273443 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.2915935470818924>
542
Acquisition function convergence reached at iteration 2783.
tf.Tensor(-3.9246090347000853, shape=(), dtype=float64)
[0.4      0.4      0.02281985 0.23120928 0.01707002 0.03104807]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.292324609895181>
543
Acquisition function convergence reached at iteration 3102.
tf.Tensor(-3.9249674187156836, shape=(), dtype=float64)
[0.4      0.4      0.02366698 0.23171785 0.01948447 0.02850705]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.293054245382685>
544
Acquisition function convergence reached at iteration 3097.
tf.Tensor(-3.9253992015807007, shape=(), dtype=float64)
[0.4      0.4      0.02596123 0.23161993 0.01904514 0.02666711]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.293782458961968>
545
Acquisition function convergence reached at iteration 2927.
tf.Tensor(-3.9258971781925065, shape=(), dtype=float64)
[0.4      0.4      0.02712891 0.23128527 0.01752247 0.02639109]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.294509256020102>
546
Acquisition function convergence reached at iteration 3015.
tf.Tensor(-3.9263651884754323, shape=(), dtype=float64)
[0.4      0.4      0.02596834 0.23113785 0.01673551 0.02994684]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.295234641913906>
547
Acquisition function convergence reached at iteration 2810.
tf.Tensor(-3.9268676930661504, shape=(), dtype=float64)
[0.4      0.4      0.02332325 0.23139486 0.01795536 0.02949108]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.295958621970167>
548
Acquisition function convergence reached at iteration 2974.
tf.Tensor(-3.9272704615236553, shape=(), dtype=float64)
[0.4      0.4      0.02673047 0.23115148 0.01683884 0.02859497]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.2966812014858595>

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549
Acquisition function convergence reached at iteration 2882.
tf.Tensor(-3.9277180305880903, shape=(), dtype=float64)
[0.4          0.4          0.02847603 0.2310877 0.01667476 0.0256492 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.297402385728373>
550
Acquisition function convergence reached at iteration 2901.
tf.Tensor(-3.928207532557787, shape=(), dtype=float64)
Trained parameters:
amplitude_champ:0 is 0.627

length_scales_champ:0 is [6.5500000e-01 9.2608813e+04 2.2000000e-02 6.0000000e-03 1.3000000e-02]

observation_noise_variance_champ:0 is 0.402

alpha_tp:0 is -0.131

amp_alpha_mean:0 is 0.042

amp_beta_mean:0 is 1.346

amp_f_mean:0 is 5.805

amp_gamma_L_mean:0 is 26.473

amp_lambda_mean:0 is 21.41

amp_r_mean:0 is 21.028

beta_tp:0 is 0.438

bias_mean:0 is -2.785

f_tp:0 is -0.105

gamma_L_tp:0 is 0.07

lambda_tp:0 is -0.322

r_tp:0 is 0.095

[0.4          0.4          0.02609284 0.23102938 0.01623288 0.02971023]
```

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<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.2981221799357225>
551
Acquisition function convergence reached at iteration 2961.
tf.Tensor(-3.9286505637853417, shape=(), dtype=float64)
[0.4      0.4      0.02637279 0.23100625 0.01613257 0.02982026]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.298840589316775>
552
Acquisition function convergence reached at iteration 2924.
tf.Tensor(-3.929106643642417, shape=(), dtype=float64)
[0.4      0.4      0.02781138 0.23078213 0.01517017 0.02916267]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.2995576190514555>
553
Acquisition function convergence reached at iteration 2836.
tf.Tensor(-3.929558128265262, shape=(), dtype=float64)
[0.4      0.4      0.02401397 0.23153955 0.01864779 0.02765887]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.300273274290965>
554
Acquisition function convergence reached at iteration 3002.
tf.Tensor(-3.9299537140462912, shape=(), dtype=float64)
[0.4      0.4      0.02476886 0.23176018 0.01971768 0.02580805]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.300987560157989>
555
Acquisition function convergence reached at iteration 3066.
tf.Tensor(-3.9303884439902084, shape=(), dtype=float64)
[0.4      0.4      0.02613425 0.23155397 0.01873354 0.02665164]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.301700481746911>
556
Acquisition function convergence reached at iteration 3090.
tf.Tensor(-3.9308412665734553, shape=(), dtype=float64)
[0.4      0.4      0.02421689 0.23177807 0.01977149 0.02721503]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.302412044124011>
557
Acquisition function convergence reached at iteration 3002.
tf.Tensor(-3.9313296769947064, shape=(), dtype=float64)
[0.4      0.4      0.02065572 0.23192892 0.02060694 0.0289879 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.303122252327676>
558
Acquisition function convergence reached at iteration 2955.
tf.Tensor(-3.9317566855740247, shape=(), dtype=float64)
[0.4      0.4      0.02393861 0.23177717 0.01979212 0.02648235]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.30383111136861>
559
Acquisition function convergence reached at iteration 3072.

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tf.Tensor(-3.932161174263617, shape=(), dtype=float64)
[0.4      0.4      0.02651985 0.23158593 0.01890007 0.02593448]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.30453862623002>
560
Acquisition function convergence reached at iteration 2919.
tf.Tensor(-3.932651229112358, shape=(), dtype=float64)
[0.4      0.4      0.0261923 0.23139389 0.0179797 0.02688452]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.30524480186783>
561
Acquisition function convergence reached at iteration 3080.
tf.Tensor(-3.9328849840629303, shape=(), dtype=float64)
[0.4      0.4      0.02573096 0.23238421 0.01768609 0.02856586]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.305949643210869>
562
Acquisition function convergence reached at iteration 2897.
tf.Tensor(-3.933347597087974, shape=(), dtype=float64)
[0.4      0.4      0.02880513 0.23197011 0.01591941 0.02595779]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.306653155161074>
563
Acquisition function convergence reached at iteration 2904.
tf.Tensor(-3.933789743387624, shape=(), dtype=float64)
[0.4      0.4      0.02727456 0.23220087 0.01690797 0.02654959]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.30735534259368>
564
Acquisition function convergence reached at iteration 2861.
tf.Tensor(-3.93426881372366, shape=(), dtype=float64)
[0.4      0.4      0.02297269 0.23251066 0.01830264 0.02903997]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.308056210357415>
565
Acquisition function convergence reached at iteration 2973.
tf.Tensor(-3.9347060637559976, shape=(), dtype=float64)
[0.4      0.4      0.02356098 0.23226358 0.01707988 0.03097842]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.308755763274688>
566
Acquisition function convergence reached at iteration 3024.
tf.Tensor(-3.935100458137585, shape=(), dtype=float64)
[0.4      0.4      0.02692917 0.2321367 0.01655038 0.02860616]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.309454006141782>
567
Acquisition function convergence reached at iteration 3048.
tf.Tensor(-3.93553439951548, shape=(), dtype=float64)
[0.4      0.4      0.02491712 0.23246334 0.01806481 0.02866575]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.310150943729039>

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568
Acquisition function convergence reached at iteration 2857.
tf.Tensor(-3.936027036505269, shape=(), dtype=float64)
[0.4      0.4      0.02395671 0.23232414 0.01739947 0.0294145 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.310846580781045>
569
Acquisition function convergence reached at iteration 2881.
tf.Tensor(-3.936447383573567, shape=(), dtype=float64)
[0.4      0.4      0.02827632 0.23181769 0.01516905 0.027704 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.311540922016816>
570
Acquisition function convergence reached at iteration 3009.
tf.Tensor(-3.9368549241282667, shape=(), dtype=float64)
[0.4      0.4      0.02733897 0.23202871 0.01608305 0.02862309]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.312233972129979>
571
Acquisition function convergence reached at iteration 3145.
tf.Tensor(-3.9372574692808815, shape=(), dtype=float64)
[0.4      0.4      0.02476569 0.23254853 0.01848366 0.02881155]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.312925735788955>
572
Acquisition function convergence reached at iteration 3079.
tf.Tensor(-3.9377093955923055, shape=(), dtype=float64)
[0.4      0.4      0.02432795 0.2325504  0.01850911 0.02867963]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.313616217637136>
573
Acquisition function convergence reached at iteration 3151.
tf.Tensor(-3.93813656973356, shape=(), dtype=float64)
[0.4      0.4      0.02315452 0.23266967 0.01908597 0.02943313]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.314305422293064>
574
Acquisition function convergence reached at iteration 2893.
tf.Tensor(-3.938606221424822, shape=(), dtype=float64)
[0.4      0.4      0.0269303  0.23210895 0.01647074 0.02765026]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.314993354350603>
575
Acquisition function convergence reached at iteration 2970.
tf.Tensor(-3.9390462092221123, shape=(), dtype=float64)
[0.4      0.4      0.02637595 0.2319958  0.0158878  0.02965706]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3156800183791235>
576
Acquisition function convergence reached at iteration 2892.
tf.Tensor(-3.9394646731078353, shape=(), dtype=float64)

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[0.4      0.4      0.02601811 0.23232615 0.01748445 0.02696009]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.316365418923664>
577
Acquisition function convergence reached at iteration 2961.
tf.Tensor(-3.939915545241427, shape=(), dtype=float64)
[0.4      0.4      0.02554704 0.23204062 0.01606888 0.03026256]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.31704956050511>
578
Acquisition function convergence reached at iteration 3121.
tf.Tensor(-3.940262509890621, shape=(), dtype=float64)
[0.4      0.4      0.02492522 0.23274135 0.01945361 0.02664829]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.317732447620361>
579
Acquisition function convergence reached at iteration 2976.
tf.Tensor(-3.9407480722202544, shape=(), dtype=float64)
[0.4      0.4      0.02364607 0.23259287 0.01872631 0.02827337]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.318414084742498>
580
Acquisition function convergence reached at iteration 2872.
tf.Tensor(-3.941226566743792, shape=(), dtype=float64)
[0.4      0.4      0.02258375 0.23230373 0.01731984 0.03100099]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.319094476320956>
581
Acquisition function convergence reached at iteration 3009.
tf.Tensor(-3.9407108074725494, shape=(), dtype=float64)
[0.4      0.4      0.02224988 0.22811862 0.01966958 0.02944092]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.319773626781682>
582
Acquisition function convergence reached at iteration 3010.
tf.Tensor(-3.941127512384551, shape=(), dtype=float64)
[0.4      0.4      0.02218561 0.22823974 0.02025819 0.028495  ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.320451540527303>
583
Acquisition function convergence reached at iteration 2873.
tf.Tensor(-3.9415568435203627, shape=(), dtype=float64)
[0.4      0.4      0.02626029 0.2276912  0.01769595 0.02751353]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3211282219372915>
584
Acquisition function convergence reached at iteration 2973.
tf.Tensor(-3.941939081766785, shape=(), dtype=float64)
[0.4      0.4      0.02682828 0.22792436 0.01882347 0.02530894]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3218036753681215>
585

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Acquisition function convergence reached at iteration 3004.
tf.Tensor(-3.942417548504992, shape=(), dtype=float64)
[0.4      0.4      0.01977623 0.22834413 0.02090083 0.02972341]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3224779051534306>
586
Acquisition function convergence reached at iteration 3034.
tf.Tensor(-3.942807433659444, shape=(), dtype=float64)
[0.4      0.4      0.02439257 0.22796765 0.01894611 0.02877594]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.323150915604178>
587
Acquisition function convergence reached at iteration 2899.
tf.Tensor(-3.9432713368329155, shape=(), dtype=float64)
[0.4      0.4      0.02554587 0.2274496 0.01653468 0.03037318]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.323822711008806>
588
Acquisition function convergence reached at iteration 2931.
tf.Tensor(-3.9436561558903422, shape=(), dtype=float64)
[0.4      0.4      0.0253959 0.22791823 0.01875379 0.02716767]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.324493295633387>
589
Acquisition function convergence reached at iteration 2792.
tf.Tensor(-3.944115308403137, shape=(), dtype=float64)
[0.4      0.4      0.0238289 0.22803536 0.01933831 0.02664772]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.325162673721785>
590
Acquisition function convergence reached at iteration 2954.
tf.Tensor(-3.9445211594857965, shape=(), dtype=float64)
[0.4      0.4      0.02537412 0.22748931 0.01670931 0.03076021]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.325830849495808>
591
Acquisition function convergence reached at iteration 3034.
tf.Tensor(-3.944897484276249, shape=(), dtype=float64)
[0.4      0.4      0.02669857 0.22767276 0.01760858 0.02842571]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.326497827155357>
592
Acquisition function convergence reached at iteration 2874.
tf.Tensor(-3.945367062238742, shape=(), dtype=float64)
[0.4      0.4      0.0239187 0.22784996 0.01842375 0.0290906 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3271636108785785>
593
Acquisition function convergence reached at iteration 2917.
tf.Tensor(-3.9457735875020474, shape=(), dtype=float64)
[0.4      0.4      0.02787755 0.22715544 0.01526215 0.02960371]

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<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.327828204822013>
594
Acquisition function convergence reached at iteration 3031.
tf.Tensor(-3.946163085129516, shape=(), dtype=float64)
[0.4      0.4      0.02414305 0.22808604 0.01953588 0.02770278]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.328491613120742>
595
Acquisition function convergence reached at iteration 3028.
tf.Tensor(-3.946559094733609, shape=(), dtype=float64)
[0.4      0.4      0.02577853 0.22804905 0.01939629 0.02582071]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.329153839888539>
596
Acquisition function convergence reached at iteration 2897.
tf.Tensor(-3.947059557699885, shape=(), dtype=float64)
[0.4      0.4      0.02033034 0.22798235 0.01916806 0.03149995]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.329814889218008>
597
Acquisition function convergence reached at iteration 2980.
tf.Tensor(-3.9474032305896762, shape=(), dtype=float64)
[0.4      0.4      0.02392471 0.22827993 0.02048465 0.02563256]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3304747651807345>
598
Acquisition function convergence reached at iteration 2837.
tf.Tensor(-3.9478961800809835, shape=(), dtype=float64)
[0.4      0.4      0.02102641 0.22795081 0.0189956 0.0306531 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.331133471827423>
599
Acquisition function convergence reached at iteration 2885.
tf.Tensor(-3.948270896632801, shape=(), dtype=float64)
[0.4      0.4      0.02615191 0.22743691 0.0165057 0.02972488]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3317910131880435>
600
Acquisition function convergence reached at iteration 2869.
tf.Tensor(-3.9487120210896163, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 8944.
Trained parameters:
amplitude_champ:0 is 0.636

length_scales_champ:0 is [6.4300000e-01 1.00765728e+05 2.2000000e-02 5.0000000e-03
1.3000000e-02 7.7000000e-02]

observation_noise_variance_champ:0 is 0.395

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alpha_tp:0 is -0.074
amp_alpha_mean:0 is 0.073
amp_beta_mean:0 is 1.19
amp_f_mean:0 is 7.032
amp_gamma_L_mean:0 is 30.672
amp_lambda_mean:0 is 23.664
amp_r_mean:0 is 12.351
beta_tp:0 is 0.428
bias_mean:0 is -2.336
f_tp:0 is -0.089
gamma_L_tp:0 is 0.074
lambda_tp:0 is -0.277
r_tp:0 is 0.093
[0.4      0.4      0.0245595  0.2273251  0.01594122 0.03206603]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.332447393271967>
601
Acquisition function convergence reached at iteration 2058.
tf.Tensor(-3.95635397745057, shape=(), dtype=float64)
[0.4      0.4      0.05294931  0.20210494  0.30122363 0.03533794]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.333102616068111>
602
Acquisition function convergence reached at iteration 2815.
tf.Tensor(-4.0044776846424135, shape=(), dtype=float64)
[0.4      0.4      0.02409156  0.22611859  0.0193423  0.02744263]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.333756685545072>
603
Acquisition function convergence reached at iteration 2822.
tf.Tensor(-4.004901667255541, shape=(), dtype=float64)
[0.4      0.4      0.02490074  0.2257871  0.01772172 0.02949108]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.334409605651267>

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604
Acquisition function convergence reached at iteration 2906.
tf.Tensor(-4.005316110830421, shape=(), dtype=float64)
[0.4      0.4      0.02109184 0.22631456 0.02033007 0.02952119]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3350613803150635>
605
Acquisition function convergence reached at iteration 3023.
tf.Tensor(-4.005698202333989, shape=(), dtype=float64)
[0.4      0.4      0.02208408 0.22634761 0.0204324  0.02919166]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3357120134449225>
606
Acquisition function convergence reached at iteration 2922.
tf.Tensor(-4.006117183963747, shape=(), dtype=float64)
[0.4      0.4      0.02242768 0.22651718 0.02130956 0.02592683]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.336361508929526>
607
Acquisition function convergence reached at iteration 2880.
tf.Tensor(-4.006517646755063, shape=(), dtype=float64)
[0.4      0.4      0.02771416 0.22569972 0.01743229 0.02676665]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.33700987063791>
608
Acquisition function convergence reached at iteration 3481.
tf.Tensor(-4.005514040206173, shape=(), dtype=float64)
[0.39999987 0.4      0.01646373 0.16597317 0.11743672 0.02567517]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.337657102419601>
609
Acquisition function convergence reached at iteration 2940.
tf.Tensor(-4.007343401203995, shape=(), dtype=float64)
[0.4      0.4      0.02683745 0.22568349 0.01729948 0.02876502]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.338303208104738>
610
Acquisition function convergence reached at iteration 3037.
tf.Tensor(-4.007746112070881, shape=(), dtype=float64)
[0.4      0.4      0.0236831  0.22636396 0.02055953 0.0267872 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.338948191504207>
611
Acquisition function convergence reached at iteration 2918.
tf.Tensor(-4.008168909795495, shape=(), dtype=float64)
[0.4      0.4      0.02340988 0.22636268 0.02056548 0.02663559]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3395920564097725>
612
Acquisition function convergence reached at iteration 2977.
tf.Tensor(-4.008551836706589, shape=(), dtype=float64)

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[0.4      0.4      0.02650536 0.22598566 0.01876659 0.02686087]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.340234806594196>
613
Acquisition function convergence reached at iteration 2374.
tf.Tensor(-3.9614176506352194, shape=(), dtype=float64)
[0.4      0.4      0.04641561 0.20234677 0.30248059 0.03717467]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.340876445811369>
614
Acquisition function convergence reached at iteration 2788.
tf.Tensor(-4.0094482066469865, shape=(), dtype=float64)
[0.4      0.4      0.02186308 0.22611934 0.01940564 0.02968391]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.341516977796434>
615
Acquisition function convergence reached at iteration 2911.
tf.Tensor(-4.009795161048876, shape=(), dtype=float64)
[0.4      0.4      0.02449067 0.22632284 0.02040138 0.02526225]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3421564062659135>
616
Acquisition function convergence reached at iteration 2904.
tf.Tensor(-4.01019228557241, shape=(), dtype=float64)
[0.4      0.4      0.02790259 0.22574409 0.01769603 0.02619569]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.342794734917825>
617
Acquisition function convergence reached at iteration 2745.
tf.Tensor(-4.01068113688393, shape=(), dtype=float64)
[0.4      0.4      0.0243823  0.22557468 0.01673282 0.03092952]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.34343196743181>
618
Acquisition function convergence reached at iteration 2912.
tf.Tensor(-4.0110292387961, shape=(), dtype=float64)
[0.4      0.4      0.02797065 0.22533142 0.01567329 0.02949645]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.344068107469253>
619
Acquisition function convergence reached at iteration 3074.
tf.Tensor(-4.011413684642601, shape=(), dtype=float64)
[0.4      0.4      0.02307065 0.22617465 0.01960635 0.03007373]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3447031586734>
620
Acquisition function convergence reached at iteration 2483.
tf.Tensor(-3.964287400939924, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 9880.
[0.4      0.4      0.04477562 0.20240796 0.30275434 0.03759715]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.345337124669478>

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621
Acquisition function convergence reached at iteration 2971.
tf.Tensor(-3.9919767781511366, shape=(), dtype=float64)
[0.4      0.4      0.02010688 0.22574947 0.02076404 0.03050547]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.345970009064815>
622
Acquisition function convergence reached at iteration 2935.
tf.Tensor(-3.992371047209659, shape=(), dtype=float64)
[0.4      0.4      0.02620004 0.22520583 0.01809523 0.0273078 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.346601815448954>
623
Acquisition function convergence reached at iteration 2764.
tf.Tensor(-3.9928117919662807, shape=(), dtype=float64)
[0.4      0.4      0.02376983 0.22511414 0.01757009 0.03072239]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.347232547393772>
624
Acquisition function convergence reached at iteration 2992.
tf.Tensor(-3.9931318414245087, shape=(), dtype=float64)
[0.4      0.4      0.02519367 0.22564599 0.0202395  0.02535943]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.347862208453592>
625
Acquisition function convergence reached at iteration 2845.
tf.Tensor(-3.993598765089727, shape=(), dtype=float64)
[0.4      0.4      0.02219537 0.22531315 0.0185511  0.031382  ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.348490802165301>
626
Acquisition function convergence reached at iteration 3061.
tf.Tensor(-3.9939690662120184, shape=(), dtype=float64)
[0.4      0.4      0.02555355 0.22510749 0.0175578  0.02952959]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3491183320484605>
627
Acquisition function convergence reached at iteration 2695.
tf.Tensor(-3.9944129027518747, shape=(), dtype=float64)
[0.4      0.4      0.02303307 0.22528874 0.01845671 0.02964508]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.349744801605418>
628
Acquisition function convergence reached at iteration 2776.
tf.Tensor(-3.9947629492334764, shape=(), dtype=float64)
[0.4      0.4      0.02715365 0.22499439 0.01710239 0.027627  ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.350370214321424>
629
Acquisition function convergence reached at iteration 2872.
tf.Tensor(-3.995134476981279, shape=(), dtype=float64)

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[0.4      0.4      0.02735899 0.2250503 0.01736662 0.02775029]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3509945736647335>
630
Acquisition function convergence reached at iteration 3002.
tf.Tensor(-3.9954958564684055, shape=(), dtype=float64)
[0.4      0.4      0.02594483 0.22555552 0.01978883 0.02597385]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3516178830867265>
631
Acquisition function convergence reached at iteration 2933.
tf.Tensor(-3.995926851434557, shape=(), dtype=float64)
[0.4      0.4      0.02448869 0.22540767 0.0190011 0.02900515]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.352240146022009>
632
Acquisition function convergence reached at iteration 2900.
tf.Tensor(-3.996343066913836, shape=(), dtype=float64)
[0.4      0.4      0.02311389 0.22537827 0.01885078 0.03049911]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.35286136588852>
633
Acquisition function convergence reached at iteration 2381.
tf.Tensor(-3.9494880180539287, shape=(), dtype=float64)
[0.4      0.4      0.04400891 0.20214619 0.30174211 0.03623568]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3534815460876475>
634
Acquisition function convergence reached at iteration 3078.
tf.Tensor(-3.9970872259131895, shape=(), dtype=float64)
[0.4      0.4      0.02280557 0.22566059 0.02021806 0.0296579 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.354100690004325>
635
Acquisition function convergence reached at iteration 2832.
tf.Tensor(-3.9975042838531047, shape=(), dtype=float64)
[0.4      0.4      0.02764679 0.22503811 0.01735969 0.02667184]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.354718801007142>
636
Acquisition function convergence reached at iteration 3075.
tf.Tensor(-3.9978705654876854, shape=(), dtype=float64)
[0.4      0.4      0.0260151 0.22542998 0.01918442 0.02656141]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.355335882448446>
637
Acquisition function convergence reached at iteration 2886.
tf.Tensor(-3.9982969289968597, shape=(), dtype=float64)
[0.4      0.4      0.02644128 0.22485915 0.01635691 0.03054173]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.355951937664452>
638

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Acquisition function convergence reached at iteration 2916.
tf.Tensor(-3.998684585817336, shape=(), dtype=float64)
[0.4         0.4         0.0215335  0.22580908 0.02103547 0.02811689]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3565669699753355>
639
Acquisition function convergence reached at iteration 2718.
tf.Tensor(-3.9991220412064554, shape=(), dtype=float64)
[0.4         0.4         0.02339816  0.22518248 0.01792345 0.03031144]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3571809826853425>
640
Acquisition function convergence reached at iteration 2738.
tf.Tensor(-3.9995197528631627, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 8557.
[0.4         0.4         0.02252466  0.22510136 0.01751426 0.03190755]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.357793979082889>
641
Acquisition function convergence reached at iteration 2966.
tf.Tensor(-4.049541996876703, shape=(), dtype=float64)
[0.4         0.4         0.0205218   0.22533946 0.02128289 0.02903721]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.358405962440659>
642
Acquisition function convergence reached at iteration 3015.
tf.Tensor(-4.04989804949209, shape=(), dtype=float64)
[0.4         0.4         0.02334466  0.22530434 0.02106005 0.0266836 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.359016936015708>
643
Acquisition function convergence reached at iteration 2469.
tf.Tensor(-4.002774405813582, shape=(), dtype=float64)
[0.4         0.4         0.04982081  0.20159739 0.30112655 0.03538735]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3596269030495565>
644
Acquisition function convergence reached at iteration 2964.
tf.Tensor(-4.050683984905846, shape=(), dtype=float64)
[0.4         0.4         0.0270341   0.22459511 0.01764407 0.02833485]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.360235866768294>
645
Acquisition function convergence reached at iteration 2814.
tf.Tensor(-4.0511225796230805, shape=(), dtype=float64)
[0.4         0.4         0.02643236  0.22433312 0.01633852 0.03000436]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.360843830382675>
646
Acquisition function convergence reached at iteration 2880.
tf.Tensor(-4.051506350945641, shape=(), dtype=float64)

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[0.4      0.4      0.0215499  0.22518988 0.02052939 0.0288762 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.361450797088208>
647
Acquisition function convergence reached at iteration 2920.
tf.Tensor(-4.051870493898868, shape=(), dtype=float64)
[0.4      0.4      0.0278339  0.22450808 0.01732326 0.02659153]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.362056770065266>
648
Acquisition function convergence reached at iteration 3040.
tf.Tensor(-4.05222610085809, shape=(), dtype=float64)
[0.4      0.4      0.02576662 0.22490161 0.01909334 0.02790603]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.362661752479165>
649
Acquisition function convergence reached at iteration 2819.
tf.Tensor(-4.05266453031289, shape=(), dtype=float64)
[0.4      0.4      0.02304347 0.2252168  0.02069177 0.02618597]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3632657474802725>
650
Acquisition function convergence reached at iteration 2837.
tf.Tensor(-4.053062465407189, shape=(), dtype=float64)
Trained parameters:
amplitude_champ:0 is 0.64

length_scales_champ:0 is [6.2200000e-01 1.05198266e+05 2.3000000e-02 5.0000000e-03
1.3000000e-02 7.0000000e-02]

observation_noise_variance_champ:0 is 0.388

alpha_tp:0 is 0.023

amp_alpha_mean:0 is 0.08

amp_beta_mean:0 is 1.088

amp_f_mean:0 is 3.734

amp_gamma_L_mean:0 is 32.01

amp_lambda_mean:0 is 25.649

amp_r_mean:0 is 5.518

beta_tp:0 is 0.423

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bias_mean:0 is -2.136
f_tp:0 is -0.17
gamma_L_tp:0 is 0.075
lambda_tp:0 is -0.251
r_tp:0 is 0.119
[0.4      0.4      0.02433289 0.22466626 0.01791351 0.03022723]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3638687582040925>
651
Acquisition function convergence reached at iteration 3109.
tf.Tensor(-4.053385179500964, shape=(), dtype=float64)
[0.4      0.4      0.0243031  0.22499318 0.01947659 0.02955671]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.364470787771359>
652
Acquisition function convergence reached at iteration 2992.
tf.Tensor(-4.053820804561818, shape=(), dtype=float64)
[0.4      0.4      0.01962341 0.22535921 0.0214235  0.0297861 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.365071839288134>
653
Acquisition function convergence reached at iteration 3019.
tf.Tensor(-4.054175037716165, shape=(), dtype=float64)
[0.4      0.4      0.02660022 0.22444096 0.01683289 0.03055459]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3656719158458905>
654
Acquisition function convergence reached at iteration 2762.
tf.Tensor(-4.054588109052041, shape=(), dtype=float64)
[0.4      0.4      0.02753448 0.22449919 0.01727497 0.02661075]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.366271020521611>
655
Acquisition function convergence reached at iteration 3127.
tf.Tensor(-4.054924504583897, shape=(), dtype=float64)
[0.4      0.4      0.02542807 0.2251677  0.02047713 0.02459718]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.366869156377873>
656
Acquisition function convergence reached at iteration 3084.
tf.Tensor(-4.055295466199521, shape=(), dtype=float64)
[0.4      0.4      0.02576637 0.2249845  0.01950137 0.02745761]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.367466326462937>

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657
Acquisition function convergence reached at iteration 2697.
tf.Tensor(-4.055779837225988, shape=(), dtype=float64)
[0.4      0.4      0.0245109  0.22462653  0.01776999  0.02911823]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.368062533810843>
658
Acquisition function convergence reached at iteration 2964.
tf.Tensor(-4.056116693493562, shape=(), dtype=float64)
[0.4      0.4      0.02251415  0.2249264   0.01917533  0.03096342]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3686577814414855>
659
Acquisition function convergence reached at iteration 3080.
tf.Tensor(-4.056452439322945, shape=(), dtype=float64)
[0.4      0.4      0.02569576  0.22478397  0.01848767  0.02945418]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.369252072360714>
660
Acquisition function convergence reached at iteration 2909.
tf.Tensor(-4.056867097154343, shape=(), dtype=float64)
[0.4      0.4      0.0271716   0.22437495  0.01656926  0.02951843]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.369845409560413>
661
Acquisition function convergence reached at iteration 2105.
tf.Tensor(-3.9607945745553352, shape=(), dtype=float64)
[0.4      0.4      0.24606842  0.19655485  0.20155839  0.04373325]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.370437796018586>
662
Acquisition function convergence reached at iteration 2768.
tf.Tensor(-4.023630057543356, shape=(), dtype=float64)
[0.4      0.4      0.02343415  0.22310819  0.01808617  0.03083081]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.371029234699446>
663
Acquisition function convergence reached at iteration 2737.
tf.Tensor(-4.024002805616287, shape=(), dtype=float64)
[0.4      0.4      0.02181633  0.22365401  0.02090438  0.02701362]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.371619728553494>
664
Acquisition function convergence reached at iteration 2928.
tf.Tensor(-4.024328157167351, shape=(), dtype=float64)
[0.4      0.4      0.0224689   0.22385561  0.02187759  0.02546713]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.372209280517612>
665
Acquisition function convergence reached at iteration 2765.
tf.Tensor(-4.024737442438957, shape=(), dtype=float64)

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[0.4      0.4      0.02590559 0.22294172 0.01731292 0.02927628]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.372797893515135>
666
Acquisition function convergence reached at iteration 2159.
tf.Tensor(-3.978131081914299, shape=(), dtype=float64)
[0.4      0.4      0.04989794 0.20082283 0.29842183 0.03406942]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3733855704559454>
667
Acquisition function convergence reached at iteration 2892.
tf.Tensor(-4.025464156211031, shape=(), dtype=float64)
[0.4      0.4      0.02373883 0.22336095 0.01935023 0.02929988]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3739723142365445>
668
Acquisition function convergence reached at iteration 2321.
tf.Tensor(-3.978831702632266, shape=(), dtype=float64)
[0.4      0.4      0.05039016 0.20080595 0.298324    0.03509393]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.374558127740141>
669
Acquisition function convergence reached at iteration 2866.
tf.Tensor(-4.026223724867651, shape=(), dtype=float64)
[0.4      0.4      0.02358554 0.22317067 0.01838189 0.03091258]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.375143013836728>
670
Acquisition function convergence reached at iteration 2866.
tf.Tensor(-4.026550510473764, shape=(), dtype=float64)
[0.4      0.4      0.02708186 0.22322116 0.01880544 0.0257819 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.375726975383166>
671
Acquisition function convergence reached at iteration 3032.
tf.Tensor(-4.026912572156392, shape=(), dtype=float64)
[0.4      0.4      0.02470448 0.22342596 0.01966171 0.02867079]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.376310015223261>
672
Acquisition function convergence reached at iteration 2888.
tf.Tensor(-4.027329132045965, shape=(), dtype=float64)
[0.4      0.4      0.02202194 0.22360803 0.02060949 0.02869764]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.376892136187844>
673
Acquisition function convergence reached at iteration 2800.
tf.Tensor(-4.027715251021777, shape=(), dtype=float64)
[0.4      0.4      0.02263793 0.2234431   0.01979095 0.02896901]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.377473341094848>
674

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Acquisition function convergence reached at iteration 2760.
tf.Tensor(-4.028083600542294, shape=(), dtype=float64)
[0.4      0.4      0.023951  0.22329969 0.01908446 0.02853282]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.378053632749387>
675
Acquisition function convergence reached at iteration 2771.
tf.Tensor(-4.028476261236336, shape=(), dtype=float64)
[0.4      0.4      0.02369701 0.22284398 0.01675082 0.03244202]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.378633013943834>
676
Acquisition function convergence reached at iteration 2231.
tf.Tensor(-3.9817688142901684, shape=(), dtype=float64)
[0.4      0.4      0.05186548 0.20076375 0.29803178 0.03442789]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.379211487457898>
677
Acquisition function convergence reached at iteration 2917.
tf.Tensor(-4.029161066139002, shape=(), dtype=float64)
[0.4      0.4      0.02312896 0.22345396 0.01981093 0.02931641]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.379789056058696>
678
Acquisition function convergence reached at iteration 2811.
tf.Tensor(-4.029538138567976, shape=(), dtype=float64)
[0.4      0.4      0.02382599 0.22347666 0.01997574 0.02728937]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.380365722500835>
679
Acquisition function convergence reached at iteration 2964.
tf.Tensor(-4.029866417358316, shape=(), dtype=float64)
[0.4      0.4      0.02384158 0.22368925 0.02101874 0.02625519]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.380941489526478>
680
Acquisition function convergence reached at iteration 2469.
tf.Tensor(-3.983220562533991, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 8268.
[0.4      0.4      0.05094782 0.20078817 0.29821125 0.03574514]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.381516359865431>
681
Acquisition function convergence reached at iteration 2857.
tf.Tensor(-4.080564593270661, shape=(), dtype=float64)
[0.4      0.4      0.02817231 0.2257847  0.01583818 0.0287575 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.382090336235204>
682
Acquisition function convergence reached at iteration 2772.
tf.Tensor(-4.080958415904922, shape=(), dtype=float64)

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[0.4      0.4      0.02238066 0.22671288 0.02035232 0.02735515]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.382663421341093>
683
Acquisition function convergence reached at iteration 2939.
tf.Tensor(-4.081306183736661, shape=(), dtype=float64)
[0.4      0.4      0.02367459 0.2263036 0.01820285 0.03109723]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.383235617876247>
684
Acquisition function convergence reached at iteration 2671.
tf.Tensor(-4.081721069270984, shape=(), dtype=float64)
[0.4      0.4      0.0244652 0.22621369 0.01784417 0.02874853]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3838069285217465>
685
Acquisition function convergence reached at iteration 2499.
tf.Tensor(-4.034766753699865, shape=(), dtype=float64)
[0.4      0.4      0.04043528 0.20307078 0.30332655 0.03496226]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.384377355946668>
686
Acquisition function convergence reached at iteration 3188.
tf.Tensor(-4.082362775469248, shape=(), dtype=float64)
[0.4      0.4      0.02412561 0.22660174 0.01969472 0.02910249]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.384946902808163>
687
Acquisition function convergence reached at iteration 2835.
tf.Tensor(-4.082795227666361, shape=(), dtype=float64)
[0.4      0.4      0.02570693 0.22591352 0.0163221 0.03089472]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.385515571751518>
688
Acquisition function convergence reached at iteration 2607.
tf.Tensor(-4.036068844161312, shape=(), dtype=float64)
[0.4      0.4      0.03306435 0.20333309 0.30396449 0.03601764]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.386083365410238>
689
Acquisition function convergence reached at iteration 2917.
tf.Tensor(-4.083482804030924, shape=(), dtype=float64)
[0.4      0.4      0.02538025 0.22659018 0.01977456 0.02537526]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3866502864061045>
690
Acquisition function convergence reached at iteration 2989.
tf.Tensor(-4.083844018841026, shape=(), dtype=float64)
[0.4      0.4      0.02311807 0.22668867 0.02014921 0.02877742]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.38721633734925>
691

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Acquisition function convergence reached at iteration 2756.
tf.Tensor(-4.084285471518842, shape=(), dtype=float64)
[0.4      0.4      0.02365112 0.22600831 0.0167603  0.03184537]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.387781520838228>
692
Acquisition function convergence reached at iteration 2955.
tf.Tensor(-4.084590075760059, shape=(), dtype=float64)
[0.4      0.4      0.02136558 0.2268025  0.02075728 0.02916983]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.388345839460075>
693
Acquisition function convergence reached at iteration 2856.
tf.Tensor(-4.084947640923885, shape=(), dtype=float64)
[0.4      0.4      0.02712658 0.22608141 0.01725066 0.02800876]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.388909295790385>
694
Acquisition function convergence reached at iteration 3019.
tf.Tensor(-4.085269509626642, shape=(), dtype=float64)
[0.4      0.4      0.02482096 0.22672588 0.02037893 0.02640585]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.389471892393371>
695
Acquisition function convergence reached at iteration 2883.
tf.Tensor(-4.085667951403481, shape=(), dtype=float64)
[0.4      0.4      0.02395407 0.22667112 0.02011362 0.02696815]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.390033631821937>
696
Acquisition function convergence reached at iteration 2900.
tf.Tensor(-4.086027860481251, shape=(), dtype=float64)
[0.4      0.4      0.02802304 0.22587819 0.01627861 0.02867914]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.390594516617737>
697
Acquisition function convergence reached at iteration 2778.
tf.Tensor(-4.086424379236882, shape=(), dtype=float64)
[0.4      0.4      0.023351   0.22651582 0.0193319  0.02839659]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.391154549311249>
698
Acquisition function convergence reached at iteration 3038.
tf.Tensor(-4.08670912221976, shape=(), dtype=float64)
[0.4      0.4      0.02562311 0.22658801 0.01969529 0.02693955]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.3917137324218345>
699
Acquisition function convergence reached at iteration 2941.
tf.Tensor(-4.087113437504669, shape=(), dtype=float64)
[0.4      0.4      0.02283261 0.22664049 0.01991482 0.02917312]

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<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.392272068457801>
700
Acquisition function convergence reached at iteration 2951.
tf.Tensor(-4.087477186188343, shape=(), dtype=float64)
Trained parameters:
amplitude_champ:0 is 0.636

length_scales_champ:0 is [6.4700000e-01 1.11431155e+05 2.3000000e-02 5.0000000e-03
1.3000000e-02 7.2000000e-02]

observation_noise_variance_champ:0 is 0.385

alpha_tp:0 is -0.145

amp_alpha_mean:0 is 0.068

amp_beta_mean:0 is 1.313

amp_f_mean:0 is 4.087

amp_gamma_L_mean:0 is 7.785

amp_lambda_mean:0 is 21.815

amp_r_mean:0 is 16.971

beta_tp:0 is 0.432

bias_mean:0 is -2.883

f_tp:0 is -0.182

gamma_L_tp:0 is 0.117

lambda_tp:0 is -0.321

r_tp:0 is 0.089

[0.4          0.4          0.02308783 0.22646803 0.01902944 0.0305317 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.392829559916476>
701
Acquisition function convergence reached at iteration 2793.
tf.Tensor(-4.041751140973092, shape=(), dtype=float64)

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[0.4      0.4      0.02718843 0.22515625 0.0173625  0.02794962]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.39338620928426>
702
Acquisition function convergence reached at iteration 2943.
tf.Tensor(-4.042092857739527, shape=(), dtype=float64)
[0.4      0.4      0.02311221 0.22568989 0.01991897 0.02966383]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.393942019036694>
703
Acquisition function convergence reached at iteration 2920.
tf.Tensor(-4.04246040473071, shape=(), dtype=float64)
[0.4      0.4      0.02269281 0.22557837 0.01934789 0.03089023]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.394496991638527>
704
Acquisition function convergence reached at iteration 2867.
tf.Tensor(-4.042806916077811, shape=(), dtype=float64)
[0.4      0.4      0.02509201 0.22539658 0.01846096 0.02941705]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.395051129543769>
705
Acquisition function convergence reached at iteration 2843.
tf.Tensor(-4.043153103390181, shape=(), dtype=float64)
[0.4      0.4      0.02812971 0.2249984  0.01661366 0.02827017]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.395604435195762>
706
Acquisition function convergence reached at iteration 2854.
tf.Tensor(-4.0435205638197615, shape=(), dtype=float64)
[0.4      0.4      0.02252535 0.22577168 0.02037673 0.02875827]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.396156911027233>
707
Acquisition function convergence reached at iteration 2449.
tf.Tensor(-3.997189372373251, shape=(), dtype=float64)
[0.4      0.4      0.04406691 0.20257395 0.29993965 0.03547145]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.396708559460363>
708
Acquisition function convergence reached at iteration 2983.
tf.Tensor(-4.044190248722289, shape=(), dtype=float64)
[0.4      0.4      0.02646414 0.22517881 0.01737336 0.0303279 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.397259382906842>
709
Acquisition function convergence reached at iteration 2662.
tf.Tensor(-4.044627940789452, shape=(), dtype=float64)
[0.4      0.4      0.02261666 0.22542744 0.01863721 0.03013466]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.397809383767934>
710

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Acquisition function convergence reached at iteration 2844.
tf.Tensor(-4.044908821141242, shape=(), dtype=float64)
[0.4         0.4         0.0231772  0.22590758 0.02110255 0.02633723]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.39835856443453>
711
Acquisition function convergence reached at iteration 2755.
tf.Tensor(-4.045281494785876, shape=(), dtype=float64)
[0.4         0.4         0.02559412  0.22532311 0.01814206 0.0284031 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.398906927287215>
712
Acquisition function convergence reached at iteration 2965.
tf.Tensor(-4.045576861251799, shape=(), dtype=float64)
[0.4         0.4         0.02666948  0.22534535 0.01824982 0.02862515]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.39945447469632>
713
Acquisition function convergence reached at iteration 2660.
tf.Tensor(-4.045996641823964, shape=(), dtype=float64)
[0.4         0.4         0.02636568  0.22517669 0.01745621 0.02769793]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.400001209021985>
714
Acquisition function convergence reached at iteration 2545.
tf.Tensor(-3.9998939049530686, shape=(), dtype=float64)
[0.4         0.4         0.03497583  0.20290681 0.30095915 0.03600907]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.400547132614215>
715
Acquisition function convergence reached at iteration 2903.
tf.Tensor(-4.046649595340151, shape=(), dtype=float64)
[0.4         0.4         0.02538343  0.2253229  0.01808775 0.02986072]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.401092247812941>
716
Acquisition function convergence reached at iteration 3054.
tf.Tensor(-4.046958279334085, shape=(), dtype=float64)
[0.4         0.4         0.02556585  0.22574224 0.02027723 0.02593285]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.401636556948071>
717
Acquisition function convergence reached at iteration 2220.
tf.Tensor(-4.000653837829922, shape=(), dtype=float64)
[0.4         0.4         0.04644519  0.20248765 0.2995803  0.03376364]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.402180062339552>
718
Acquisition function convergence reached at iteration 2783.
tf.Tensor(-4.047716566418354, shape=(), dtype=float64)
[0.4         0.4         0.02506463  0.22525132 0.01773567 0.02989506]

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<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.4027227662974235>
719
Acquisition function convergence reached at iteration 2956.
tf.Tensor(-4.048037654894166, shape=(), dtype=float64)
[0.4      0.4      0.02265405 0.22559879 0.01945097 0.03090921]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.403264671121878>
720
Acquisition function convergence reached at iteration 3074.
tf.Tensor(-4.048329140011742, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 9917.
[0.4      0.4      0.02595795 0.22547851 0.01886607 0.02927417]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.403805779103311>
721
Acquisition function convergence reached at iteration 2796.
tf.Tensor(-4.033160753569685, shape=(), dtype=float64)
[0.4      0.4      0.02668426 0.22612718 0.01750012 0.02857339]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.404346092522378>
722
Acquisition function convergence reached at iteration 2798.
tf.Tensor(-4.033512630845082, shape=(), dtype=float64)
[0.4      0.4      0.02493413 0.22627631 0.0181817  0.02965773]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.404885613650053>
723
Acquisition function convergence reached at iteration 2946.
tf.Tensor(-4.033841716947799, shape=(), dtype=float64)
[0.4      0.4      0.02055829 0.2267813  0.0208186  0.03084467]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.405424344747677>
724
Acquisition function convergence reached at iteration 2738.
tf.Tensor(-4.034245422717684, shape=(), dtype=float64)
[0.4      0.4      0.02280898 0.22605463 0.016984   0.03285023]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.405962288067017>
725
Acquisition function convergence reached at iteration 3010.
tf.Tensor(-4.034479378776654, shape=(), dtype=float64)
[0.4      0.4      0.0265344  0.22626536 0.01814857 0.02948061]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.406499445850318>
726
Acquisition function convergence reached at iteration 2579.
tf.Tensor(-3.9887101192295904, shape=(), dtype=float64)
[0.4      0.4      0.03559091 0.20373794 0.30035701 0.03541331]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.407035820330354>
727

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Acquisition function convergence reached at iteration 2570.
tf.Tensor(-3.9889803953771303, shape=(), dtype=float64)
[0.4      0.4      0.03804882 0.20364483 0.30015295 0.03505785]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.407571413730487>
728
Acquisition function convergence reached at iteration 2784.
tf.Tensor(-4.035575690217947, shape=(), dtype=float64)
[0.4      0.4      0.02148341 0.22655351 0.01961932 0.03085609]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.408106228264713>
729
Acquisition function convergence reached at iteration 2992.
tf.Tensor(-4.035860908950789, shape=(), dtype=float64)
[0.4      0.4      0.0224147  0.22666426 0.0201444  0.03060723]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.408640266137718>
730
Acquisition function convergence reached at iteration 2848.
tf.Tensor(-4.036226800623089, shape=(), dtype=float64)
[0.4      0.4      0.02100741 0.22690001 0.02148351 0.02842034]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.409173529544928>
731
Acquisition function convergence reached at iteration 2696.
tf.Tensor(-4.036571887406573, shape=(), dtype=float64)
[0.4      0.4      0.02531368 0.22644057 0.01912621 0.02670741]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.409706020672561>
732
Acquisition function convergence reached at iteration 2908.
tf.Tensor(-4.036877027454733, shape=(), dtype=float64)
[0.4      0.4      0.02626802 0.22619465 0.01778802 0.02955224]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.410237741697682>
733
Acquisition function convergence reached at iteration 2792.
tf.Tensor(-4.037241248260082, shape=(), dtype=float64)
[0.4      0.4      0.02417684 0.22663443 0.02012067 0.02647308]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.410768694788247>
734
Acquisition function convergence reached at iteration 2623.
tf.Tensor(-4.03763641989153, shape=(), dtype=float64)
[0.4      0.4      0.02317229 0.22623501 0.01796801 0.03043344]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.411298882103158>
735
Acquisition function convergence reached at iteration 2840.
tf.Tensor(-4.037894126465591, shape=(), dtype=float64)
[0.4      0.4      0.02611807 0.22626878 0.01819489 0.02858856]

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<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.411828305792312>
736
Acquisition function convergence reached at iteration 2870.
tf.Tensor(-4.038200599697234, shape=(), dtype=float64)
[0.4      0.4      0.02714815 0.22639253 0.01893746 0.02613038]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.41235696799665>
737
Acquisition function convergence reached at iteration 2992.
tf.Tensor(-4.03854718473973, shape=(), dtype=float64)
[0.4      0.4      0.02285792 0.22668808 0.02027273 0.02994177]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.412884870848208>
738
Acquisition function convergence reached at iteration 3119.
tf.Tensor(-4.038858916835775, shape=(), dtype=float64)
[0.4      0.4      0.0242271 0.22669193 0.0203106 0.02870077]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.413412016470165>
739
Acquisition function convergence reached at iteration 2679.
tf.Tensor(-4.039274083031981, shape=(), dtype=float64)
[0.4      0.4      0.0246228 0.22636337 0.01867909 0.02822257]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.413938406976891>
740
Acquisition function convergence reached at iteration 2908.
tf.Tensor(-4.039547385334241, shape=(), dtype=float64)
[0.4      0.4      0.02758371 0.22612158 0.01751077 0.02825785]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.414464044473998>
741
Acquisition function convergence reached at iteration 2892.
tf.Tensor(-4.055397314648992, shape=(), dtype=float64)
[0.4      0.4      0.02185034 0.22604703 0.02136731 0.02888754]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.414988931058387>
742
Acquisition function convergence reached at iteration 2932.
tf.Tensor(-4.055706303297563, shape=(), dtype=float64)
[0.4      0.4      0.02636742 0.22550249 0.01852182 0.0291214 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.415513068818291>
743
Acquisition function convergence reached at iteration 2546.
tf.Tensor(-4.010321002175344, shape=(), dtype=float64)
[0.4      0.4      0.0367061 0.20331469 0.29841446 0.03535755]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.4160364598333315>
744
Acquisition function convergence reached at iteration 2733.

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tf.Tensor(-4.05644380838134, shape=(), dtype=float64)
[0.4      0.4      0.02221948 0.22567746 0.01939389 0.03071502]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.4165591061745575>
745
Acquisition function convergence reached at iteration 2728.
tf.Tensor(-4.0567483140382405, shape=(), dtype=float64)
[0.4      0.4      0.02522848 0.22561534 0.01913655 0.0277774 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.417081009904496>
746
Acquisition function convergence reached at iteration 3001.
tf.Tensor(-4.057001480700082, shape=(), dtype=float64)
[0.4      0.4      0.02634391 0.22583718 0.0203295  0.02641225]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.417602173077201>
747
Acquisition function convergence reached at iteration 3001.
tf.Tensor(-4.057366815617976, shape=(), dtype=float64)
[0.4      0.4      0.0230535  0.22592037 0.02063729 0.02983877]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.418122597738292>
748
Acquisition function convergence reached at iteration 2816.
tf.Tensor(-4.0577292773843405, shape=(), dtype=float64)
[0.4      0.4      0.02715846 0.22524293 0.01722586 0.02911103]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.418642285925007>
749
Acquisition function convergence reached at iteration 2882.
tf.Tensor(-4.058044440235795, shape=(), dtype=float64)
[0.4      0.4      0.02458592 0.22570881 0.01955996 0.02916466]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.419161239666247>
750
Acquisition function convergence reached at iteration 2896.
tf.Tensor(-4.058373063072422, shape=(), dtype=float64)
Trained parameters:
amplitude_champ:0 is 0.636

length_scales_champ:0 is [6.4200000e-01 1.15616663e+05 2.3000000e-02 5.0000000e-03
1.2000000e-02 7.0000000e-02]

observation_noise_variance_champ:0 is 0.384

alpha_tp:0 is -0.122

amp_alpha_mean:0 is 0.066

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amp_beta_mean:0 is 1.362
amp_f_mean:0 is 3.913
amp_gamma_L_mean:0 is 7.835
amp_lambda_mean:0 is 22.327
amp_r_mean:0 is 20.687
beta_tp:0 is 0.435
bias_mean:0 is -2.846
f_tp:0 is -0.185
gamma_L_tp:0 is 0.118
lambda_tp:0 is -0.314
r_tp:0 is 0.087
[0.4      0.4      0.02790053 0.22515404 0.01679743 0.02935901]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.419679460982614>
751
Acquisition function convergence reached at iteration 2828.
tf.Tensor(-4.058696573007383, shape=(), dtype=float64)
[0.4      0.4      0.02847168 0.22527004 0.01749724 0.02702134]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.420196951886468>
752
Acquisition function convergence reached at iteration 2946.
tf.Tensor(-4.059011020434259, shape=(), dtype=float64)
[0.4      0.4      0.02716035 0.22541322 0.01809514 0.02890102]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.420713714381962>
753
Acquisition function convergence reached at iteration 2861.
tf.Tensor(-4.059372337364494, shape=(), dtype=float64)
[0.4      0.4      0.02606933 0.22536243 0.01776975 0.03001795]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.421229750465089>
754
Acquisition function convergence reached at iteration 2999.
tf.Tensor(-4.059656256585331, shape=(), dtype=float64)
[0.4      0.4      0.02577272 0.2258843  0.02058541 0.02595241]

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<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.421745062123729>
755
Acquisition function convergence reached at iteration 2918.
tf.Tensor(-4.0599919849858415, shape=(), dtype=float64)
[0.4      0.4      0.02444733 0.2260239  0.02128074 0.02623145]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.422259651337687>
756
Acquisition function convergence reached at iteration 2868.
tf.Tensor(-4.060368658681287, shape=(), dtype=float64)
[0.4      0.4      0.02678714 0.22505839 0.01621129 0.03119288]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.422773520078743>
757
Acquisition function convergence reached at iteration 2753.
tf.Tensor(-4.060690503134012, shape=(), dtype=float64)
[0.4      0.4      0.02390893 0.22588419 0.02054778 0.02702466]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.423286670310689>
758
Acquisition function convergence reached at iteration 3077.
tf.Tensor(-4.060950409111563, shape=(), dtype=float64)
[0.4      0.4      0.02544452 0.22575292 0.01977646 0.02925864]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.423799103989376>
759
Acquisition function convergence reached at iteration 2958.
tf.Tensor(-4.061314692470995, shape=(), dtype=float64)
[0.4      0.4      0.02533521 0.22549367 0.01840509 0.03067404]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.424310823062755>
760
Acquisition function convergence reached at iteration 2668.
tf.Tensor(-4.06170287583254, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 6896.
[0.4      0.4      0.02263895 0.22581819 0.02019012 0.02843775]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.42482182947092>
761
Acquisition function convergence reached at iteration 2886.
tf.Tensor(-4.151023393586413, shape=(), dtype=float64)
[0.4      0.4      0.02572039 0.22658043 0.01668669 0.03112343]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.425332125146148>
762
Acquisition function convergence reached at iteration 2926.
tf.Tensor(-4.151348328289209, shape=(), dtype=float64)
[0.4      0.4      0.02100981 0.22731206 0.020464   0.03051373]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.425841712012943>
763

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Acquisition function convergence reached at iteration 2808.
tf.Tensor(-4.151680336284038, shape=(), dtype=float64)
[0.4      0.4      0.02624148 0.22677015 0.01774117 0.02843572]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.426350591988077>
764
Acquisition function convergence reached at iteration 2767.
tf.Tensor(-4.152015182736119, shape=(), dtype=float64)
[0.4      0.4      0.02759518 0.22658217 0.0168776 0.02765258]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.42685876698063>
765
Acquisition function convergence reached at iteration 3077.
tf.Tensor(-4.152271699874096, shape=(), dtype=float64)
[0.4      0.4      0.02593467 0.22712339 0.01951106 0.02799986]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.4273662388920325>
766
Acquisition function convergence reached at iteration 2743.
tf.Tensor(-4.152684203547381, shape=(), dtype=float64)
[0.4      0.4      0.02413846 0.22707711 0.01929676 0.0278864 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.427873009616104>
767
Acquisition function convergence reached at iteration 2869.
tf.Tensor(-4.1529946602539685, shape=(), dtype=float64)
[0.4      0.4      0.02213143 0.22736426 0.02075798 0.02843805]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.428379081039096>
768
Acquisition function convergence reached at iteration 3115.
tf.Tensor(-4.153256170039324, shape=(), dtype=float64)
[0.4      0.4      0.02553024 0.22715761 0.01965629 0.02850763]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.428844550397295>
769
Acquisition function convergence reached at iteration 2871.
tf.Tensor(-4.153643795350442, shape=(), dtype=float64)
[0.4      0.4      0.02675378 0.22670267 0.01739954 0.0288467 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.429389133489237>
770
Acquisition function convergence reached at iteration 2877.
tf.Tensor(-4.153985997957045, shape=(), dtype=float64)
[0.4      0.4      0.02398765 0.2269307 0.01846018 0.03046722]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.4298931182514>
771
Acquisition function convergence reached at iteration 2816.
tf.Tensor(-4.154337735394945, shape=(), dtype=float64)
[0.4      0.4      0.02209919 0.22703345 0.01899682 0.03106334]

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<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.43039641118259>
772
Acquisition function convergence reached at iteration 2971.
tf.Tensor(-4.1546108209688954, shape=(), dtype=float64)
[0.4      0.4      0.02402894 0.22711715 0.01942292 0.02959064]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.430899014131809>
773
Acquisition function convergence reached at iteration 2778.
tf.Tensor(-4.154974765807314, shape=(), dtype=float64)
[0.4      0.4      0.02233152 0.22735715 0.0207587 0.02744575]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.431400928940721>
774
Acquisition function convergence reached at iteration 2921.
tf.Tensor(-4.155290625541866, shape=(), dtype=float64)
[0.4      0.4      0.02654171 0.22646283 0.01612188 0.03114529]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.4319021574437>
775
Acquisition function convergence reached at iteration 2877.
tf.Tensor(-4.155595820635614, shape=(), dtype=float64)
[0.4      0.4      0.02391188 0.22727196 0.02028922 0.02741505]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.432402701467863>
776
Acquisition function convergence reached at iteration 2743.
tf.Tensor(-4.155974878480789, shape=(), dtype=float64)
[0.4      0.4      0.0249372 0.22669151 0.01727424 0.03015871]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.432902562833109>
777
Acquisition function convergence reached at iteration 2940.
tf.Tensor(-4.1562569760424255, shape=(), dtype=float64)
[0.4      0.4      0.02728088 0.2264263 0.01597986 0.03060672]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.433401743352157>
778
Acquisition function convergence reached at iteration 2971.
tf.Tensor(-4.156565533045496, shape=(), dtype=float64)
[0.4      0.4      0.02694342 0.22660091 0.01684953 0.03015294]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.433900244830581>
779
Acquisition function convergence reached at iteration 3059.
tf.Tensor(-4.156848194134181, shape=(), dtype=float64)
[0.4      0.4      0.02617795 0.22722675 0.02013455 0.02568501]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.434398069066854>
780
Acquisition function convergence reached at iteration 2811.

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tf.Tensor(-4.157246667860428, shape=(), dtype=float64)
Hyperparameter convergence reached at iteration 9639.
[0.4      0.4      0.0263415  0.22663245 0.01702058 0.02942605]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.434895217852376>
781
Acquisition function convergence reached at iteration 2452.
tf.Tensor(-4.057486418939524, shape=(), dtype=float64)
[0.4      0.4      0.04236339  0.20323913 0.29586043 0.03321118]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.435391692971519>
782
Acquisition function convergence reached at iteration 2823.
tf.Tensor(-4.103159300699836, shape=(), dtype=float64)
[0.4      0.4      0.02311398  0.22538803 0.0194559  0.03111351]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.4358874962016595>
783
Acquisition function convergence reached at iteration 2670.
tf.Tensor(-4.103488069385068, shape=(), dtype=float64)
[0.4      0.4      0.02704549  0.22502788 0.01771309 0.02793102]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.436382629313213>
784
Acquisition function convergence reached at iteration 2403.
tf.Tensor(-4.0584489636747545, shape=(), dtype=float64)
[0.4      0.4      0.04240724  0.203238   0.29585576 0.03283394]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.436877094069675>
785
Acquisition function convergence reached at iteration 2861.
tf.Tensor(-4.104108107380733, shape=(), dtype=float64)
[0.4      0.4      0.02388293  0.2252236  0.0185605  0.03183977]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.437370892227652>
786
Acquisition function convergence reached at iteration 2917.
tf.Tensor(-4.1043780073679965, shape=(), dtype=float64)
[0.4      0.4      0.02452017  0.22564651 0.02089652 0.02793285]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.4378640255369035>
787
Acquisition function convergence reached at iteration 2719.
tf.Tensor(-4.1047663268641195, shape=(), dtype=float64)
[0.4      0.4      0.0254807   0.22502367 0.01756861 0.03039595]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.4383564957403685>
788
Acquisition function convergence reached at iteration 2848.
tf.Tensor(-4.105018950759595, shape=(), dtype=float64)
[0.4      0.4      0.02786536  0.22512005 0.01823146 0.02761283]

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<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.438848304574209>
789
Acquisition function convergence reached at iteration 2706.
tf.Tensor(-4.105420160738686, shape=(), dtype=float64)
[0.4      0.4      0.02376823 0.22500693 0.01742183 0.03218644]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.439339453767839>
790
Acquisition function convergence reached at iteration 2576.
tf.Tensor(-4.105744829956824, shape=(), dtype=float64)
[0.4      0.4      0.02413319 0.22516412 0.01831903 0.0296945 ]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.439829945043965>
791
Acquisition function convergence reached at iteration 2578.
tf.Tensor(-4.06076842092121, shape=(), dtype=float64)
[0.4      0.4      0.03718294 0.20343181 0.29638675 0.03500044]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.440319780118614>
792
Acquisition function convergence reached at iteration 2946.
tf.Tensor(-4.106277341833303, shape=(), dtype=float64)
[0.4      0.4      0.02743988 0.22499116 0.01746237 0.02999906]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.440808960701172>
793
Acquisition function convergence reached at iteration 3035.
tf.Tensor(-4.106552844373447, shape=(), dtype=float64)
[0.4      0.4      0.02646846 0.22563227 0.0209383 0.02536076]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.441297488494418>
794
Acquisition function convergence reached at iteration 2725.
tf.Tensor(-4.106956429680482, shape=(), dtype=float64)
[0.4      0.4      0.02710943 0.22489443 0.01697821 0.02931837]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.441785365194555>
795
Acquisition function convergence reached at iteration 2691.
tf.Tensor(-4.107270414656626, shape=(), dtype=float64)
[0.4      0.4      0.02592131 0.22513553 0.01820886 0.02882113]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.442272592491248>
796
Acquisition function convergence reached at iteration 2842.
tf.Tensor(-4.107541671305577, shape=(), dtype=float64)
[0.4      0.4      0.02643047 0.2252369 0.01875852 0.02856427]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.442759172067653>
797
Acquisition function convergence reached at iteration 2745.

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```
tf.Tensor(-4.10790311339662, shape=(), dtype=float64)
[0.4      0.4      0.02241608 0.22538926 0.01948113 0.03119671]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.443245105600454>
798
Acquisition function convergence reached at iteration 2692.
tf.Tensor(-4.108218019294836, shape=(), dtype=float64)
[0.4      0.4      0.0256839 0.22502689 0.01760595 0.02991655]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.443730394759891>
799
Acquisition function convergence reached at iteration 2758.
tf.Tensor(-4.108507954945109, shape=(), dtype=float64)
[0.4      0.4      0.02281342 0.22555853 0.02041893 0.02944716]
<tf.Variable 'eta_t:0' shape=() dtype=float64, numpy=6.4442150412098>
800
Acquisition function convergence reached at iteration 2689.
tf.Tensor(-4.108855291556164, shape=(), dtype=float64)
Trained parameters:
amplitude_champ:0 is 0.638

length_scales_champ:0 is [6.3200000e-01 1.2090582e+05 2.3000000e-02 5.0000000e-03 1.2000000e-02]

observation_noise_variance_champ:0 is 0.381

alpha_tp:0 is -0.115

amp_alpha_mean:0 is 0.065

amp_beta_mean:0 is 1.363

amp_f_mean:0 is 3.555

amp_gamma_L_mean:0 is 8.01

amp_lambda_mean:0 is 22.389

amp_r_mean:0 is 19.745

beta_tp:0 is 0.435

bias_mean:0 is -2.857

f_tp:0 is -0.197
```

gamma\_L\_tp:0 is 0.116

lambda\_tp:0 is -0.315

r\_tp:0 is 0.088

```
[0.4      0.4      0.02209054 0.23075614 0.02130305 0.02734125]
[0.4      0.4      0.05294931 0.20210494 0.30122363 0.03533794]
[0.4      0.4      0.02668426 0.22612718 0.01750012 0.02857339]
[0.4      0.4      0.02572039 0.22658043 0.01668669 0.03112343]
[0.4      0.4      0.04236339 0.20323913 0.29586043 0.03321118]
[0.4      0.4      0.02646846 0.22563227 0.0209383  0.02536076]
[0.4      0.4      0.02241608 0.22538926 0.01948113 0.03119671]
[0.4      0.4      0.02281342 0.22555853 0.02041893 0.02944716]
[0.4      0.4      0.02431981 0.22503842 0.01761125 0.03131528]
```

