In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```
plt.style.use('seaborn-v0_8')
sns.set_palette("Set2")
plt.rcParams['figure.figsize'] = (10, 6)
```

In [3]:
```
df = pd.read_csv("earthquake_data_tsunami.csv")
```

In [4]:
```
df.head(5)
```

Out[4]:

	magnitude	cdi	mmi	sig	nst	dmin	gap	depth	latitude	longitude	Year	Montl
0	7.0	8	7	768	117	0.509	17.0	14.000	-9.7963	159.596	2022	1
1	6.9	4	4	735	99	2.229	34.0	25.000	-4.9559	100.738	2022	1
2	7.0	3	3	755	147	3.125	18.0	579.000	-20.0508	-178.346	2022	1
3	7.3	5	5	833	149	1.865	21.0	37.000	-19.2918	-172.129	2022	1
4	6.6	0	2	670	131	4.998	27.0	624.464	-25.5948	178.278	2022	1

In [5]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 782 entries, 0 to 781
Data columns (total 13 columns):
 #   Column     Non-Null Count  Dtype  
---  ------     --------------  -----  
 0   magnitude  782 non-null    float64
 1   cdi        782 non-null    int64  
 2   mmi        782 non-null    int64  
 3   sig        782 non-null    int64  
 4   nst        782 non-null    int64  
 5   dmin       782 non-null    float64
 6   gap        782 non-null    float64
 7   depth      782 non-null    float64
 8   latitude   782 non-null    float64
 9   longitude  782 non-null    float64
 10  Year       782 non-null    int64  
 11  Month      782 non-null    int64  
 12  tsunami    782 non-null    int64  
dtypes: float64(6), int64(7)
memory usage: 79.6 KB
```

In [7]:
```
df.describe()
```

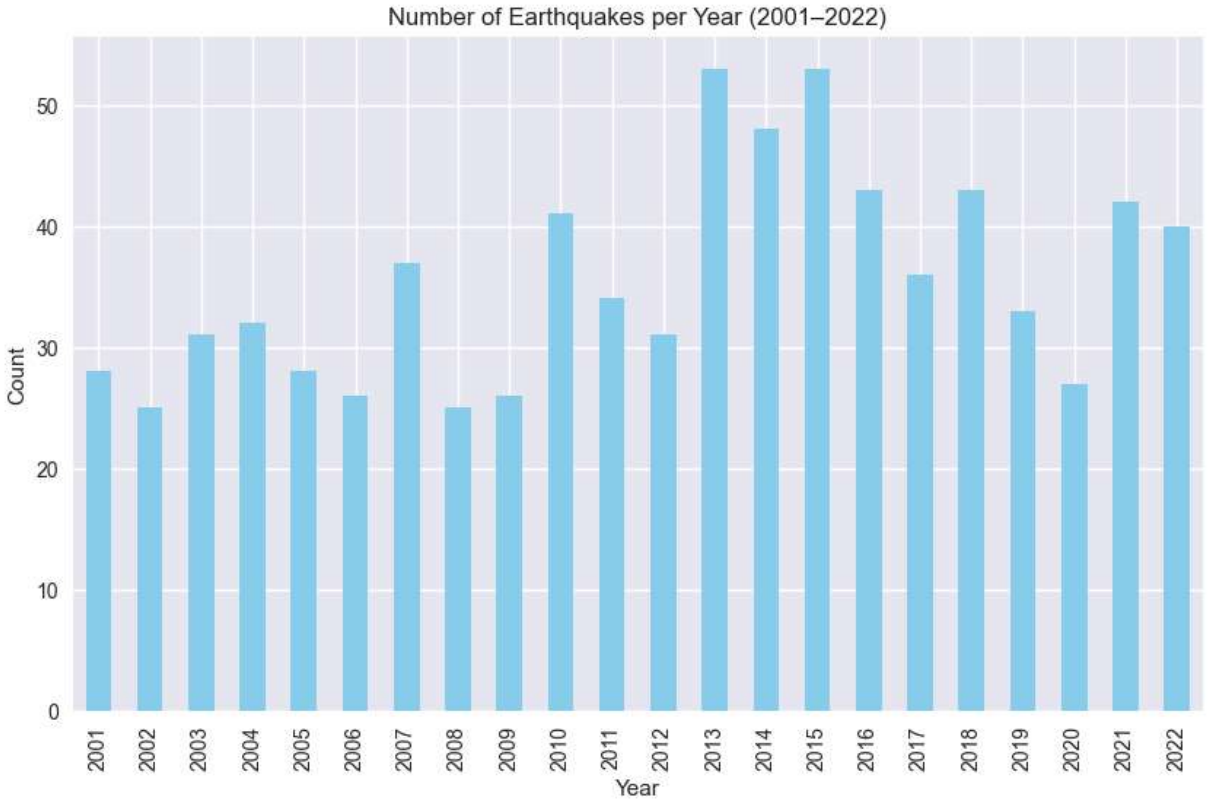
Out[7]:

	magnitude	cdi	mmi	sig	nst	dmin	gap
count	782.000000	782.000000	782.000000	782.000000	782.000000	782.000000	782.000000
mean	6.941125	4.333760	5.964194	870.108696	230.250639	1.325757	25.038990
std	0.445514	3.169939	1.462724	322.465367	250.188177	2.218805	24.225067
min	6.500000	0.000000	1.000000	650.000000	0.000000	0.000000	0.000000
25%	6.600000	0.000000	5.000000	691.000000	0.000000	0.000000	14.625000
50%	6.800000	5.000000	6.000000	754.000000	140.000000	0.000000	20.000000
75%	7.100000	7.000000	7.000000	909.750000	445.000000	1.863000	30.000000
max	9.100000	9.000000	9.000000	2910.000000	934.000000	17.654000	239.000000

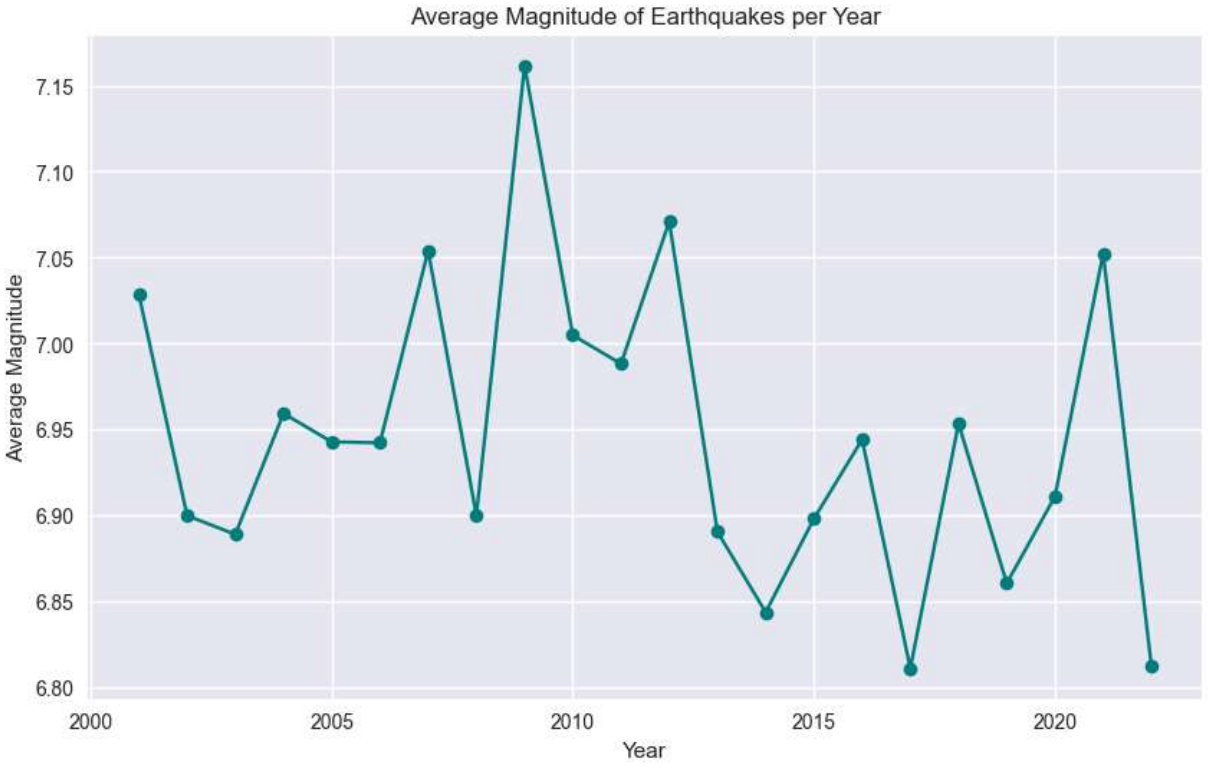
In [8]:
```
df.isnull().sum()
```

Out[8]:
```
magnitude    0
cdi          0
mmi          0
sig          0
nst          0
dmin         0
gap          0
depth        0
latitude     0
longitude    0
Year         0
Month        0
tsunami      0
dtype: int64
```

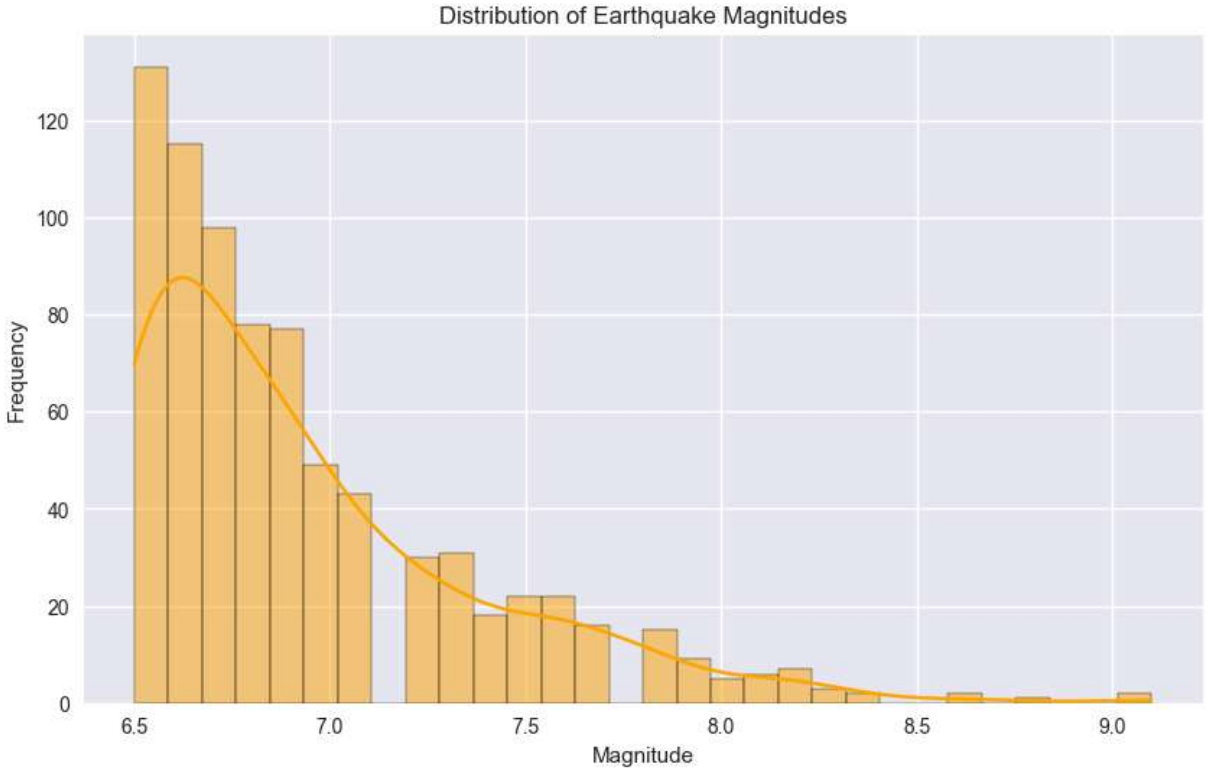
In [10]:
```
# Count of earthquakes per year
yearly_counts = df.groupby('Year').size()
plt.figure()
yearly_counts.plot(kind='bar', color='skyblue')
plt.title("Number of Earthquakes per Year (2001–2022)")
plt.xlabel("Year")
plt.ylabel("Count")
plt.show()
```



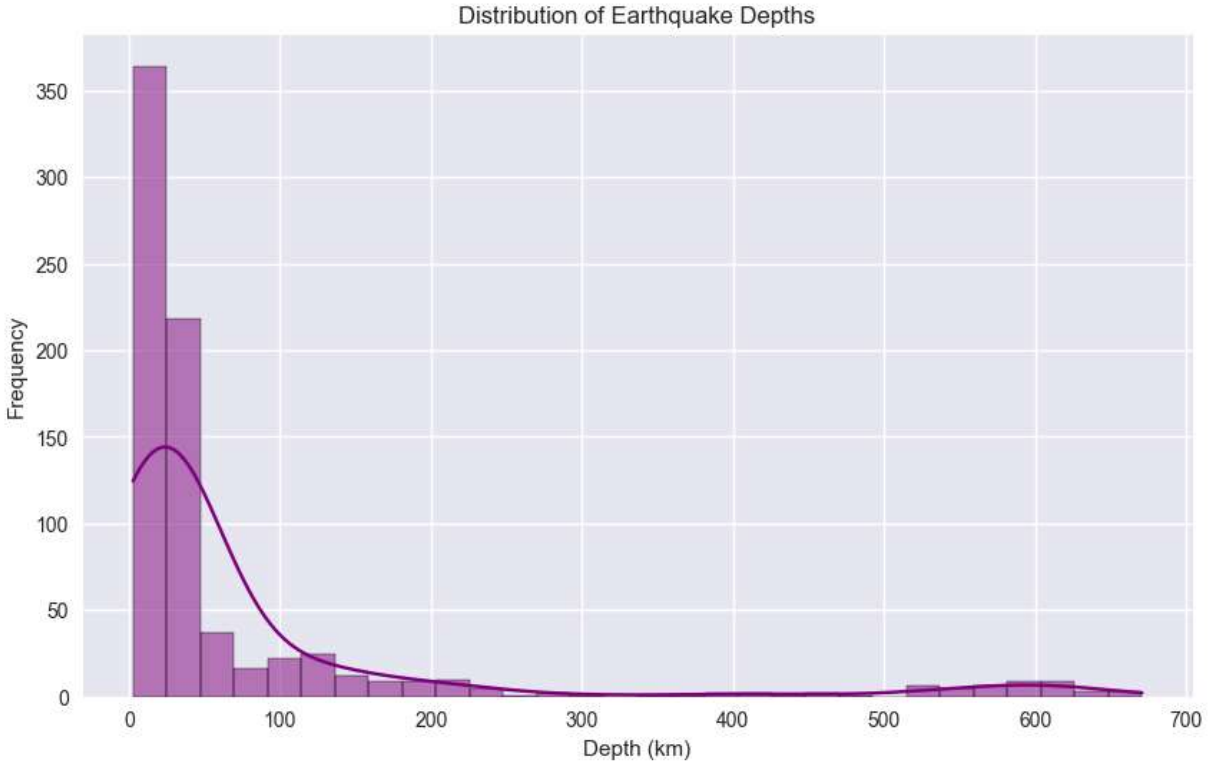
In [11]:
```
plt.figure()
df.groupby('Year')['magnitude'].mean().plot(marker='o', color='teal')
plt.title("Average Magnitude of Earthquakes per Year")
plt.xlabel("Year")
plt.ylabel("Average Magnitude")
plt.grid(True)
plt.show()
```



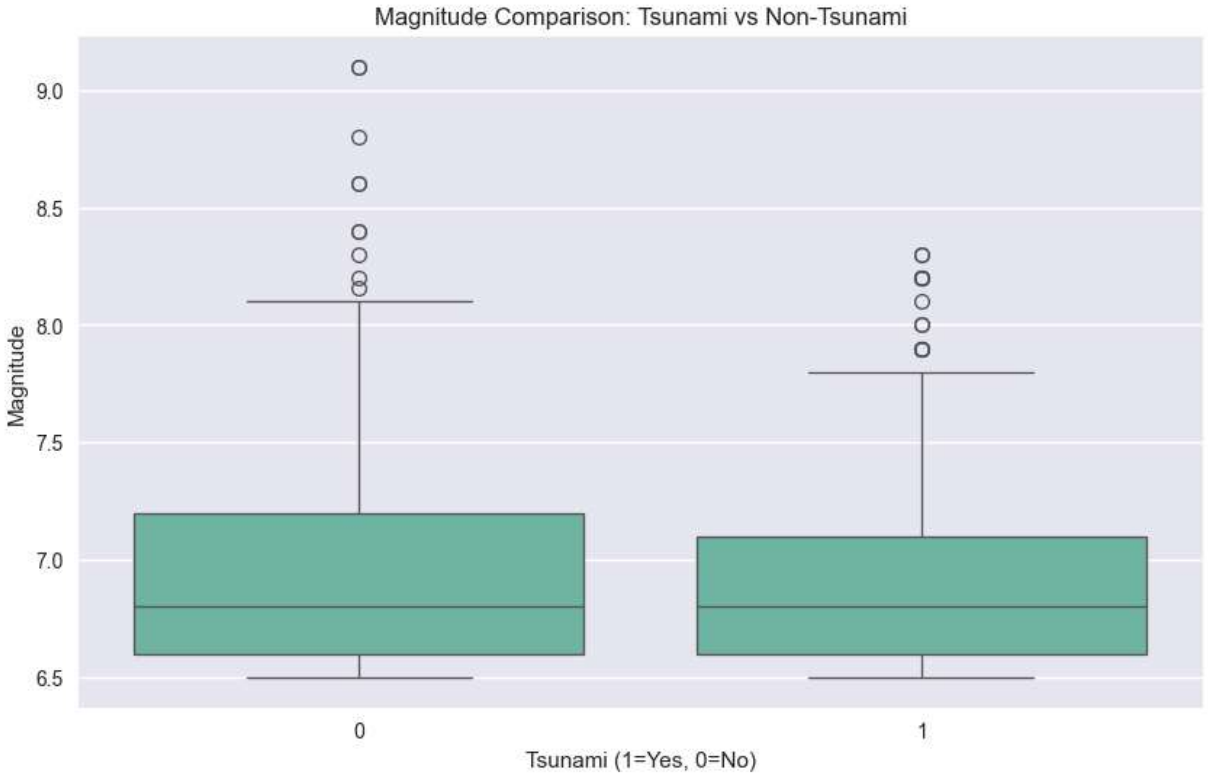
In [12]:
```
plt.figure()
sns.histplot(df['magnitude'], bins=30, kde=True, color='orange')
plt.title("Distribution of Earthquake Magnitudes")
plt.xlabel("Magnitude")
plt.ylabel("Frequency")
plt.show()
```



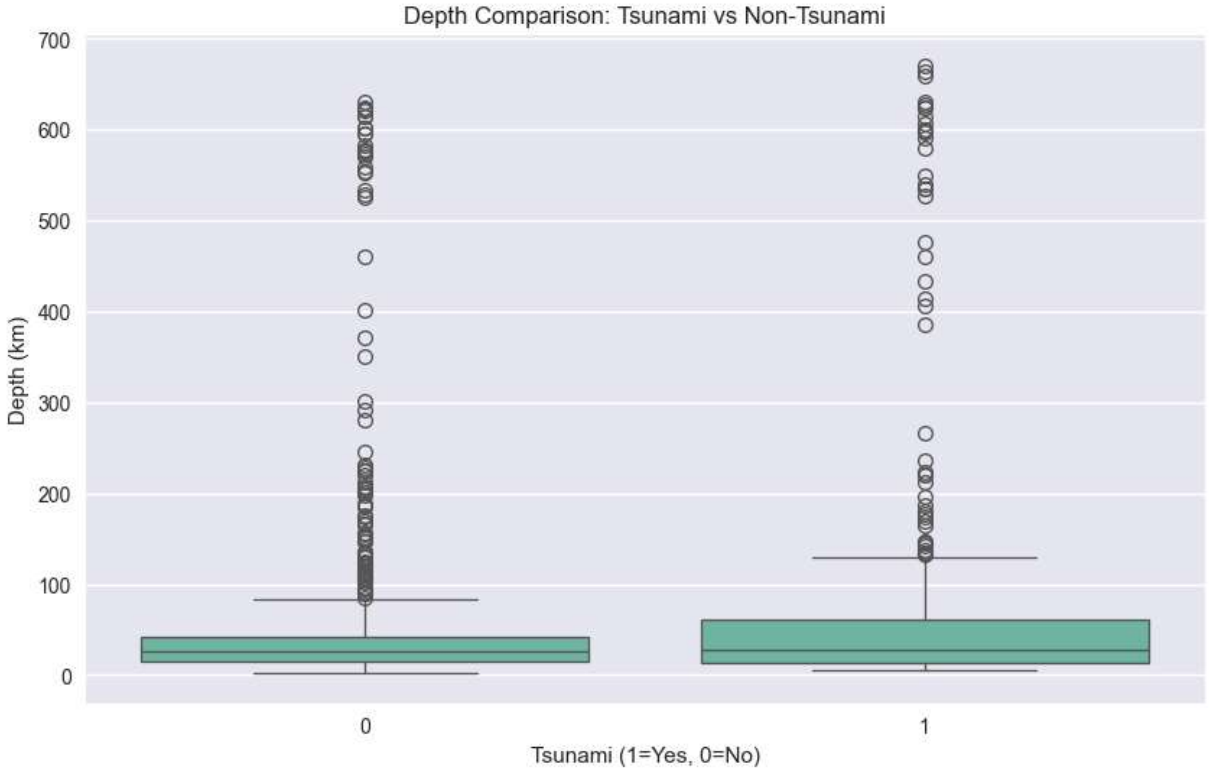
In [13]:
```
plt.figure()
sns.histplot(df['depth'], bins=30, kde=True, color='purple')
plt.title("Distribution of Earthquake Depths")
plt.xlabel("Depth (km)")
plt.ylabel("Frequency")
plt.show()
```



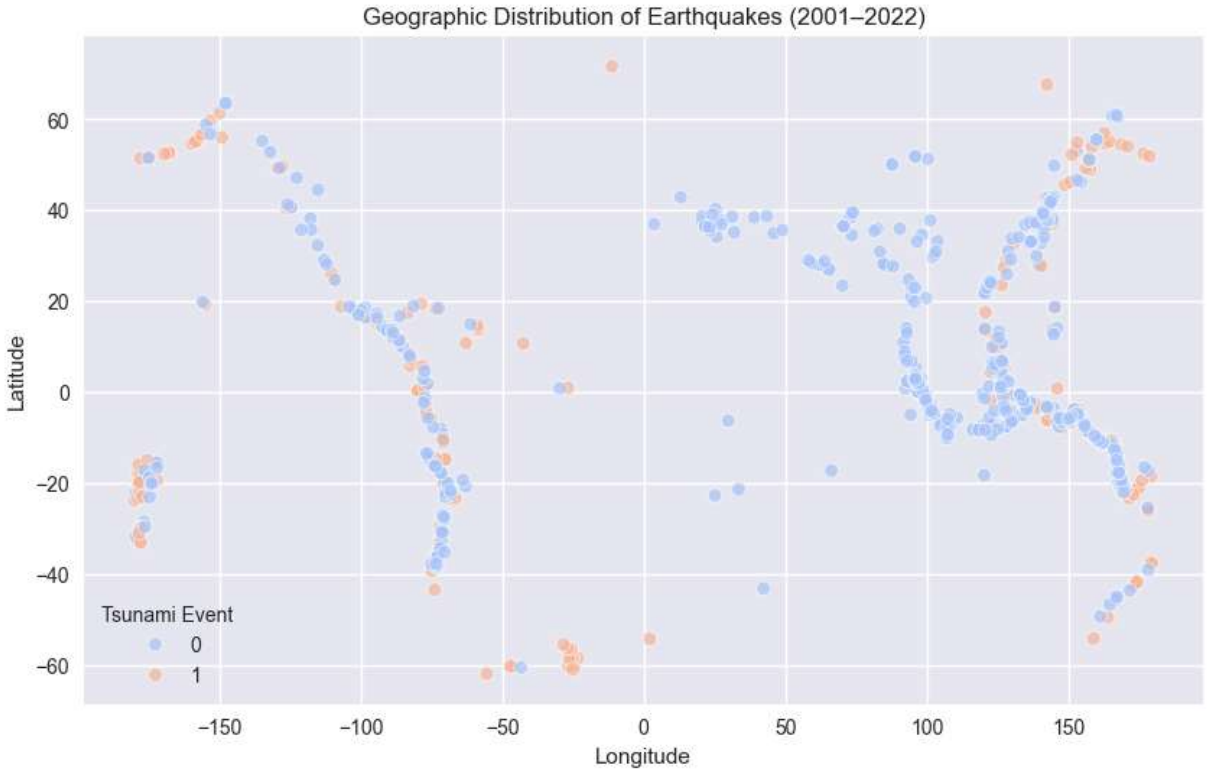
In [14]:
```
plt.figure()
sns.boxplot(x='tsunami', y='magnitude', data=df)
plt.title("Magnitude Comparison: Tsunami vs Non-Tsunami")
plt.xlabel("Tsunami (1=Yes, 0=No)")
plt.ylabel("Magnitude")
plt.show()
```



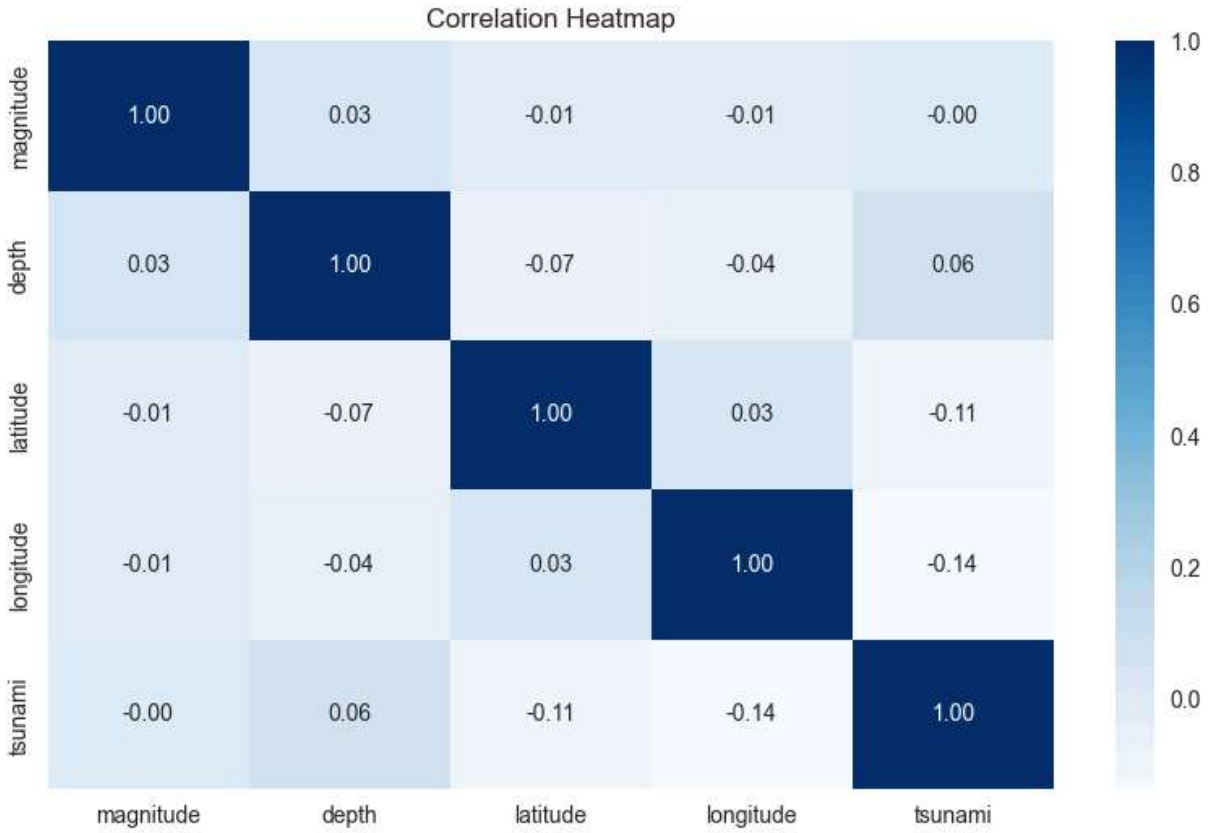
In [15]:
```
plt.figure()
sns.boxplot(x='tsunami', y='depth', data=df)
plt.title("Depth Comparison: Tsunami vs Non-Tsunami")
plt.xlabel("Tsunami (1=Yes, 0=No)")
plt.ylabel("Depth (km)")
plt.show()
```



In [17]:
```
plt.figure()
sns.scatterplot(x='longitude', y='latitude', data=df, hue='tsunami', palette='coolw
plt.title("Geographic Distribution of Earthquakes (2001-2022)")
plt.xlabel("Longitude")
plt.ylabel("Latitude")
plt.legend(title="Tsunami Event")
plt.show()
```



In [18]:
```
corr = df[['magnitude', 'depth', 'latitude', 'longitude', 'tsunami']].corr()
plt.figure()
sns.heatmap(corr, annot=True, cmap='Blues', fmt='.2f')
plt.title("Correlation Heatmap")
plt.show()
```

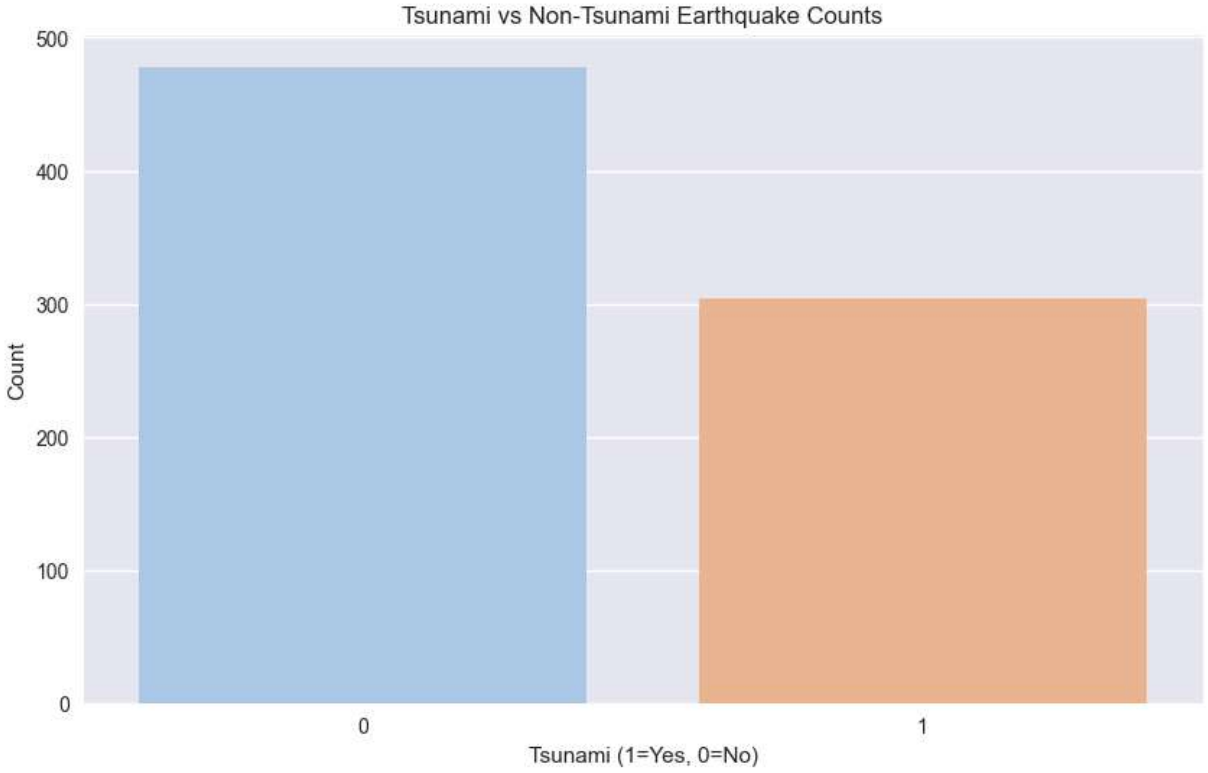


In [19]:
```
plt.figure()
sns.countplot(x='tsunami', data=df, palette='pastel')
plt.title("Tsunami vs Non-Tsunami Earthquake Counts")
plt.xlabel("Tsunami (1=Yes, 0=No)")
plt.ylabel("Count")
plt.show()
```

```
C:\Users\Avita\AppData\Local\Temp\ipykernel_9684\3323526106.py:2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.1
4.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

  sns.countplot(x='tsunami', data=df, palette='pastel')
```



In [ ]:
```
```