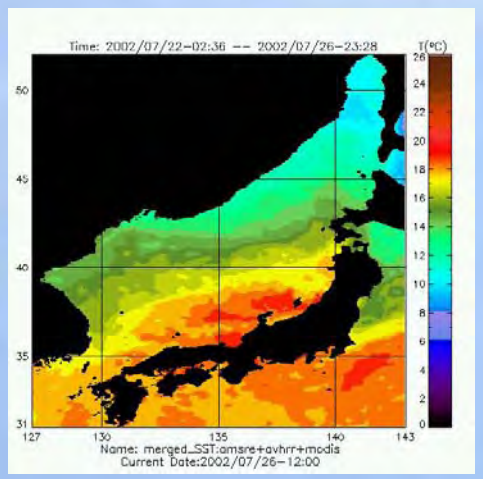
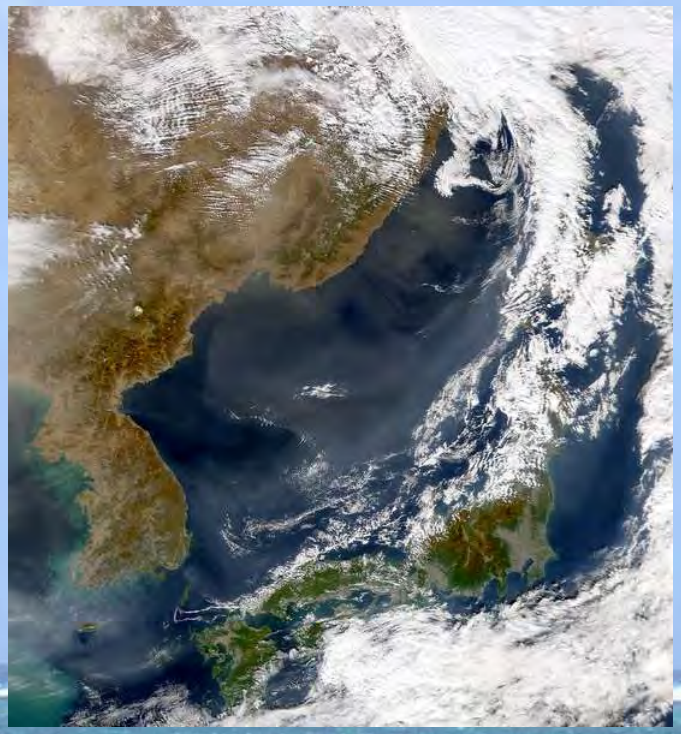
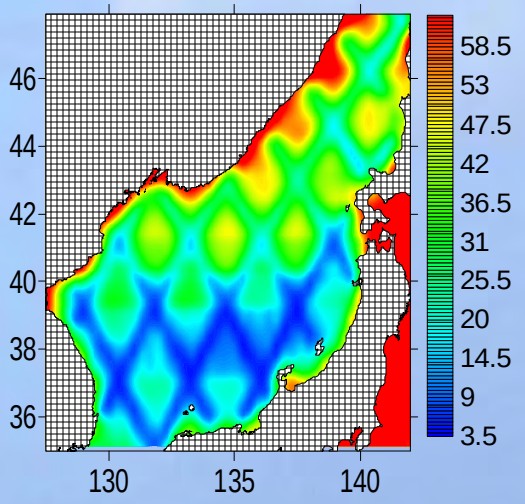
Effects of variability ‘separation’ for the northern Japan/East Sea obtained from satellite data







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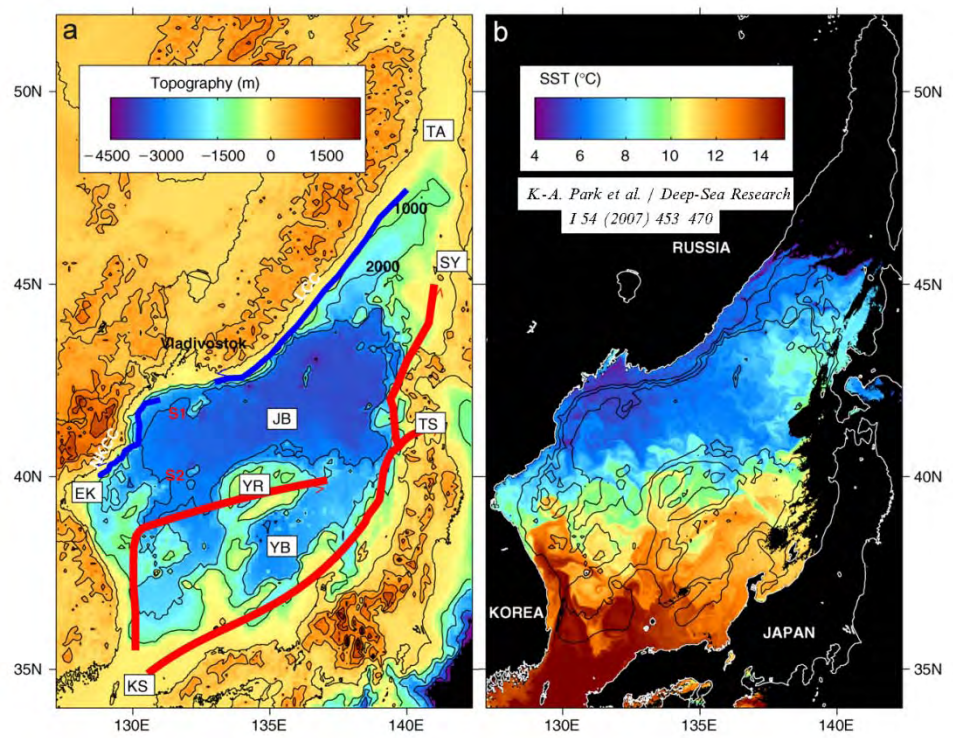
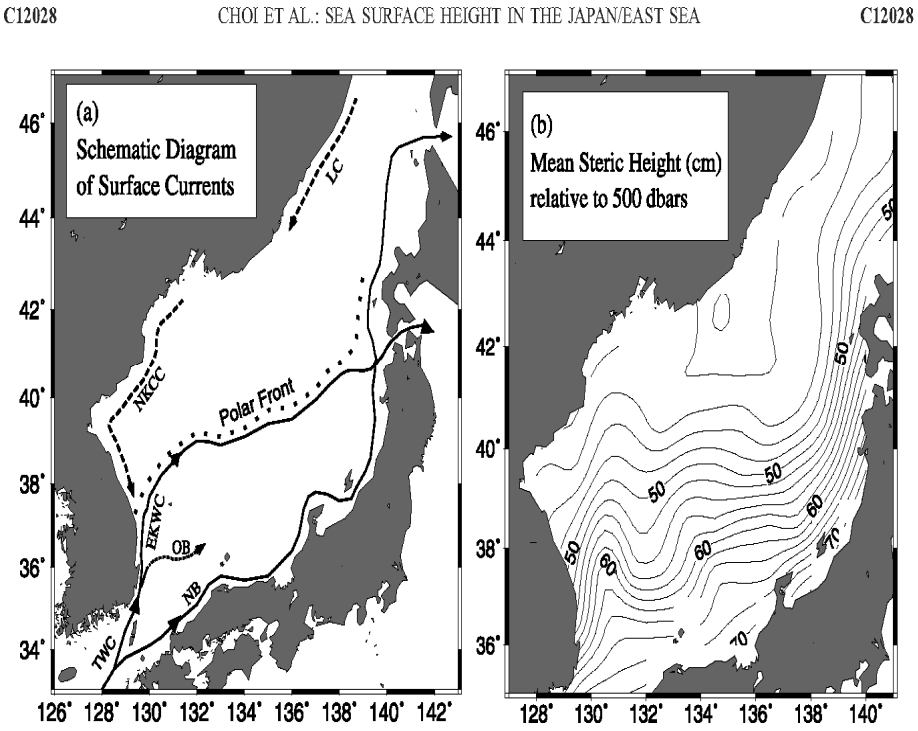
Contents

- Motivation: why and what those 3 domains?
- Data Description
- Methods of data processing and analysis
- Assessing East/Japan Sea domains SSH/SST variability
- Conclusions

Motivation

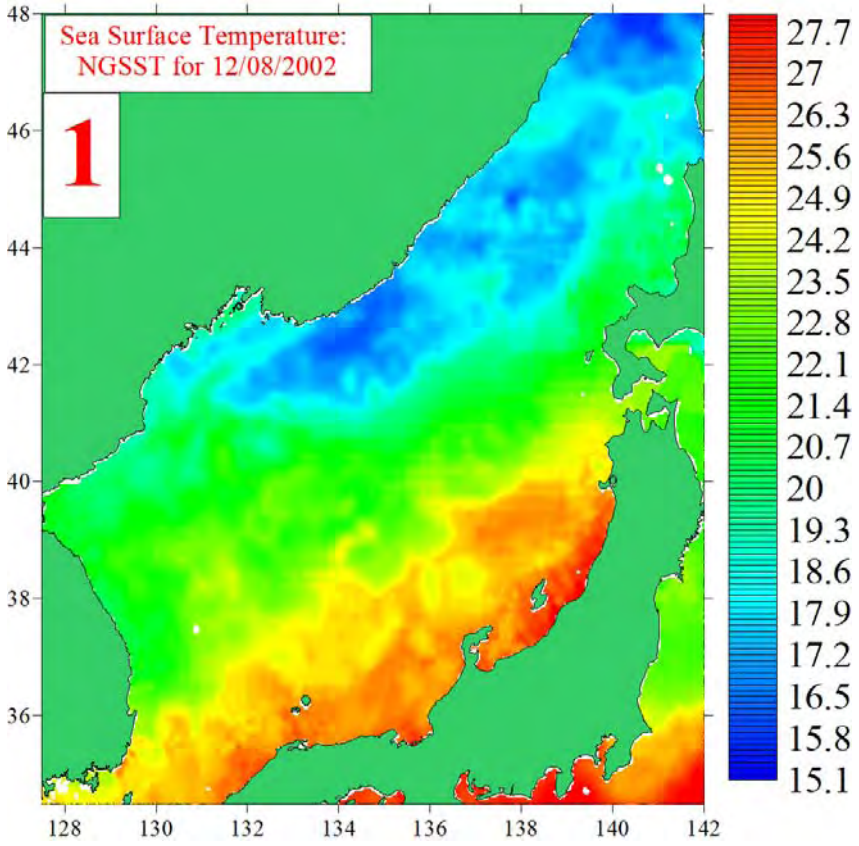


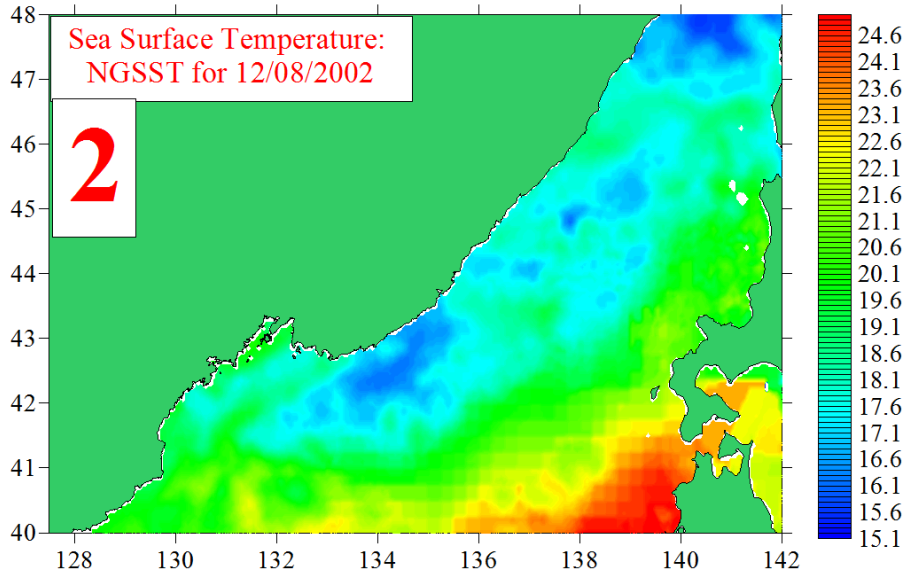


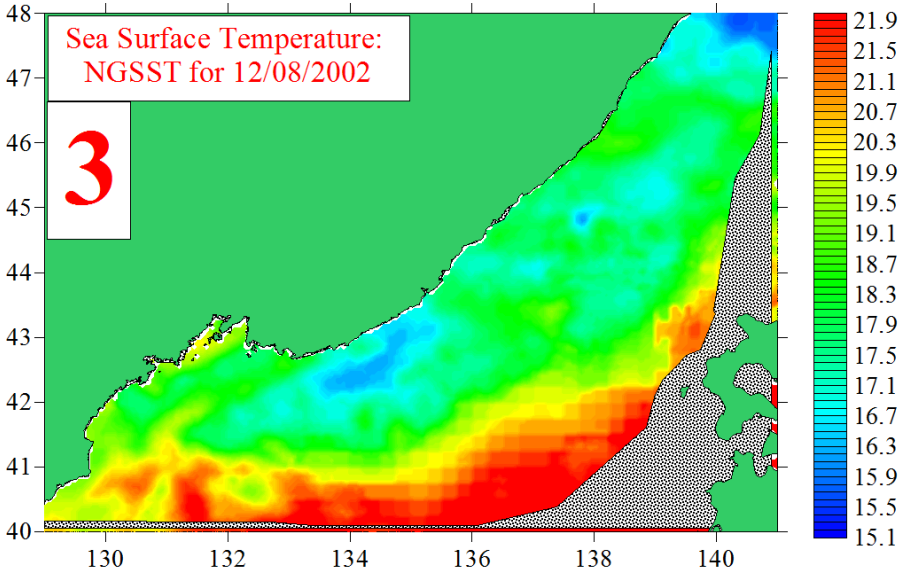
-East/Japan Sea parts situated in the subtropical and subpolar areas.

-Tsushima current goes through the whole sea.

Domains of JES for this study







Methods of data analysis

- **Used methods of analysis:**

- **Decompositon on Complex Empirical Orthogonal Functions (CEOF)**
- **Spectral analysis of principal components for timeseries of decomposition**
- **Correlation analysis of initial timeseries**

- **Applying of CEOF:**

- **Decomposition of initial SST-field z(x,y,t) in following form:**

$$\hat{z}(x,y,t) = z(x,y,t) + iz_t(x,y,t), \mathrm{i} \equiv \sqrt{-1} \quad (1)$$

$$\hat{z}(x,y,t) = \sum_n PC_n(t) S_n^*(x,y) \quad (2)$$

- **PC_n and $S_n(x,y)$ time and spatial components of initial field**

- **Subtracting of 1st mode to get rid of its variability (only SST):**

$$\hat{z}'(x,y,t) = \hat{z}(x,y,t) - PC_1(t) S_1^*(x,y) \quad (3).$$

Used Data

- Dataset I:

- Satellite data of DailySST JMA for North-Western part of Pacific, http://goos.kishou.go.jp/rrtdb-cgi/access/products/dailysst.cgi
- This dataset is based on Merged satellite and in-situ data Global Daily Sea Surface Temperature (MGDSST) belonged to Japan Metorological Agency (JMA)
- http://goos.kishou.go.jp/rrtdb-cgi/access/products/mgdsst.cgi
- Data period: 19 October 1993 yr. – present
- http://goos.kishou.go.jp/rrtdb/usr/pub/JMA/dailysst/
- Missed data is absent.

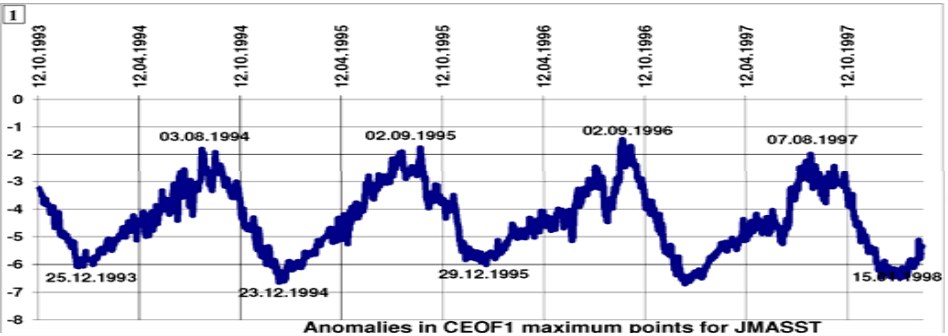
- Dataset II:

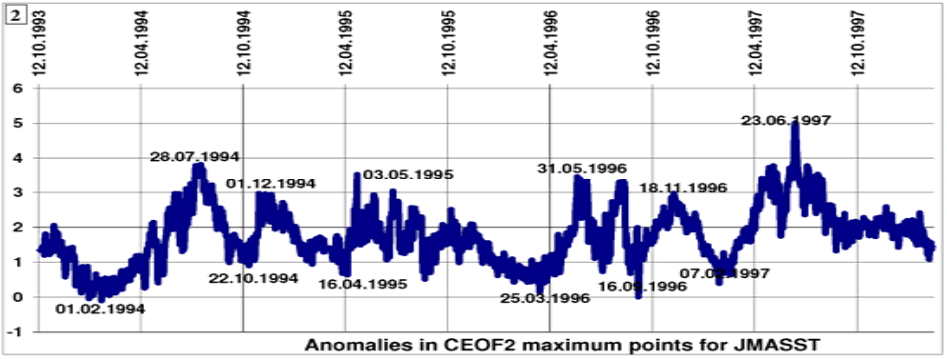
- archive of project AVISO от Space Oceanography Division of Collecte Localisation Satellites (CLS), Toulouse, France : ftp://ftp.cls.fr/pub/oceano/AVISO/ (weekly data with the 0.33° resolution)
- Time period- 1992/10/14-2008/01/13
- Data type: ***DT-MSLA*** **"Ref"** (“Reference” timeseries : homogenous data from two satellites (Topex/Poseidon, Jason-1 + ERS, Envisat) with the same trajectory. The variability is constant in time).

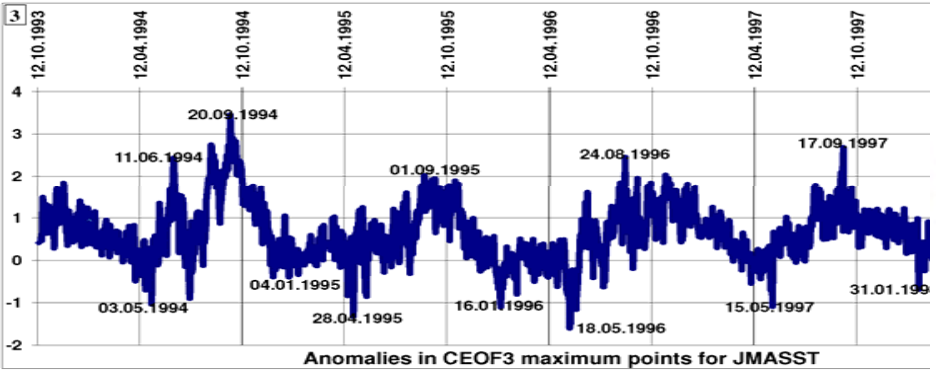
- Used period in work:

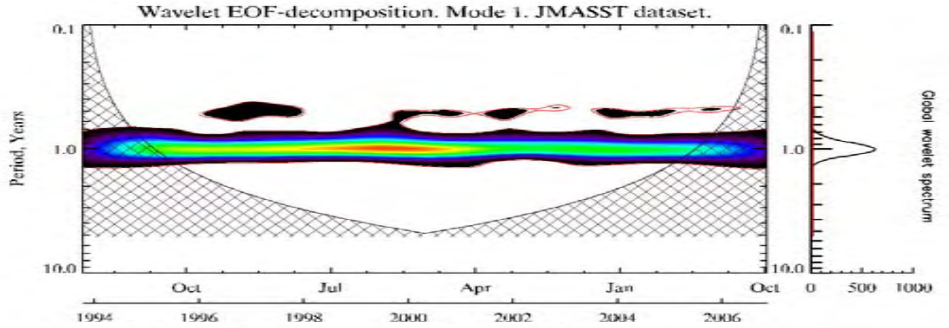
- 12.10.1993 – 11.08.2006 yr. (DailySST JMA)
- 1992/10/14-2008/01/13 (AVISO)

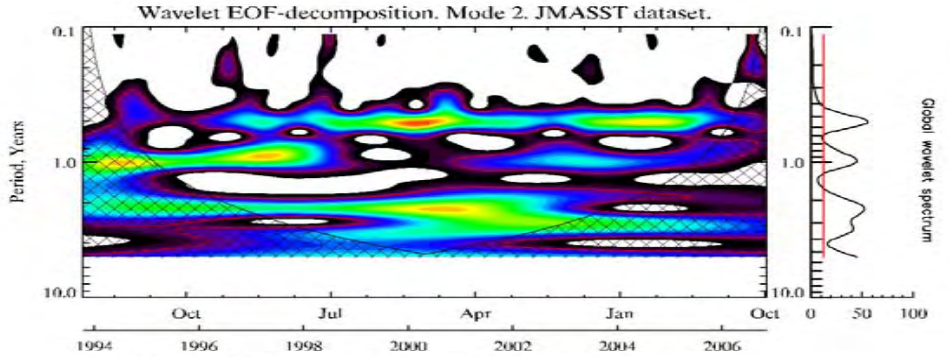
1st Domain - SST

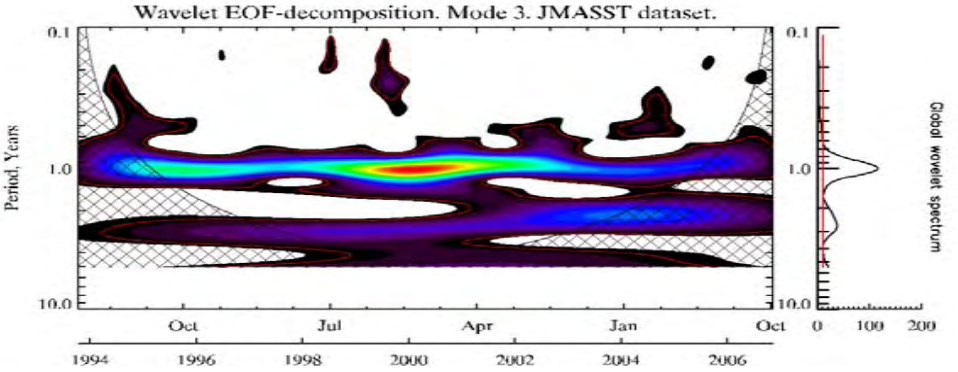




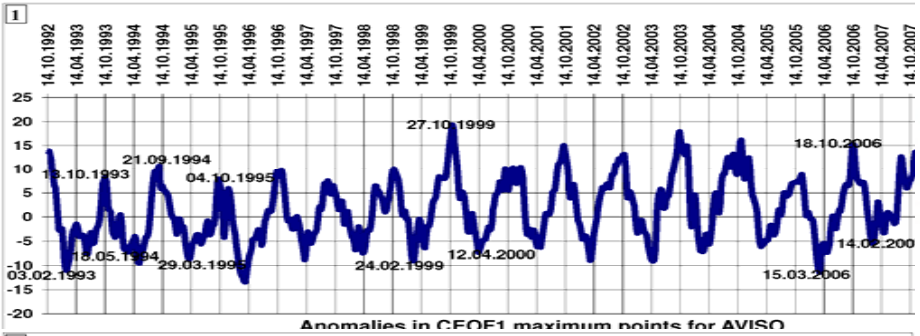


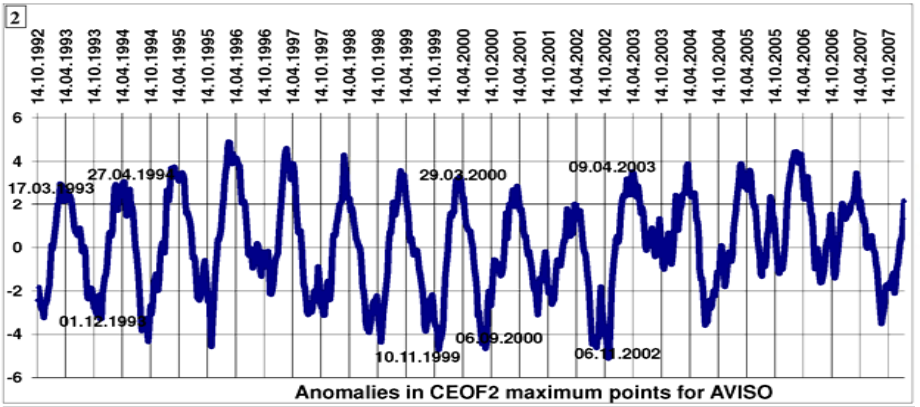


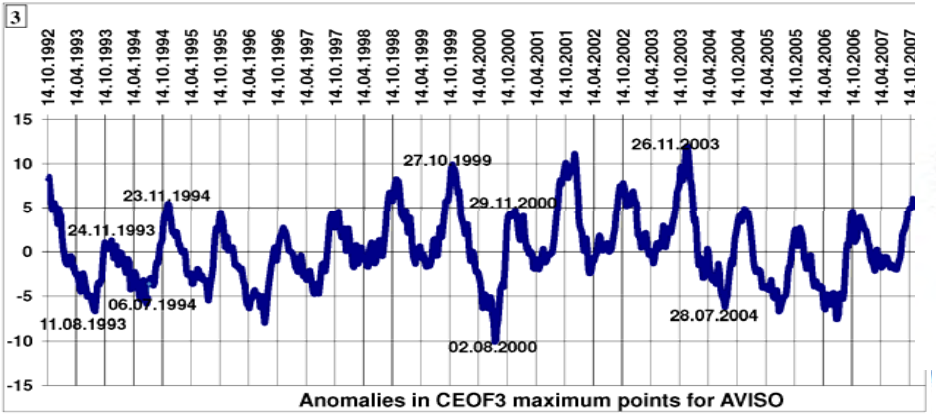


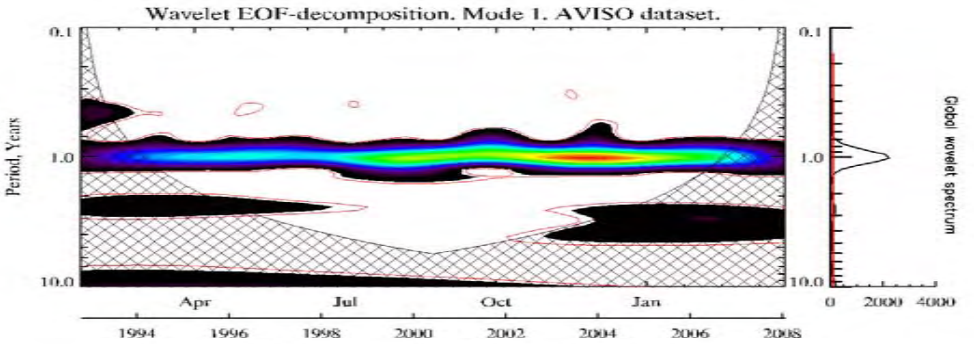


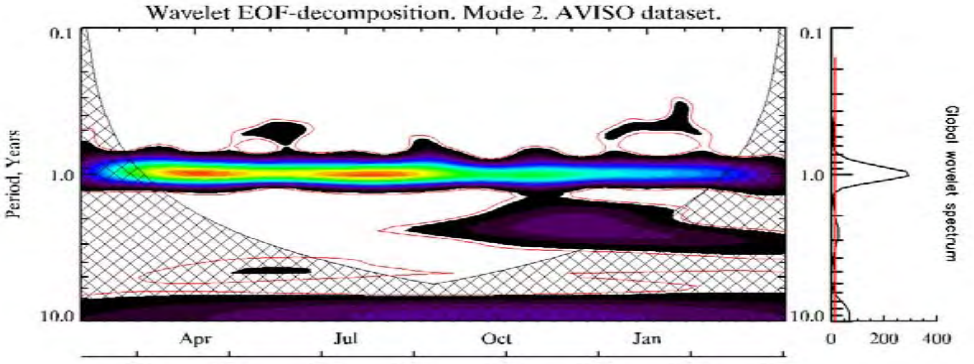
1st Domain - SSH

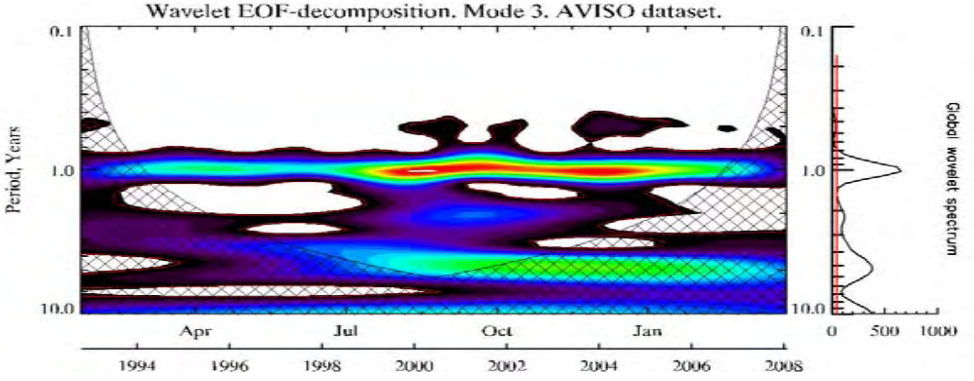




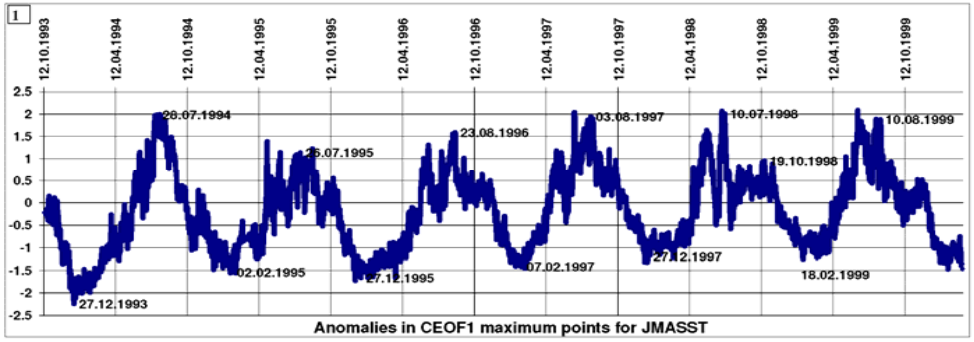


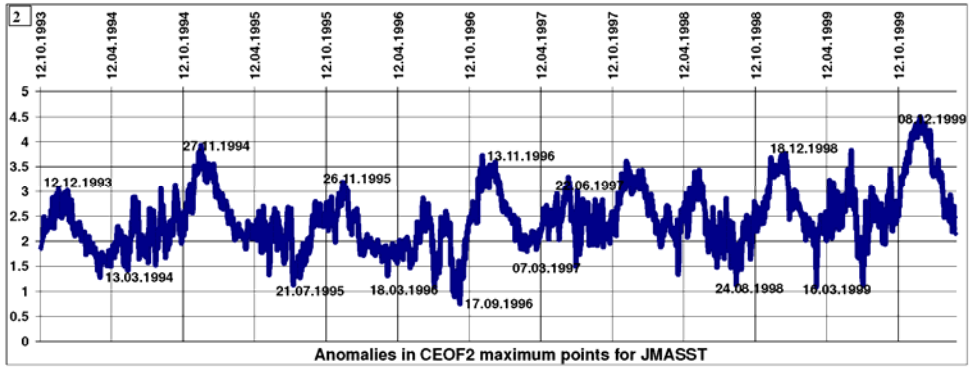


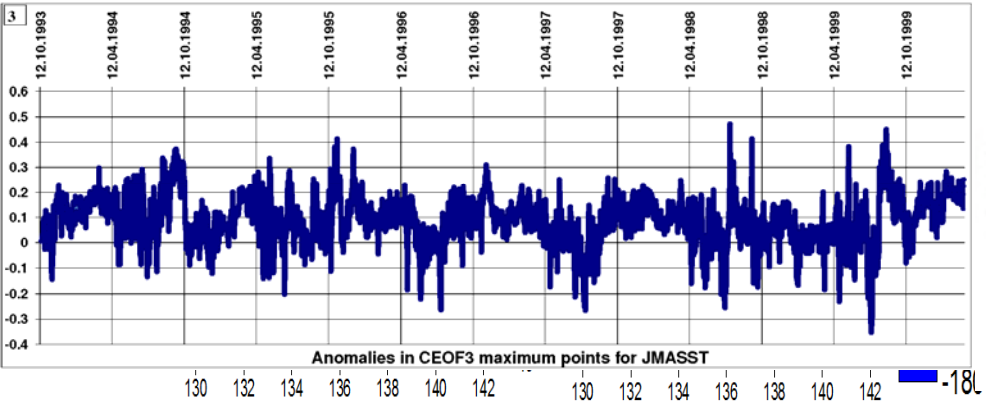


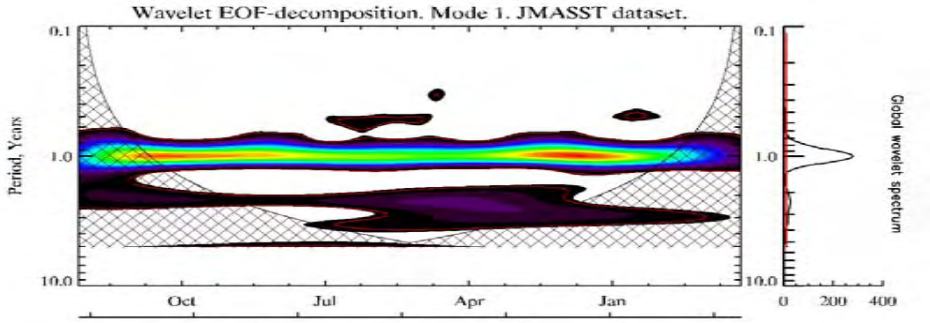


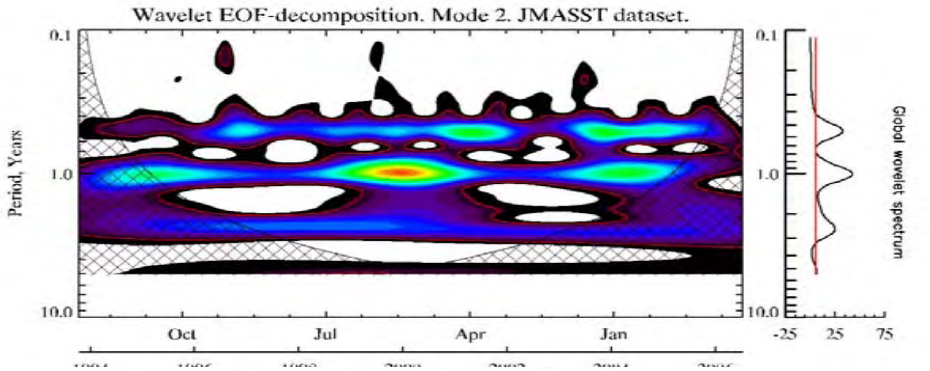
2nd Domain – SST Northern JES

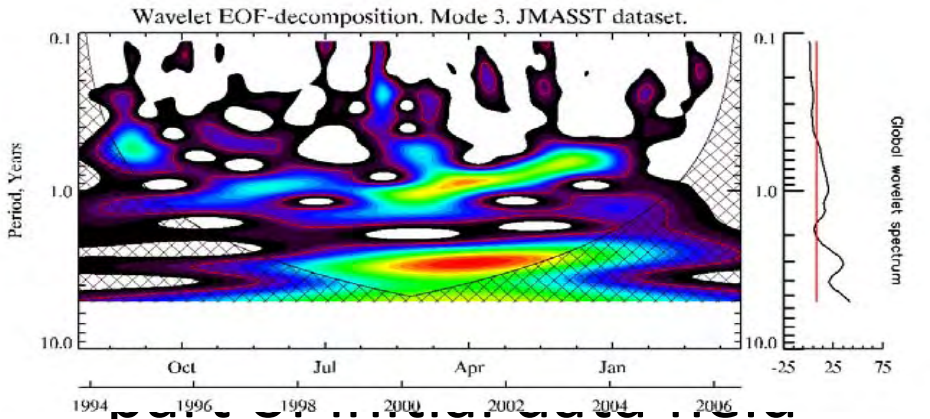




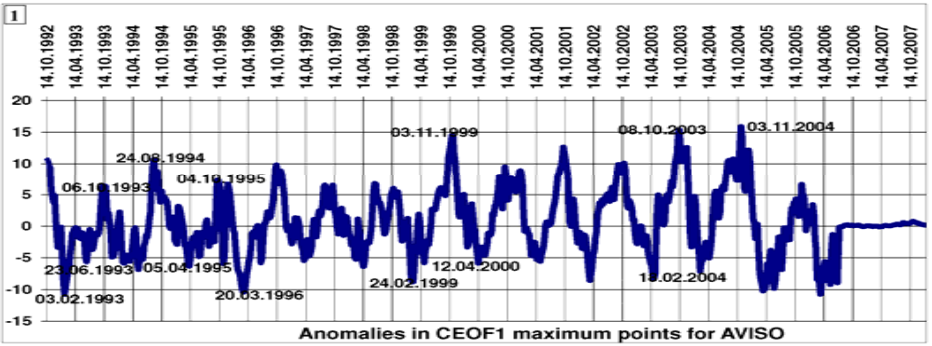


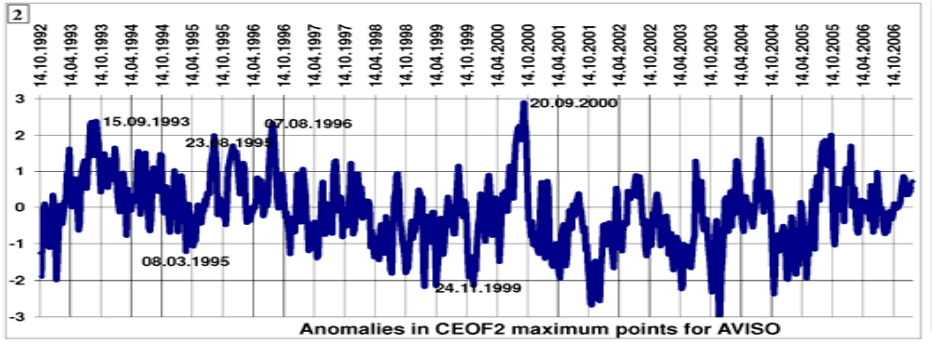


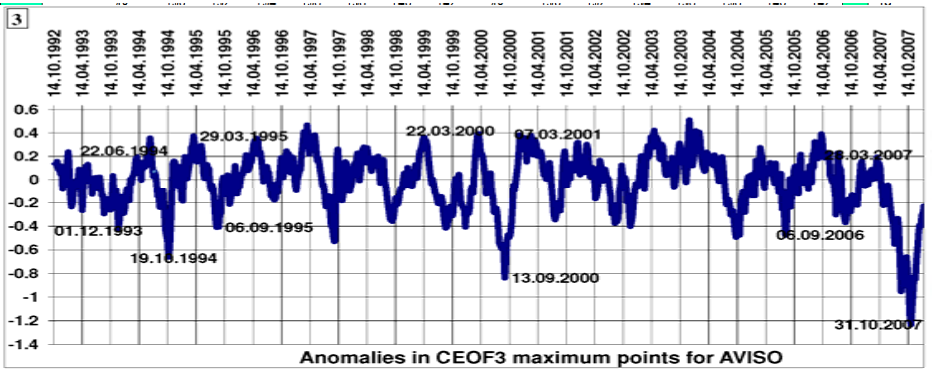


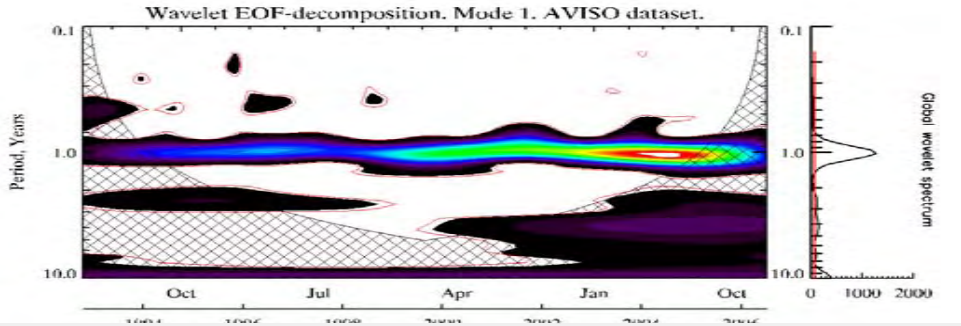


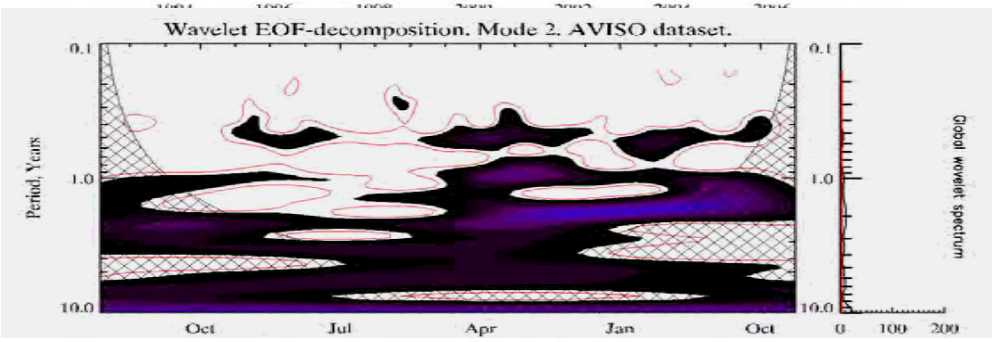
2nd Domain - SSH

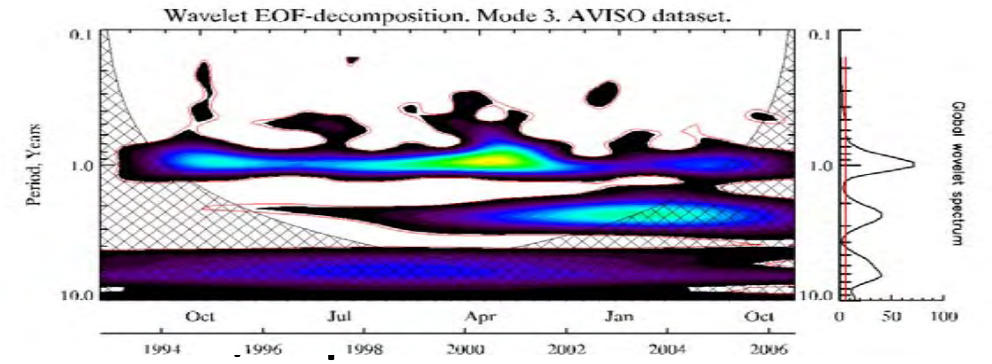






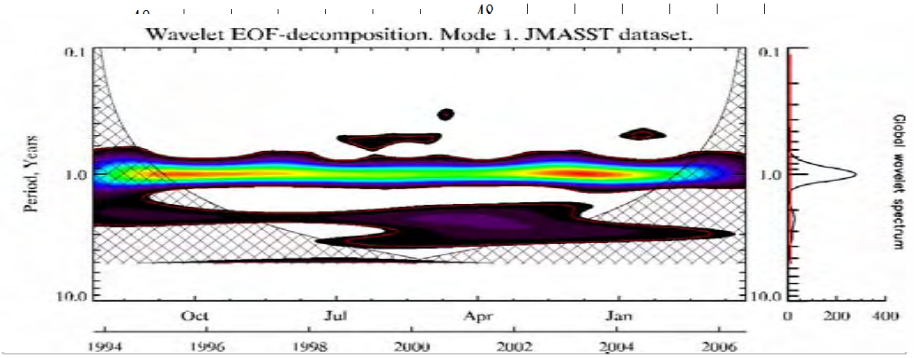


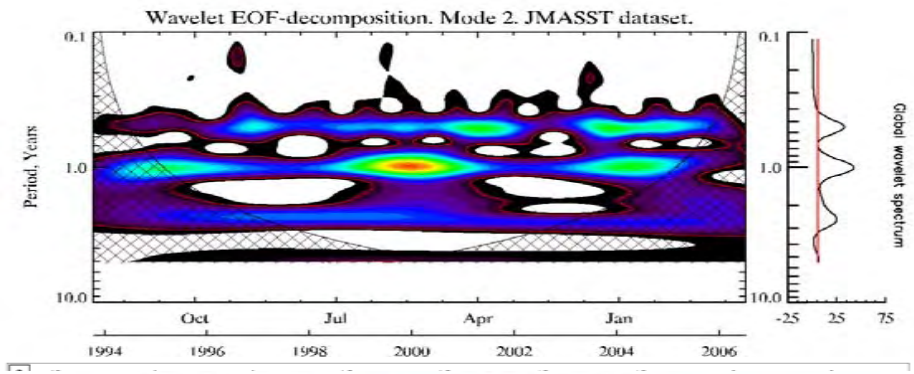


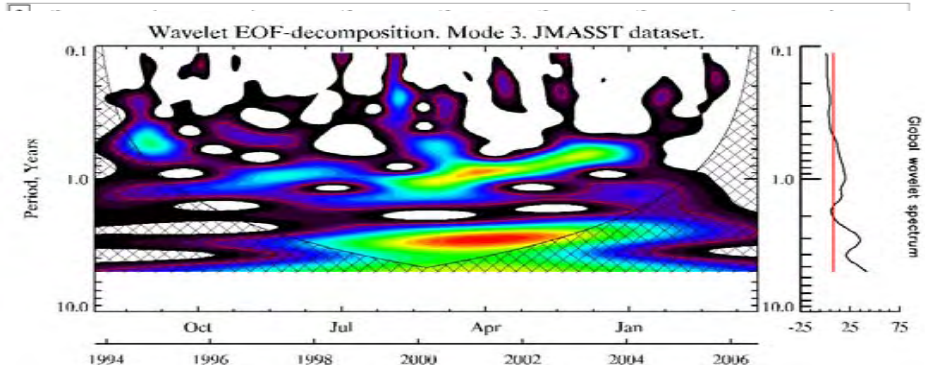


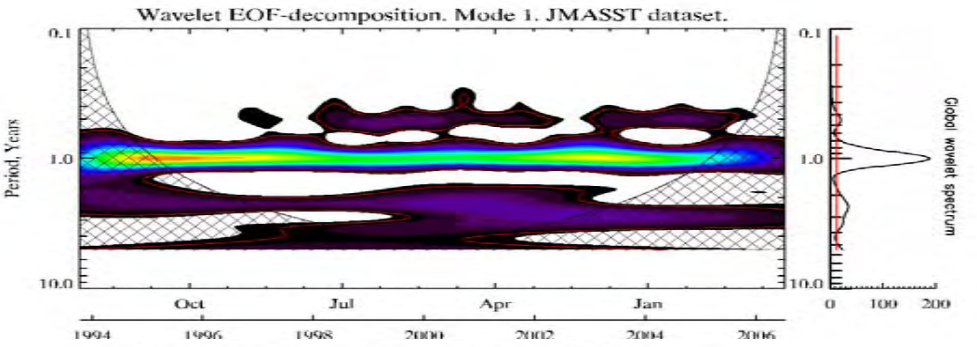
As for the case SST: separation by Subpolar front shows the difference in variability SSH

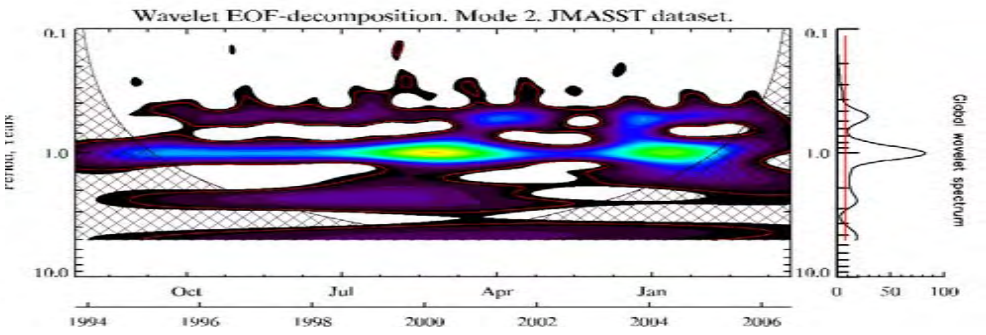
3rd Domain - SST

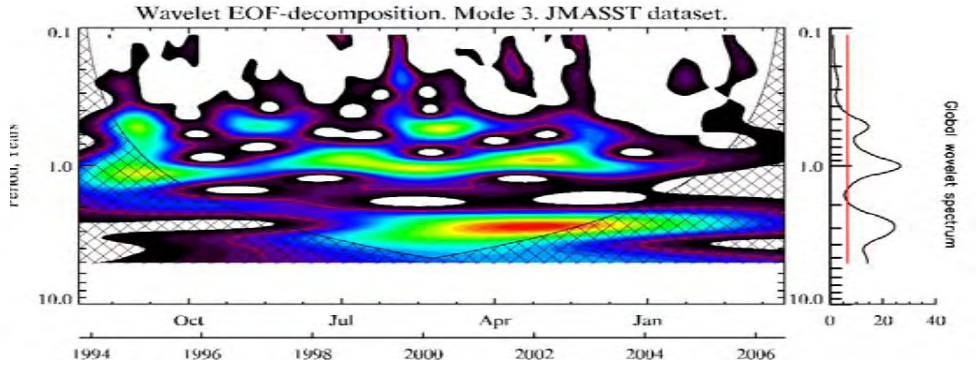




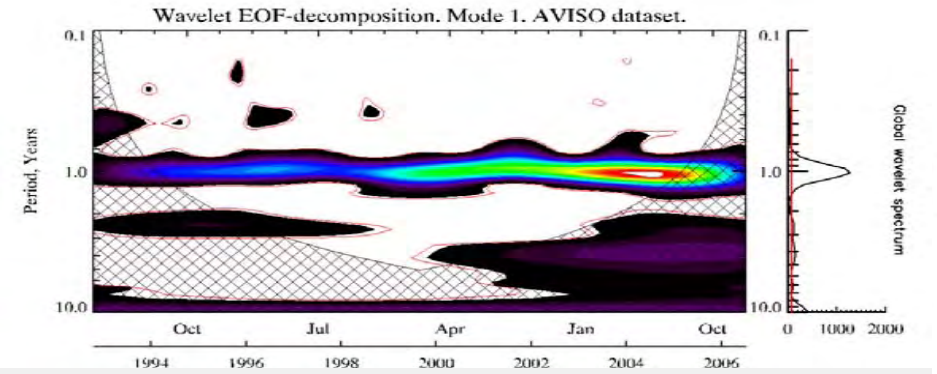


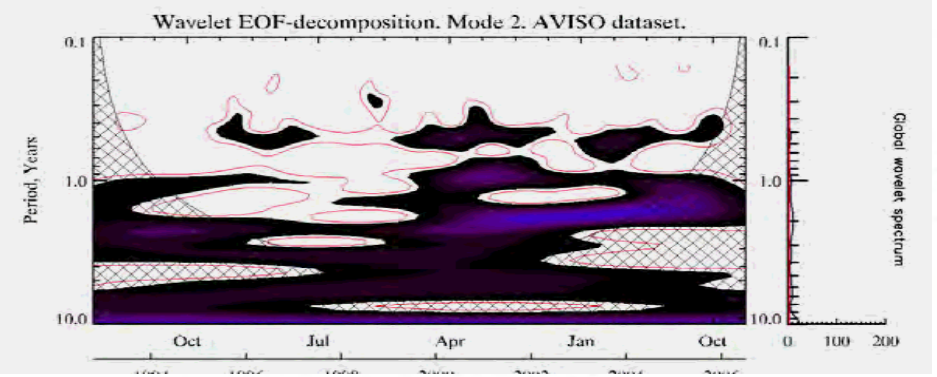


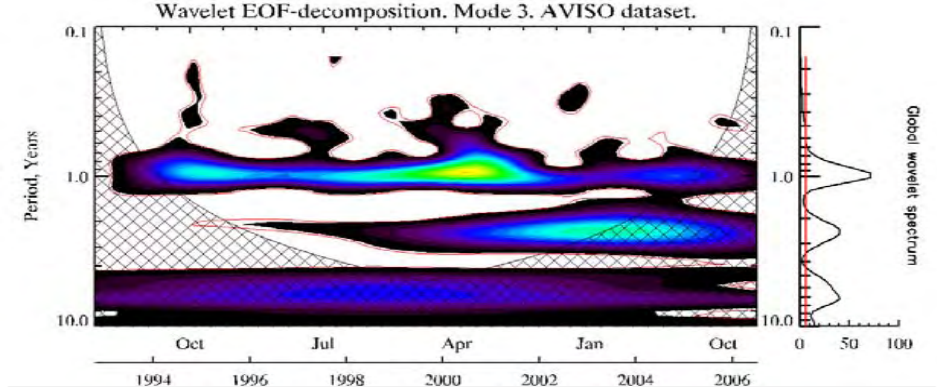


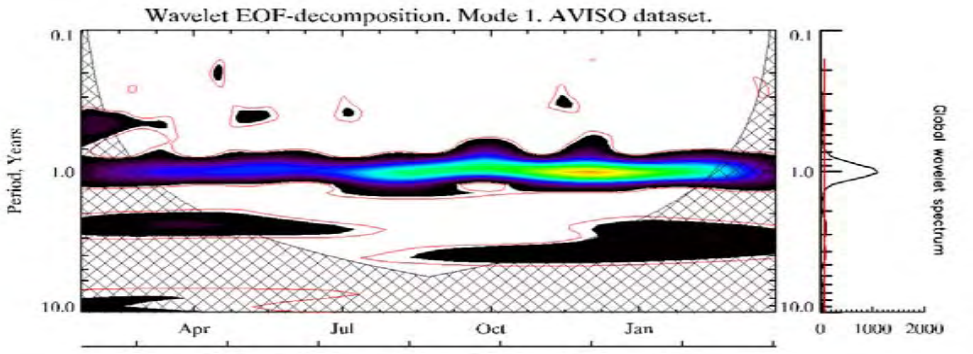


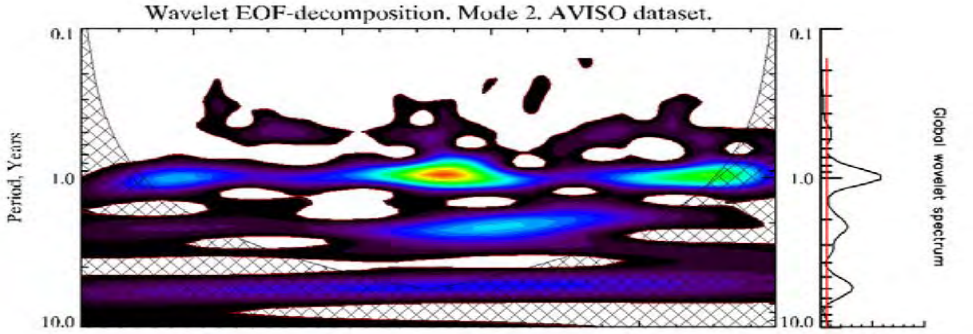
3rd Domain - SSH

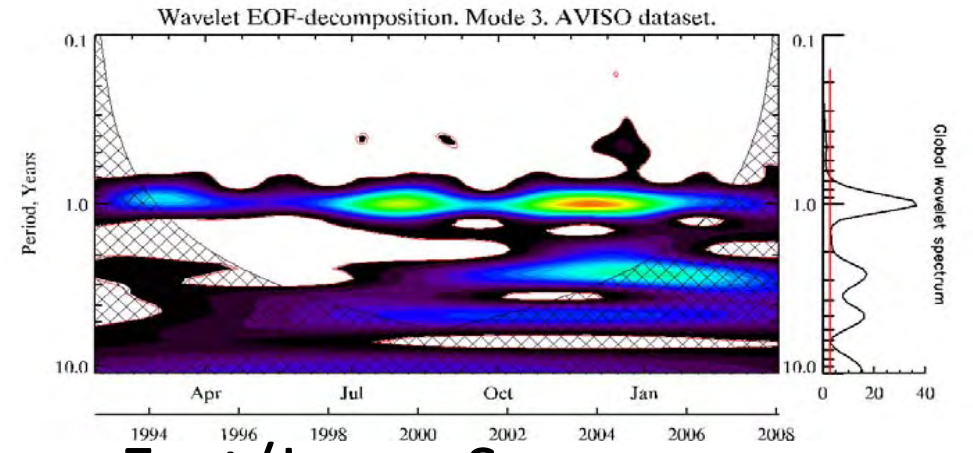












East/Japan Sea

Conclusions

- The separation of the data field can allow to see variability which is not seen for the whole data field.
- In case of East/Japan Sea separation of data for the SSH and SST by the subpolar front we obtain for the Northern part of sea some details of interaction Tsushima and Primorye current.
- Otherwise excluding from data of Northern part sea the region of Tsushima gives no variability separation, but helps to obtain more clear manifestation of local variability details.

감사 합니다!

Thank you for your attention!